SUPPLEMENT TO

AJOG American Journal of Obstetrics & Gynecology

The Gray Journal | JANUARY 2024 ■ Volume 230, Number 1S | Founded 1869

ajog.org

SMFM 2024 Pregnancy Meeting

February 10-14, 2024 | Gaylord National Resort & Convention Center | National Harbor, Maryland

AJOG *is the official journal of the*
Society for Maternal · Fetal Medicine

ISSN 0002-9378

ELSEVIER

ajog.org

American Journal of Obstetrics & Gynecology

SUPPLEMENT TO JANUARY 2024 ■ Volume 230, Number 1S ■ Pages S1-S624

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AJOG American Journal of Obstetrics & Gynecology

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SMFM 2024 Pregnancy Meeting

SMFM2024 PREGNANCY MEETING™

Postgraduate courses and scientific and clinical meeting

Society for Maternal-Fetal Medicine

February 10–11, 2024
Gaylord National Resort & Convention Center
National Harbor, Maryland

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All abstract presentations take place at the Gaylord National Resort and Convention Center

Schedule of oral presentations 5A

MONDAY, February 12

3:15 PM–3:45 PM — **Opening Addresses from Program Chair & President; Honorary, Lifetime Achievement, and President's Awards**

3:45 PM–6:00 PM — **Oral Plenary Session I and Late Breaking**
Abstracts 1-8, and LB1 | *Potomac Ballroom* S1

TUESDAY, February 13

7:00 AM–7:30 AM — **Foundation for SMFM Chair Address**
Potomac Ballroom, Ballroom Level

7:30 AM–8:00 AM — **Keynote Address by Secretary Xavier Becerra**
Potomac Ballroom, Ballroom Level

8:00 AM–10:30 AM — **Oral Plenary Session II - Fellows Plenary and Late-Breaking**
Abstracts 9-16 | *Third Floor* S7

10:30 AM–12:00 PM — **Poster Session I**
Abstracts 95-369 | *Exhibit Hall* S70

1:30 PM–3:30 PM — **Oral Concurrent Sessions**

Session 1 Prematurity
Abstracts 17-24 | *Potomac Ballroom AB* S14

Session 2 Diabetes
Abstracts 25-32 | *Potomac Ballroom C* S20

Session 3 Basic Science
Abstracts 33-40 | *Potomac Ballroom D* S26

3:30 PM–5:00 PM — **Poster Session II**
Abstracts 370-643 | *Exhibit Hall* S208

(continued on page 3A)

SMFM 2025 Pregnancy Meeting™

January 27-February 1, 2025
Gaylord Rockies Resort and Convention Center
Aurora, CO

SMFM 2026 Pregnancy Meeting™

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Caesars Forum
Las Vegas, NV

SMFM 2027 Pregnancy Meeting™

March 21-26, 2027
Gaylord National Harbor
National Harbor, MD

SMFM 2028 Pregnancy Meeting™

April 23-28, 2028
Caesars Forum
Las Vegas, NV

WEDNESDAY, February 14

8:30 AM–10:00 AM Poster Session III
Abstracts 644-918 | *Exhibit Hall* S348

10:00 AM–12:00 PM Oral Concurrent Sessions

Session 4 Hypertension
Abstracts 41-48 | *Potomac Ballroom AB* S32

Session 5 Medical & Surgical Complications
Abstracts 49-56 | *Potomac Ballroom C* S38

Session 6 Quality, Equity & Public Health
Abstracts 57-64 | *Potomac Ballroom D* S44

1:00 PM–2:30 PM Poster Session IV
Abstracts 919-1193 | *Exhibit Hall* S487

3:00 PM–5:30 PM Oral Concurrent Sessions

Session 7 Clinical Obstetrics & Postpartum
Abstracts 65-74 | *Potomac Ballroom AB* S50

Session 8 Labor & Delivery
Abstracts 75-84 | *Potomac Ballroom C* S57

Session 9 Fetal US Genetics
Abstracts 85-94 | *Potomac Ballroom D* S64

5:30 PM–6:00 PM Awards Ceremony and Passing of Gavel
Potomac Ballroom AB A4

Topic Index A15
Author Index A17
Institutional Index A35

Congratulations to Our Abstract Awards Winners

Bruce A. Work Award for Best Research by a Practicing or Training Maternal-Fetal Medicine Physician outside of the US

72: Increased risk of postpartum hemorrhage in women with resolved low placentation: a multicenter prospective study

Ornaghi Sara, MD, PhD

Disparities Award for Best Research on Diversity/Disparity in Health Outcomes

64: Exploring Black birthing people's perspectives on racial concordance with obstetric care providers

E. Nicole Teal, MD, MPH

Dru Carlson Memorial Award for Best Research in Ultrasound and Genetics

1: Multicenter, prospective cohort of genome sequencing in 750 fetal structural anomalies

Ronald J. Wapner, MD

Norman F. Gant Award for Best Research in Maternal Medicine

42: Clinical Outcomes Following Remote Hypertension Monitoring Program for Postpartum Individuals with Hypertensive Disorders of Pregnancy

Lara S. Lemon, PhD, PharmD

Best Abstract in Fetal Therapy Award *supported by NAFTNet in memory of Elizabeth Thom*

11: Donor velamentous cord insertion: an omen for poor laser outcomes?

Christy Gandhi, MD

MONDAY, February 12, 2024 • 3:45 PM - 6:00 PM

Time	Abstract	Oral Plenary Session I and Late-Breaking
3:45 PM	1	**Multicenter, prospective cohort of genome sequencing in 750 fetal structural anomalies** **Ronald J. Wapner**[1]; Jessica L. Giordano[2]; Jessica de Voest[3]; Kelly L. Gilmore[4]; Lauren Westerfield[5]; Alexandra Tinfow[6]; Stephanie Galloway[2]; Leandra Tolusso[7]; Beatrix Wong[8]; Farrah Jackson[7]; Grant Bonesteele[5]; Theresa Wittman[9]; Blair Stevens[10]; Samantha Stover[11]; Anthony Johnson[12]; Nancy Doan Leslie[7]; Daniel Swarr[7]; Aaron B. Caughey[13]; Wendy Chung[14]; Rebecca Clifton[15]; Ignatia B. Van den Veyver[16]; Neeta L. Vora[4] [1]Columbia University Irving Medical Center, New York, NY; [2]Columbia University, New York, NY; [3]George Washington University, Rochester, MD; [4]University of North Carolina at Chapel Hill, Chapel Hill, NC; [5]Baylor College of Medicine and Texas Children's Hospital, Houston, TX; [6]Columbia University, New York City, NY; [7]Cincinnati Children's Hospital Medical Center, Cincinnati, OH; [8]Cincinnati Children's Hospital, Cincinnati, OH; [9]UT Health, Houston, TX; [10]UTPhysicians, Houston, TX; [11]Texas Children's Hospital, Houston, TX; [12]McGovern Medical School at UTHealth Houston, Houston, TX; [13]Oregon Health & Science University, Portland, OR; [14]Harvard and Boston Children's Hospital, Boston, MA; [15]George Washington University, Washington, DC; [16]Baylor College of Medicine, Houston, TX
4:00 PM	2	**Association between HDP and GDM and Child Cardiovascular Health in Early Adolescence** **Kartik Kailas Venkatesh**[1]; Amanda Perak[2]; Sadiya S. Khan[3]; Jiqiang Wu[4]; Patrick Catalano[5]; Mark B. Landon[6]; Denise Scholtens[2]; William Lowe[2]; William A. Grobman[1] [1]The Ohio State University, Columbus, OH; [2]Northwestern University, Chicago, IL; [3]Northwestern University Feinberg School of Medicine, Oak Park, IL; [4]Ohio State University, Columbus, OH; [5]Tufts Medical Center, Boston, MA; [6]The Ohio State University Wexner Medical Center, Columbus, OH
4:15 PM	3	**Evaluation of a more restrictive, heparin-based, obstetric thromboprophylaxis protocol** **Macie L. Champion**[1]; Christina T. Blanchard[2]; Anna Lively[1]; Morgan Jenkins[1]; Samantha E. Howell[1]; Grace M. Lee[1]; Brian M. Casey[1]; Akila Subramaniam[2] [1]University of Alabama at Birmingham, Birmingham, AL; [2]Center for Women's Reproductive Health, University of Alabama at Birmingham, Birmingham, AL
4:30 PM	4	**Cost-effectiveness of Azithromycin for the Prevention of Maternal Sepsis or Death in Planned Vaginal Births** Jackie Patterson[1]; Simon Neuwahl[2]; Janet Moore[3]; Elizabeth M. McClure[3]; Waldemar Carlo[4]; Melissa Buserman[5]; **Alan T. Tita**[6] [1]University of North Carolina at Chapel Hill, School of Medicine, Chapel Hill, NC; [2]RTI International, Atlanta, GA; [3]RTI International, Durham, NC; [4]Center for Women's Reproductive Health, University of Alabama at Birmingham, Birmingham, AL; [5]University of North Carolina at Chapel Hill, Chapel Hill, NC; [6]University of Alabama at Birmingham, Birmingham, AL; on behalf of the NICHD Global Network for Women's and Children's Health Research APLUS Trial.
4:45 PM	5	**Peripartum dapagliflozin improves late life cardiovascular outcomes in a mouse model of superimposed preeclampsia** **Ashley Hesson**[1]; Ajleeta Sangtani[1]; Elizabeth S. Langen[1]; Kristina Hunker[2]; Nitin Kumar[1]; Santhi K. Ganesh[2] [1]University of Michigan, Ann Arbor, MI; [2]Michigan Medicine, Ann Arbor, MI
5:00 PM	6	**Effect of supplemental oxygen for Category II resuscitation on oxidative stress: a randomized controlled trial** **Nandini Raghuraman**[1]; Fan Zhang[1]; Brianna Bradley[1]; Antonina I. Frolova[1]; Ebony B. Carter[2]; Jeannie C. Kelly[2]; Anthony O. Odibo[1]; Molly J. Stout[3]; D Michael Nelson[4]; Methodius G. Tuuli[5]; Alison G. Cahill[6] [1]Washington University School of Medicine in St. Louis, St. Louis, MO; [2]Washington University School of Medicine in St. Louis, Barnes Jewish Hospital, St. Louis, MO; [3]University of Michigan, Ann Arbor, MI; [4]Washington University in St. Louis, St. Louis, MO; [5]Women & Infants Hospital of Rhode Island, Warren Alpert Medical School of Brown University, Providence, RI; [6]University of Texas at Austin, Dell Medical School, Austin, TX
5:15 PM	7	**Association of Postpartum Oxytocin Dose and Postpartum Hemorrhage** **Ashley E. Shea**[1]; Candice Woolfolk[2]; Vasiliki B. Orfanakos[1]; Alison G. Cahill[3]; Methodius G. Tuuli[4]; Sindhu K. Srinivas[5]; George A. Macones[6]; Alan T. Tita[1]; Akila Subramaniam[7] [1]University of Alabama at Birmingham, Birmingham, AL; [2]Washington University School of Medicine in St. Louis, St. Louis, MO; [3]University of Texas at Austin, Dell Medical School, Austin, TX; [4]Women & Infants Hospital of Rhode Island, Warren Alpert Medical School of Brown University, Providence, RI; [5]Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA; [6]The University of Texas at Austin, Austin, TX; [7]Center for Women's Reproductive Health, University of Alabama at Birmingham, Birmingham, AL
5:30 PM	8	**A Randomized Controlled Trial (RCT) of Laser Surgery in Twin-Twin Transfusion Syndrome: The Sequential Trial** **Ramen H. Chmait**[1]; Arlyn Llanes[1]; Lisa M. Korst[2]; Kristine B. Rallo[1]; Andrew H. Chon[3]; Martha A. Monson[4]; Ruben A. Quintero[5] [1]University of Southern California, Los Angeles, CA; [2]Childbirth Research Associates, North Hollywood, CA; [3]Oregon Health & Science University, Portland, OR; [4]Intermountain Healthcare, Salt Lake City, UT; [5]USFetus Research Consortium, Coral Gables, FL, on behalf of USFetus.
5:45 PM	LB01	**Development of post-acute sequelae of SARS-CoV-2 (PASC) after infection in pregnancy: NIH RECOVER-Pregnancy Cohort** **Torri D. Metz**[1]; Harrison Reeder[2]; Rebecca G. Clifton[3]; Valerie Flaherman[4]; Leyna V. Aragon[5]; Leah Castro Baucom[6]; Alexis Braverman[7]; Tingyi Cao[2]; Jodie A. Dionne[8]; Andrea S. Foulkes[2]; Rachel S. Gross[9]; Jenny Han[10]; Rachel Hess[1]; Leora I. Horwitz[9]; Xiaolin Jia[11]; Minal Kale[12]; Alem Mehari[13]; Jonathan S. Monteiro[2]; Deepti Pant[2]; Patrick S. Ramsey[14]; Vanessa Jacoby[4] [1]University of Utah Health, Salt Lake City, UT; [2]Massachusetts General Hospital, Boston, MA; [3]George Washington University, ROCKVILLE, MD; [4]University of California at San Francisco, San Francisco, CA; [5]University of New Mexico, Albuquerque, NM; [6]RECOVER Patient, Caregiver, or Community Advocate Representative, New York, NY; [7]University of Illinois Chicago, Chicago, IL; [8]Department of Medicine, Division of Infectious Diseases, University of Alabama at Birmingham, BIRMINGHAM, AL; [9]New York University Grossman School of Medicine, New York, NY; [10]Emory University, Atlanta, GA; [11]Stanford University, Palo Alto, CA; [12]Mount Sinai Medical Center, New York, NY; [13]Howard University, Washington DC, DC; [14]UTHSCSA, UTHSCSA, TX

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TUESDAY, February 13, 2024 • 8:00 AM - 10:30 AM

Time	Abstract	Oral Plenary Session II - Fellows Plenary and Late-Breaking
8:00 AM	9	**Pessary or Cerclage (PC Study) to prevent recurrent preterm delivery – a randomized controlled trial** **Annabelle L. van Gils**[1]; Charlotte E. van Dijk[1]; Bouchra Koullali[1]; M.A. Lugthart[1]; B.B. Bet[1]; Maud D. van Zijl[2]; H M. Knol[3]; Begoña Martinez de Tejada[4]; Sanne J. Gordijn[5]; Marieke Sueters[6]; Marjon A. de Boer[1]; Eline S. van den Akker[7]; Brenda J. Hermsen[8]; Yolanda M. de Mooij[9]; Sabina de Weerd[10]; Wilhelmina M. van Baal[11]; Marion E. van Hoorn[12]; Martine C. van der Weide[1]; Martijn A. Oudijk[1]; Brenda M. Kazemier[13]; Ben Willem W. Mol[14]; Eva Pajkrt[1] [1]Amsterdam UMC, location AMC, Amsterdam, Noord-Holland; [2]Amsterdam UMC, location AMC, IJsselstein, Utrecht; [3]Isala Hospital, Isala, Overijssel; [4]University Hospitals of Geneva and Faculty of Medicine, Geneva, Geneve; [5]UMCG, Groningen, Groningen; [6]Leiden University Medical Center, Leiden, Netherlands; [7]Onze Lieve Vrouwe Gasthuis Oost, Amsterdam, Noord-Holland; [8]Onze Lieve Vrouwe Gasthuis West, Amsterdam, Noord-Holland; [9]Zaans Medical Center, Zaandam, Noord-Holland; [10]Albert Schweitzer Hospital, Dordrecht, Zuid-Holland; [11]Flevoziekenhuis, Almere, Flevoland; [12]Haga Hospital, Den Haag, Zuid-Holland; [13]Wilhelmina's Children Hospital, Utrecht, Utrecht; [14]Monash University, Clayton, Victoria
8:15 AM	10	**Optimal Misoprostol Dosing Among Patients with a BMI Greater Than 30: A Randomized Controlled Trial** **Alexander M. Saucedo**[1]; Miriam Alvarez[1]; George A. Macones[2]; Alison G. Cahill[1]; Lorie M. Harper[1] [1]University of Texas at Austin, Dell Medical School, Austin, TX; [2]The University of Texas at Austin, Austin, TX
8:30 AM	11	**Donor velamentous cord insertion: an omen for poor laser outcomes?** **Christy Gandhi**; Noelle Breslin; Russell S. Miller; Rosalie Ingrassia; Chia Ling Nhan Chang; Lynn Simpson Columbia University Irving Medical Center, New York, NY
8:45 AM	12	**Outpatient Induction of Labor – Primary Outcome Results from the HOME INDUCTION Randomized Controlled Trial** **Sarah M. Nicholson**[1]; Orla Smith[2]; Corina Oprescu[2]; Eimear Wall[2]; Sara El Nimr[2]; Geraldine Gannon[2]; Susan Hatt[2]; Ita Shanahan[3]; Bernard Kennedy[2]; Ronan Daly[2]; Claudia Looi[2]; Elena Fernandez[2]; Zara Molphy[1]; Patrick Dicker[1]; Karen Flood[1]; Fergal D. Malone[2] [1]Royal College of Surgeons in Ireland, Dublin, Ireland; [2]Rotunda Hospital, Dublin, Ireland; [3]Rotunda, Rotunda, Dublin
9:00 AM	13	**The effect of enhanced recovery after surgery (ERAS) on neonatal glucose: A randomized, equivalence trial** **Amanda McWhirter**[1]; Maria Ruiz[2]; Autri Hafezi[2]; Ethan Manninen[3]; Eli Lefkowitz[2]; Benjamin Manninen[4]; Karen Lesser[2] [1]University of Arizona, Tucson College of Medicine, Tucson, AZ; [2]University of Arizona, Tucson, AZ; [3]Harvard University, Cambridge, MA; [4]Cornell University, Ithaca, NY
9:15 AM	14	**Persistent Programming of Offspring Gut Serotonin Pathway by Maternal Western-Style Diet in Non-Human Primates** **Erin Bolte**[1]; Derek O'Neil[1]; Rene Lindsley[2]; Melissa Kirigiti[2]; Paul Kievit[3]; Mindy Engevik[4]; Kjersti M. Aagaard[5] [1]Baylor College of Medicine, Houston, TX; [2]Ohio State University, Beaverton, OR; [3]Oregon National Primate Research Center, Beaverton, OR; [4]Texas Children's Hospital, Houston, TX; [5]Texas Children's Hospital, Baylor College of Medicine, Houston, TX
9:30 AM	15	**Panniculus retractor use for visualization of fetal anatomy: a randomized controlled trial** **Melissa L. Wise**[1]; Marvin Okon[2]; Katelyn Pratt[1]; Andrew Lane[3]; Laura Carlson[1]; Amy Crockett[1]; Lu Zhang[2]; Daniel Pasko[1] [1]Prisma Health, University of South Carolina School of Medicine Greenville, Greenville, SC; [2]Clemson University, Clemson, SC; [3]Prisma Health, Greenville, SC
9:45 AM	16	**Early amniotomy after Foley balloon in labor induction: a randomized clinical trial** **Marissa J. Berry**[1]; Kelly Lamiman[2]; Megan Slan[3]; Xue Zhang[2]; Daphne D. Arena Goncharov[2]; Yihharn P. Hwang[2]; Jennifer Rogers[2]; Luis D. Pacheco[4]; George R. Saade[5]; Antonio F. Saad[2] [1]The Ohio State University, Columbus, OH; [2]University of Texas Medical Branch, Galveston, TX; [3]McGovern Medical School at The University of Texas Health Science Center at Houston (UTHealth), Houston, TX; [4]University of Texas Medical Branch, Friendswood, TX; [5]Eastern Virginia Medical School, Norfolk, VA
10:00 AM	LB02	**Long Term Outcomes for The Milking In Non-Vigorous Infants (MINVI) Trial** **Anup Katheria**[1]; Laure El Ghormli[2]; Erin A. Clark[3]; Bradley Yoder[4]; Georg Schmölzer[5]; Brenda Law[5]; Walid El-Naggar[6]; David Rittenberg[6]; Sheetal Sheth[7]; Courtney Martin[8]; Farha Vora[8]; Satyan Lakshminrusimha[9]; Mark Underwood[10]; Jan Mazela[11]; Joseph Kaempf[12]; Mark Tomlinson[13]; Yvonne Gollin[14]; Wade Rich[14]; Ana Morales[14]; Michael W. Varner[15]; Debra Poeltler[14]; Yvonne Vaucher[16]; Judith Mercer[14]; Neil Finer[16]; Madeline Rice[17] [1]Sharp Mary Birch Hospital for Women & Newborns, SAN DIEGO, CA; [2]George Washington University School of Medicine and Health Sciences, Washington, DC; [3]University of Utah, Salt Lake City, UT; [4]University of Utah School of Medicine, Salt Lake City, UT; [5]University of Alberta Faculty of Medicine and Dentistry, Edmonton, AB; [6]IWK Health Centre, Halifax, NS; [7]The George Washington University School of Medicine and Biomedical Sciences, Washington, DC; [8]Loma Linda University Children's Hospital, Loma Linda, CA; [9]UC Davis Children's Hospital, Sacramento, CA; [10]University of California, Davis, School of Medicine, Sacramento, CA; [11]Poznan University of Medical Sciences, Poznan, Wielkopolskie; [12]Providence Health System Oregon, Portland, OR; [13]Providence St. Vincent Medical Center, Portland, OR; [14]Sharp Mary Birch Hospital for Women & Newborns, San Diego, CA; [15]Eunice Kennedy Shriver National Institute of Child Health and Human Development, SALT LAKE CTY, UT; [16]UCSD, La Jolla, CA; [17]George Washington University, Washington, DC
10:15 AM	LB03	**Randomized trial of screening for preterm birth in low-risk women. The Preterm Birth Screening Study** **Gabriele Saccone**[1]; Daniele Di Mascio[2]; Fabrizio Zullo[3] [1]Università degli studi di Napoli Federico II, PHILADELPHIA, PA; [2]Policlinico Umberto I - University Hospital, Rome, Piemonte; [3]University of Rome, Roma, AL

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TUESDAY, February 13, 2024 • 1:30 - 3:30 PM

Time	Abstract	Oral Concurrent Session 1 - Prematurity
1:30 PM	17	**Risk markers for recurrent adverse pregnancy outcomes** **William A. Grobman**[1]; Beth Wiener[2]; Rebecca B. McNeil[3]; Hyagriv Simhan[4]; Bob M. Silver[5]; Philip Greenland[6]; Noel Bairey Merz[7]; George R. Saade[8]; Matthew Hoffman[9]; Victoria Pemberton[10]; Lynn M. Yee[11]; Lisa D. Levine[12]; Brian M. Mercer[13]; David M. Haas[14]; Judith H. Chung[15]; Uma M. Reddy[16]; Janet M. Catov[17] [1]The Ohio State University, Columbus, OH; [2]RTI, Chapel Hill, NC; [3]RTI, Durbam, NC; [4]University of Pittsburgh, Pittsburgh, PA; [5]University of Utah, School of Medicine, Salt Lake City, UT; [6]Northwestern University Feinberg School of Medicine, Evanston, IL; [7]Cedars-Sinai Medical Center, Los Angeles, CA; [8]Eastern Virginia Medical School, Norfolk, VA; [9]Christiana Care Health Systems, Newark, DE; [10]National Institutes of Health, Bethesda, MD; [11]Northwestern University, Chicago, IL; [12]University of Pennsylvania, Philadelphia, PA; [13]MetroHealth Medical Center, Cleveland, OH; [14]Indiana University, Carmel, IN; [15]UC Irvine Health, Orange, CA; [16]Columbia University, New York, NY; [17]Magee-Womens Research Institute, Pittsburgh, PA
1:45 PM	18	**Prenatal heat stress and birth outcomes in a rural Ghanaian cohort** **Blair Wylie**[1]; Alison Lee[2]; Aalekhya Reddam[3]; Mohammed Mujtaba Nuhu[4]; Cascade Tuholske[5]; Kaali Seyram[6]; Kennetha A. Ae-Ngibise[4]; Danielle Medgyesi[3]; Ellen Boamah[6]; Andrea Baccarelli[3]; Oscar Agyei[4]; Steven Chillrud[7]; Kwaku Poku asante[6]; Darby Jack[8]; Prince Darko Agyapong[4]; Abubakari Sulemana[4] [1]Columbia University, New York, NY; [2]Mount Sinai Hospital, New York, NY; [3]Columbia Mailman School of Public Health, New York, NY; [4]Kintampo Health Research Centre, Kintampo, Brong-Ahafo; [5]Montana State University, Billings, MT; [6]Kintampo Health Research Centre, Brong Ahafo, Ghana; [7]The Earth Institute, New York, NY; [8]Mailman School of Public Health, New York, NY
2:00 PM	19	**Neonatal Hypoglycemia in Pregnancies at Risk for Late Preterm Birth: Childhood Neurodevelopmental Outcomes** **Cynthia Gyamfi-Bannerman** UC San Diego Health, La Jolla, CA, for the Eunice Kennedy Shriver National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network
2:15 PM	20	**Pessary versus cerclage with/without progesterone in twin pregnant women and a short cervix: a RCT** **Yen TN He**[1]; Ha NH Pham[2]; Tri C Nguyen[3]; Trung Q Bui[2]; Nhu T Vuong[2]; Diem TN Nguyen[3]; Thanh V Le[2]; Wentao Li[4]; Cam H Le[1]; Tuong M Ho[2]; Ben Willem W. Mol[5]; Vinh Q Dang[6]; Lan N Vuong[7] [1]My Duc Phu Nhuan Hospital, Ho Chi Minh, Ho Chi Minh; [2]My Duc Hospital, Ho Chi Minh, Ho Chi Minh; [3]HOPE Research Center, Ho Chi Minh, Ho Chi Minh; [4]Monash University, Melbourne, Victoria; [5]Monash University, Clayton, Victoria; [6]My Duc Hospital, Ho Chi Minh, Vietnam; [7]University of Medicine and Pharmacy at Ho Chi Minh City, Ho Chi Minh, Vietnam
2:30 PM	21	**Vaginal polyamines mitigate inflammasome activation: potential immune mechanisms governing barrier function in preterm birth** Briana Ferguson[1]; Aaron Loder[1]; Scott M. Gordon[2]; Lauren Anton[1]; **Kristin D. Gerson**[3] [1]University of Pennsylvania, Perelman School of Medicine, Philadelphia, PA; [2]Children's Hospital of Philadelphia, Philadelphia, PA; [3]Hospital of the University of Pennsylvania, Philadelphia, PA
2:45 PM	22	**Vaginal progesterone for the prolongation of pregnancy after arrested pre-term labor-multicenter randomized controlled trial** **Enav Yefet**[1]; Yael Ganor Paz[2]; Malak Wattad[3]; Noa Harel[4]; Manal Massalha[5]; Zohar Nachum[6] [1]Tzafon Medical Center, Afula, HaZafon; [2]Edith Wolfson Medical Center, Shoham, HaMerkaz; [3]Emek Medical Center, Afula, Israel; [4]Tzafon Medical Center, Poriya, HaZafon; [5]Emek medical center, Afula, HaZafon; [6]Emek medical center, Timrat, HaZafon
3:00 PM	23	**Investigating the Association between Preterm Delivery and Autism Spectrum Disorder in Childhood** **Sapir ELLOUK**[1]; Omri Zamstein[2]; Tamar Wainstock[3]; Eyal Sheiner[2] [1]Soroka Medical Center, Beer-Sheva, HaDarom; [2]Soroka University Medical Center, Beer-Sheva, HaDarom; [3]Ben Gurion University, Beer-Sheva, HaDarom
3:15 PM	24	**Vaginal putrescine attenuates microbe-mediated inflammation in the cervical epithelium** Briana Ferguson[1]; Aaron Loder[1]; Scott M. Gordon[2]; Lauren Anton[1]; **Kristin D. Gerson**[3] [1]University of Pennsylvania, Perelman School of Medicine, Philadelphia, PA; [2]Children's Hospital of Philadelphia, Philadelphia, PA; [3]Hospital of the University of Pennsylvania, Philadelphia, PA

TUESDAY, February 13, 2024 • 1:30 - 3:30 PM

Time	Abstract	Oral Concurrent Session 2 - Diabetes
1:30 PM	25	**Initiation of Metformin in Pregnancy Results in Fetal Bioaccumulation, Growth Restriction & Renal Dysmorphology** **Kjersti M. Aagaard**[1]; Paul Kievit[2]; Maureen Gannon[3]; Carrie McCurdy[4]; Stephanie Wesolowski[5]; Jed Friedman[6]; Tyler Dean[2]; Kristin Sauter[2]; Maxim D. Seferovic[7]; Brandon T. Garcia[7]; Feng Li[8]; John Hicks[1]; Xuan Qin[9]; Erin Bolte[9]; Gwendolynn Hummel[9]; Melissa Suter[1] [1]Texas Children's Hospital, Baylor College of Medicine, Houston, TX; [2]Oregon National Primate Research Center, Beaverton, OR; [3]Vanderbilt University Medical Center, Nashville, TN; [4]University of Oregon, Eugene, OR; [5]University of Colorado Health Sciences Center-Anschulz, Denver, CO; [6]University of Oklahoma Health Sciences Center & Hamm Diabetes Center, Oklahoma City, OK; [7]Baylor College of Medicine and Texas Children's Hospital, Houston, TX; [8]University of North Carolina at Chapel Hill, Chapel Hill, NC; [9]Baylor College of Medicine, Houston, TX
1:45 PM	26	**IRELAnD—Investigating the Role of Early Low-dose Aspirin in Diabetes: a multicenter placebo-controlled blinded randomized trial** **Catherine Finnegan**[1]; Patrick Dicker[2]; Denisa Ramona Asandei[3]; Mary Higgins[4]; Neil O'Gorman[5]; Fidelma Dunne[6]; Geraldine Gaffney[7]; Christine Newman[8]; Fionnuala M. Mcauliffe[9]; Mairead O'Riordan[10]; Vineta Ciprike[11]; Elena Fernandez[1]; Fergal D. Malone[1]; Fionnuala M. Breathnach[12] [1]Rotunda Hospital, Dublin, Ireland; [2]Royal College of Surgeons in Ireland, Dublin, Ireland; [3]RCSI Rotunda, Dublin, Ireland; [4]National Maternity Hospital, Dublin, Ireland; [5]Coombe Hospital, Dublin, Dublin; [6]NUI Galway, NIUG, Galway; [7]NUI Galway, NUIG, Galway; [8]UHG, UHG, Galway; [9]UCD NMH, Dublin, Ireland; [10]UCC, Cumh, Cork; [11]OLOL Drogheda, Louth; [12]Royal College of Surgeons in Ireland, Dublin, Dublin

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TUESDAY, February 13, 2024 • 1:30 - 3:30 PM *(continued)*

Time	Abstract	Oral Concurrent Session 2 - Diabetes
2:00 PM	27	**Relationship between metformin use and preterm preeclampsia in pregnancies with type 2 diabetes** **Maya Patel**[1]; Ashley N. Battarbee[2]; Jerrie Refuerzo[3]; Noelia Zork[4]; Kacey Eichelberger[5]; Gladys A. Ramos[6]; Gayle Olson[7]; Celeste Durnwald[8]; Mark B. Landon[9]; Kjersti M. Aagaard[10]; Kedra Wallace[11]; Christina Scifres[12]; Todd J. Rosen[13]; Wadia Mulla[14]; Amy M. Valent[15]; Sherri Longo[16]; Kim Boggess[1] [1]UNC at Chapel Hill, Chapel Hill, NC; [2]University of Alabama at Birmingham, Birmingham, AL; [3]McGovern Medical School at The University of Texas Health Science Center at Houston (UTHealth), Houston, TX; [4]New York Presbyterian, Columbia University Medical Center, New York, NY; [5]USC School of Medicine Greenville, Greenville, SC; [6]University of California, San Diego, San Diego, CA; [7]University of Texas Medical Branch, Galveston, TX; [8]University of Pennsylvania, Philadelphia, PA; [9]The Ohio State University Wexner Medical Center, Columbus, OH; [10]Texas Children's Hospital, Baylor College of Medicine, Houston, TX; [11]UMiss, Rockford, IL; [12]Indiana University School of Medicine, Indianapolis, IN; [13]Robert Wood Johnson Medical School, Rutgers University, New Brunswick, NJ; [14]Temple University Hospital, Philadelphia, PA; [15]Oregon Health & Science University, Portland, OR; [16]Ochsner Medical center, New Orleans, LA
2:15 PM	28	**Oral antihyperglycemic agent strategy versus insulin for gestational diabetes mellitus – a randomized controlled trial** **Doortje Rademaker**[1]; Leon de Wit[2]; Ruben G. Duijnhoven[1]; Daphne N. Voormolen-van Münster[2]; Joris van der Post[1]; Judith E. Bosmans[3]; Harold W. de Valk[2]; Inge M. Evers[4]; Ben Willem W. Mol[5]; Arie Franx[6]; Hans de Vries[1]; Rebecca Painter[7]; Bas van Rijn[8]; SUGAR-DIP Investigator Group[9] [1]Amsterdam UMC, location AMC, Amsterdam, Noord-Holland; [2]UMC Utrecht, UMC Utrecht, Utrecht; [3]Vrije Universiteit, Vrije Universiteit, Noord-Holland; [4]Meander MC, Meander MC, Noord-Holland; [5]Monash University, Clayton, Victoria; [6]Erasmus MC, Erasmus MC, Zuid-Holland; [7]Amsterdam UMC, location AMC, Amsterdam, Netherlands; [8]Maxima Medisch Centrum, Noord-Brabant; [9]Netherlands, Netherlands, Noord-Holland
2:30 PM	29	**Permissive Glucose Control Versus Usual Care for Diabetes in Labor: An Equivalence Randomized Control Trial** **Ghamar Bitar**[1]; Rafael Santos[1]; Claudia Pedroza[1]; Sarah Nazeer[2]; Suneet P. Chauhan[3]; Sean C. Blackwell[4]; Baha M. Sibai[5]; Michal Fishel Bartal[6] [1]McGovern Medical School at The University of Texas Health Science Center at Houston (UTHealth), Houston, TX; [2]McGovern Medical School at UTHealth Houston, Houston, TX; [3]University of Texas-Houston Medical School, Houston, TX; [4]Children's Memorial Hermann Hospital, Houston, TX; [5]Hermann Memorial Hospital, Houston, TX; [6]McGovern Medical School at UTHealth Houston, Sheba Medical Center, Tel Hashomer, Sackler School of Medicine, Tel Aviv University, Tel Aviv, Israel, Houston, TX
2:45 PM	30	**Breastfeeding and Long-Term Maternal and Child Cardiometabolic Health at 10-14 years after delivery** **Yiwen Cui**[1]; Kartik Kailas Venkatesh[2]; Anna Palatnik[1] [1]Medical College of Wisconsin, Milwaukee, WI; [2]The Ohio State University, Columbus, OH
3:00 PM	31	**Association of glucose profiles based on daily continuous glucose monitoring metrics with adverse perinatal outcomes** **Ashley N. Battarbee**[1]; Ayodeji Sanusi[2]; Isabel Fulcher[3]; Sara Sauer[4] [1]University of Alabama at Birmingham, Birmingham, AL; [2]Center for Women's Reproductive Health, University of Alabama at Birmingham, Birmingham, AL; [3]Delfina Care, Sunnyville, CA; [4]Delfina Care, San Francisco, CA
3:15 PM	32	**Classifying patients based on weekly continuous glucose monitoring metrics and their association with pregnancy outcomes** **Sara Sauer**[1]; Ayodeji Sanusi[2]; Isabel Fulcher[3]; Ashley N. Battarbee[4] [1]Delfina Care, San Francisco, CA; [2]Center for Women's Reproductive Health, University of Alabama at Birmingham, Birmingham, AL; [3]Delfina Care, Sunnyville, CA; [4]University of Alabama at Birmingham, Birmingham, AL

TUESDAY, February 13, 2024 • 1:30 - 3:30 PM

Time	Abstract	Oral Concurrent Session 3 – Basic Science
1:30 PM	33	**Bioaccumulation of Microplastics in Placentae Associated with Environmental Chemical Exposures and Obstetrical Outcomes** **Enrico R. Barrozo**[1]; Marcus A. Garcia[2]; Michael D. Jochum, Jr.[3]; Eliane El Hayek[2]; Eliseo F. Castillo[2]; Jorge Gonzalez-Estrella[2]; Cynthia Shope[3]; Melissa Suter[4]; Matthew J. Campen[2]; Kjersti M. Aagaard[4] [1]Baylor College of Medicine and Texas Children's Hospital, Houston, TX; [2]University of New Mexico, Albuquerque, NM; [3]Baylor College of Medicine, Houston, TX; [4]Texas Children's Hospital, Baylor College of Medicine, Houston, TX
1:45 PM	34	**Safety and efficacy of open fetal repair of complex gastroschisis in the fetal lamb model** **Luc Joyeux**[1]; David Basurto[2]; Kanokwaroon Watananirun[2]; Tom Bleeser[2]; Tomohiro Arai[2]; Inge Depoortere[2]; Alison Accarie[2]; Tim Vanuystel[2]; Michael Aertsen[2]; Alex Menys[3]; Paolo De Coppi[4]; Larry H. Hollier[1]; Michael A. Belfort[5]; Jan Deprest[6]; Sundeep Keswani[1] [1]Texas Children's Hospital, Baylor College of Medicine, Houston, TX; [2]KU Leuven, Leuven, West-Vlaanderen; [3]Motilent, London, England; [4]Great Ormond Street Hospital, NHS, London, England; [5]Texas Children's Hospital, Houston, TX; [6]University Hospitals Leuven, Leuven, Vlaams-Brabant
2:00 PM	35	**Potential mechanism of neuroprotection by magnesium sulfate and betamethasone in microglia and neural stem cells** **Sarah Ligon**[1]; Jennifer Damicis[1]; Marit K. Bastian[1]; Katherine E. Free[1]; Irina Burd[2]; Peter Napolitano[3]; Nicholas Ieronimakis[1] [1]Madigan Army Medical Center, Tacoma, WA; [2]University of Maryland, Baltimore, MD; [3]University of Washington, Seattle, WA
2:15 PM	36	**Evaluation of transplacental transfer of cancer therapies in melanoma via the perfused human placental model** Estelle Heggarty[1]; David Combarel[2]; Francois Vialard[3]; yoann rodriguez[3]; Stanislas Grassin-Delyle[3]; Elodie lamy[4]; Olivier Mir[2]; Angelo Paci[5]; **Paul Berveiller**[6] [1]CHIPS Poissy Hospital, Paris Saclay University, Ile-de-France; [2]Gustave Roussy Cancer Campus, Villejuif, Ile-de-France; [3]Université Paris-Saclay, Jouy-en-Josas, Ile-de-France; [4]Université Paris-Saclay, Montrigny-le-Bretonneux, Ile-de-France; [5]Gustave Roussy, Villejuif, Ile-de-France; [6]Centre Hospitalier Intercommunal de Poissy Saint Germain, Poissy, France

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TUESDAY, February 13, 2024 • 1:30 - 3:30 PM *(continued)*

Time	Abstract	Oral Concurrent Session 3 — Basic Science
2:30 PM	37	**Refractoriness of chorion trophoblast cells to epithelial mesenchymal transition (EMT) by pPROM risk factors** **Benjamin A. Bush**[1]; Enkhtuya Radnaa[2]; Ryan Lintao[3]; Mary Severino[4]; RamKumar Menon[5] [1]UTMB-Galveston, Friendswood, TX; [2]University of Texas Medical Branch at Galveston, Galveston, TX; [3]University of Texas - Medical Branch, Manila, TX; [4]University of Texas - Medical Branch, Galveston, TX; [5]University of Texas Medical Branch, League City, TX
2:45 PM	38	**Impact of Gestational E-Cigarette Aerosols on Uterine Artery Function in Rats** **Alexander Juusela**[1]; Vishal D. Naik[2]; Alexander Carabulea[2]; Joseph Janeski[2]; Hong Jiang[2]; Jayanth Ramadoss[2] [1]Wayne State University, Detroit, MI; [2]C.S. Mott Center for Human Growth and Development, School of Medicine, Wayne State University, Detroit, MI
3:00 PM	39	**Developing an Approach for In Utero Gene Editing: Lessons Learned** **Courtney Breckenfelder**[1]; Patrick McGrath[1]; Jennifer Matsuda[2]; Ganna Bilosouva[1]; Paul Rozance[1]; Russell Anthony[3]; Michael V. Zaretsky[4] [1]University of Colorado Denver Anschutz Medical Campus, Aurora, CO; [2]National Jewish Health, Denver, CO; [3]Colorado State University, Fort Collins, CO; [4]University of Colorado, School of Medicine, Aurora, CO
3:15 PM	40	**Increased Offspring Anxiety Following Maternal Western-Style Diet Exposure During Gestation and Lactation in Non-Human Primates** **Erin Bolte**[1]; Geoff Dunn[2]; Thomas Horvath[3]; Maxim D. Seferovic[4]; Sigmund Haidacher[5]; Kathleen Hoch[5]; Derek O'Neil[1]; Anthony Haag[3]; Kjersti M. Aagaard[6] [1]Baylor College of Medicine, Houston, TX; [2]Ohio State University, Beaverton, OR; [3]Texas Children's Microbiome Center Mass Spectrometry Laboratory, Texas Children's Hospital, Houston, TX; [4]Baylor College of Medicine and Texas Children's Hospital, Houston, TX; [5]Texas Children's Hospital, Houston, TX; [6]Texas Children's Hospital, Baylor College of Medicine, Houston, TX

WEDNESDAY, February 14, 2024 • 10:00 AM - 12:00 PM

Time	Abstract	Oral Concurrent Session 4 — Hypertension
10:00 AM	41	**ASpirin in Placental and maternal Endothelial cell Regulation IN pre-eclampsia (ASPERIN Trial): Primary Outcome** **John O'Brien**; Aarthi Srinivasan; Katherine Vignes; Cynthia Cockerham; Wendy Whitley; Hong Huang; Arnold J. Stromberg; John A. Bauer University of Kentucky, Lexington, KY
10:15 AM	42	**Clinical Outcomes Following Remote Hypertension Monitoring Program for Postpartum Individuals with Hypertensive Disorders of Pregnancy** **Lara S. Lemon**[1]; Beth Quinn[2]; Anna Binstock[1]; Jacob Larkin[2]; Hyagriv Simhan[1]; Alisse Hauspurg[3] [1]University of Pittsburgh, Pittsburgh, PA; [2]Magee-Womens Hospital, University of Pittsburgh Medical Center, Pittsburgh, PA; [3]UPMC Magee-Womens Hospital, Pittsburgh, PA
10:30 AM	43	**162 mg versus 81 mg Aspirin for High-risk Obese Individuals: An Open Label RCT (ASPREO)** **Farah H. Amro**[1]; Michal Fishel Bartal[2]; Claudia Pedroza[1]; Sami Backley[1]; Ghamar Bitar[1]; Joseph Lucci IV[1]; Nahla Daye[1]; Sandra Sadek[1]; Suneet P. Chauhan[3]; Sean C. Blackwell[4]; Baha M. Sibai[5] [1]McGovern Medical School at The University of Texas Health Science Center at Houston (UTHealth), Houston, TX; [2]McGovern Medical School at UTHealth Houston, Sheba Medical Center, Tel Hashomer, Sackler School of Medicine, Tel Aviv University, Tel Aviv, Israel, Houston, TX; [3]University of Texas-Houston Medical School, Houston, TX; [4]Children's Memorial Hermann Hospital, Houston, TX; [5]Hermann Memorial Hospital, Houston, TX
10:45 AM	44	**Platelet Response to Aspirin Therapy in Pregnancy and Association with Pregnancy Outcome** **Rupsa C. Boelig**[1]; Emily Foecke Munden[2]; Tingting Zhan[3]; Steven McKenzie[4]; Walter Kraft[4] [1]Thomas Jefferson University Hospital, Philadelphia, PA; [2]Sidney Kimmel Medical College at Thomas Jefferson University Hospital, Philadlephia, PA; [3]Thomas Jefferson University, Philadelphia, PA; [4]Sidney Kimmel Medical College at Thomas Jefferson University Hospital, Philadelphia, PA
11:00 AM	45	**Optimal Gestational Age for Delivery of Pregnant Individuals with Mild Chronic Hypertension** **Torri D. Metz** University of Utah Health, Salt Lake City, UT, on behalf of the Chronic Hypertension and Pregnancy (CHAP) Trial Consortium
11:15 AM	46	**Subtypes of hypertension years after a hypertensive disorder of pregnancy** **Laura H. Brubaker**[1]; Janet M. Catov[2]; Natalie Bello[3]; Judith H. Chung[4]; Bethany Gibbs[5]; Philip Greenland[6]; William A. Grobman[7]; Abbi Lane-Cordova[8]; Lisa D. Levine[9]; Rebecca B. McNeil[10]; Brian M. Mercer[11]; Noel Bairey Merz[3]; Eliza C. Miller[12]; Mitali Ray[13]; Uma M. Reddy[14]; George R. Saade[15]; Sadiya S. Khan[16]; Christina Scifres[17]; Robert M. Silver[18]; Hyagriv Simhan[13]; Lauren H. Theilen[18]; Jasmina Varagic[19]; Lynn M. Yee[20]; Alisse Hauspurg[1] [1]UPMC Magee-Womens Hospital, Pittsburgh, PA; [2]Magee-Womens Research Institute & Foundation, Pittsburgh, PA; [3]Cedars-Sinai Medical Center, Los Angeles, CA; [4]UC Irvine Health, Orange, CA; [5]West Virginia University, Morgantown, WV; [6]Northwestern University Feinberg School of Medicine, Evanston, IL; [7]The Ohio State University, Columbus, OH; [8]University of South Carolina, Columbia, SC; [9]University of Pennsylvania, Philadelphia, PA; [10]RTI, Durbam, NC; [11]MetroHealth Medical Center, Cleveland, OH; [12]Columbia University Irving Medical Center, New York, NY; [13]University of Pittsburgh, Pittsburgh, PA; [14]Columbia University, New York, NY; [15]Eastern Virginia Medical School, Norfolk, VA; [16]Northwestern University Feinberg School of Medicine, Oak Park, IL; [17]Indiana University School of Medicine, Indianapolis, IN; [18]University of Utah Health, Salt Lake City, UT; [19]National Institutes of Health, Bethesda, MD; [20]Northwestern University, Chicago, IL, on behalf of RTI International.
11:30 AM	47	**Subclinical Cardiovascular Alterations and Molecular Signatures in Women with History of Hypertensive Disorders in Pregnancy** **Lee Reicher**[1]; Nastya Godneva[2]; Adina Weinberger[2]; Yariv Yogev[3]; Eran Segal[2] [1]Lis Hospital for Women's Health, Tel Aviv Sourasky Medical Center, Tel-Aviv, Israel; [2]Weizmann Institute of Science, Rehovot, HaMerkaz; [3]Lis Hospital for Women's Health, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel

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WEDNESDAY, February 14, 2024 • 10:00 AM - 12:00 PM *(continued)*

Time	Abstract	Oral Concurrent Session 4 — Hypertension
11:45 AM	48	**Lower thresholds for diagnosing hypertension in pregnancy and perinatal outcomes in large Tanzanian cohort** **Andrea Barnabas Pembe**[1]; Christopher Sudfeld[2]; Alfa Muhihi[3]; Amani Kikula[1]; Nandita Perumal[4]; Heavenlight Paul[3]; Honorati Masanji[5]; Mary Mwanyika-Sando[3]; Wafaie Fawzi[2]; Blair Wylie[6] [1]Muhimbili University of Health and Allied Sciences, Dar es Salaam, Dar es Salaam; [2]Harvard T.H. Chan School of Public Health, Boston, MA; [3]Africa Academy for Public Health, Dar es Salaam, Dar es Salaam; [4]Harvard T.H.Chan School of Public Health, Boston, MA; [5]Ifakara Health Institute, Dar es Salaam, Dar es Salaam; [6]Columbia University, New York, NY

WEDNESDAY, February 14, 2024 • 10:00 AM - 12:00 PM

Time	Abstract	Oral Concurrent Session 5 — Medical & Surgical Complications
10:00 AM	49	**Early pregnancy reticulocyte hemoglobin content as a marker for iron deficiency by BMI category** **Kaitlyn P. Casper**[1]; Kimberly Moyle[1]; Amanda A. Allshouse[1]; Ashley E. Benson[2]; Timothy M. Bahr[1]; Robert D. Christensen[1]; David Branch[1] [1]University of Utah Health, Salt Lake City, UT; [2]Oregon Health & Science University, Portland, OR
10:15 AM	50	**Frequency of cytomegalovirus reinfection during pregnancy: a prospective cohort study** **Juliette St-Georges**[1]; Safari Joseph Balegamire[1]; Suresh Boppana[2]; Mi-Suk Kang Dufour[3]; Ariane Larouche[3]; Barbora Knoppova[2]; Misty Latting[2]; Christian Renaud[3]; Benoit Masse[4]; Yves Giguère[5]; Jean-Claude Forest[6]; Soren Gantt[3]; Isabelle Boucoiran[7] [1]Université de Montréal, Montréal, QC; [2]University of Alabama at Birmingham, Birmingham, AL; [3]Centre Hospitalier Universitaire Sainte-Justine, Montréal, QC; [4]University of Montréal, Montréal, QC; [5]Research Center of the CHU de Québec-Université Laval, QC; [6]CHU de Québec, Quebec City, QC; [7]CHU Sainte-Justine, Center for Maternal-Fetal Medicine, Montréal, QC
10:30 AM	51	**Association of SARS CoV-2 infection in pregnancy and placental gene expression at delivery** **Sunitha C. Suresh**[1]; Alexa A. Freedman[2]; Steve Cole[3]; Renee Odom[2]; Megan Choi[4]; Lauren S. Keenan-Devlin[2]; Britney P. Smart[2]; Greg E. Miller[2]; Jessica Britt[5]; Janedelie Romero[2]; Linda M. Ernst[6]; Ann Borders[7]; Amy Crockett[8] [1]NorthShore University Health System, Evanston, IL; [2]NorthShore University HealthSystem, Evanston, IL; [3]University of California, Los Angeles, Los Angeles, CA; [4]Northwestern University, Evanston, IL; [5]Prisma Health Upstate, Greenville, SC; [6]NorthShore University HealthSystem, University of Chicago Pritzker School of Medicine, Evanston, IL; [7]NorthShore University HealthSystem, Evanston Hospital, Evanston, IL; [8]Prisma Health, University of South Carolina School of Medicine Greenville, Greenville, SC
10:45 AM	52	**Short term risk of cardiovascular disease complications differs depending on the mode of delivery** **Gabriella Lobitz**[1]; Emily B. Rosenfeld[2]; Rachel Lee[3]; Deepika Sagaram[1]; Cande V. Ananth[1] [1]Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ; [2]Robert Wood Johnson Medical School, Rutgers University, New Brunswick, NJ; [3]Flushing Hospital Medical Center, Bayside, NY
11:00 AM	53	**Systematic review of recipient alloimmunization using standard ABO+D versus an extended donor match protocol** **Ronan P. Sugrue**[1]; Marie Elise Abi Antoun[2]; Jaxon Olsen[3]; Alexandra Stonehill[4]; Jennifer J. Cate[1]; Virginia Y. Watkins[5]; Lesley Skalla[4]; Marilyn Telen[4]; Andra H. James[6]; Jerome J. Federspiel[5] [1]Duke University, Durham, NC; [2]Tufts University School of Medicine, Boston, MA; [3]Duke University School of Medicine, Salt Lake City, UT; [4]Duke University School of Medicine, Durham, NC; [5]Duke University Hospital, Durham, NC; [6]Duke University Medical Center, Durham, NC
11:15 AM	54	**Azithromycin to Reduce Maternal Infections in Planned Vaginal Birth: Secondary Analysis of the A-PLUS Trial** **Waldemar Carlo**[1]; Alan T. Tita[2]; Elizabeth M. McClure[3] [1]Center for Women's Reproductive Health, University of Alabama at Birmingham, Birmingham, AL; [2]University of Alabama at Birmingham, Birmingham, AL; [3]RTI International, Durham, NC, on behalf of NICHD Global Network for Women's and Children's Health Research
11:30 AM	55	**Infant developmental delays at well visit encounters in infants exposed to MOUD: buprenorphine or methadone** **Chaitali Korgaonkar-Cherala**[1]; Emily H. Stetler[2]; Lauren Stewart[2]; Oladunni Ogundipe[2]; Julia Kim[2]; Rakasa Pattanaik[2]; David Garry[3]; Kimberly Herrera[2]; Diana Garretto[4]; Cassandra Heiselman[3] [1]Lis Hospital for Women's Health, Tel Aviv Sourasky Medical Center, Tel Aviv University, Tel Aviv, Israel; [2]Stony Brook University Hospital, Stony Brook, NY; [3]Stony Brook Medicine, Stony Brook, NY; [4]Stony Brook University Hospital, E Northport, NY
11:45 AM	56	**Transperineal ultrasound-based algorithm advising women after obstetric anal sphincter injury regarding their subsequent delivery mode** **Tamar Katzir**; Gil Friedman; Edi Vaisbuch; Moshe Gillor Kaplan Medical Center, Rehovot, HaMerkaz

WEDNESDAY, February 14, 2024 • 10:00 AM - 12:00 PM

Time	Abstract	Oral Concurrent Session 6 — Quality, Equity & Public Health
10:00 AM	57	**Inter-pregnancy interval and uterine rupture among more than 500,000 Trials of Labor after Cesarean (TOLAC)** **Bradley de Vries**[1]; Pejman Adily[2]; Travis Bettison[3]; Vincenzo Berghella[4]; Adam Mackie[3]; Rajit Narayan[3]; George Johnson[1]; Marjan Mosalman Haghighi[1] [1]Sydney Institute for Women, Children and their Families, Camperdown, New South Wales; [2]Sydney Institute for Women, Children and their Families, Sydney, New South Wales; [3]Royal Prince Alfred Hospital, New South Wales; [4]Jefferson Medical College, Philadelphia, PA, on behalf of the Sydney Institute for Women, Children and their Families.

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WEDNESDAY, February 14, 2024 • 10:00 AM - 12:00 PM *(continued)*

Time	Abstract	Oral Concurrent Session 6 — Quality, Equity & Public Health
10:15 AM	58	**Prenatal herbicide exposure and newborn size in a Ghanaian cohort** Kwaku Poku asante[1]; Kaali Seyram[1]; Mohammed Mujtaba Nuhu[2]; Elizabeth Gibson[3]; Alison Lee[4]; Kennetha A. Ae-Ngibise[2]; Anna M. Modest[5]; Ellen Boamah[1]; Jones Opoku-Mensah[2]; Austin M. Oberlin[6]; Oscar Agyei[2]; Russ Hauser[3]; Abena Konadu Yawson[2]; Darby Jack[7]; Brent Coull[3]; **Blair Wylie**[8] [1]Kintampo Health Research Centre, Brong Ahafo, Ghana; [2]Kintampo Health Research Centre, Kintampo, Brong-Ahafo; [3]Harvard T.H. Chan School of Public Health, Boston, MA; [4]Mount Sinai Hospital, New York, NY; [5]Beth Israel Deaconess Medical Center, Boston, MA; [6]Columbia University Irving Medical Center, New York, NY; [7]Mailman School of Public Health, New York, NY; [8]Columbia University, New York, NY
10:30 AM	59	**Assessment of Labor Unit Culture as a Factor in Safely Reducing Cesarean Births** Althea Bourdeau[1]; Emily White VanGompel[2]; Elizabeth S. Langen[1]; **Lisa Kane Low**[1] [1]University of Michigan, Ann Arbor, MI; [2]NorthShore University HealthSystem, Chicago, IL
10:45 AM	60	**Predicting chorioamnionitis using AI-based methods: a retrospective cohort study** **Anne R. Waldrop**[1]; Tomin K. James[1]; Sanaa Suharwardy[2]; Manual Studer[1]; Alan Chang[1]; Camilo Espinosa Bernal[1]; Feng Xie[1]; Sayane Shome[1]; Debapriya Hazra[1]; Yera Kim[1]; Geetha Clarke[1]; Dipro Chakraborty[1]; Samson Mataraso[1]; Eloise Berson[1]; Lei Xue[1]; Seyedeh Payrovnaziri[1]; Neshat Mohammadi[1]; William Haberkorn[1]; Ivana Maric[2]; Yasser Y. El-Sayed[2]; Brendan Carvalho[2]; Nima Aghaeepour[2] [1]Stanford University, Palo Alto, CA; [2]Stanford University, Stanford, CA
11:00 AM	61	**A Pilot Study for Implementation of a Virtual Group Prenatal Genetics Counseling Program** **Sarah J. Weingarten**[1]; Erika Brockhoff, MS[1]; Eliana Spielman[1]; Heather S. Lipkind, MD, MS[1]; Jessica Scholl, MD[1] [1]Weill Cornell Medicine, New York, NY
11:15 AM	62	**Genetic Health Literacy in an Urban Southeastern Population** **Akila Subramaniam**[1]; Yuanfan Ye[1]; Victoria C. Jauk[1]; Fallon Brewer[2]; Taylor Dunn[2]; Anna Hurst[2]; Brian M. Casey[2] [1]Center for Women's Reproductive Health, University of Alabama at Birmingham, Birmingham, AL; [2]University of Alabama at Birmingham, Birmingham, AL
11:30 AM	63	**A Novel Index to Assess Association Between Structural Racism and Black/White Stillbirth Rate Disparities** **Sebastian Ramos**[1]; Erika F. Werner[1]; Chloe E. Bird[2]; Ndidiamaka Amutah-Onukagha[3]; Michael B. Siegel[1] [1]Tufts University School of Medicine, Boston, MA; [2]Center for Health Equity Research, Boston, MA; [3]Department of Public Health and Community Medicine, Boston, MA
11:45 AM	64	**Exploring Black birthing people's perspectives on racial concordance with obstetric care providers** **E. Nicole Teal**; Aryana Daye; Kayla Blades; Kathryn Menard; Karen Sheffield-Abdullah University of North Carolina at Chapel Hill, Chapel Hill, NC

WEDNESDAY, February 14, 2024 • 3:00 PM - 5:30 PM

Time	Abstract	Oral Concurrent Session 7 — Clinical Obstetrics & Postpartum
3:00 PM	65	**Prophylactic Antibiotics after Cesarean Trial (PACT): A Randomized Control Trial** **Brett Goldman**[1]; Nicholas Spencer[2]; Maggie Kuhlmann[3]; Mollie McDonnold[4]; George R. Saade[5]; Antonio F. Saad[2] [1]University of Texas Medical Branch, Dickinson, TX; [2]University of Texas Medical Branch, Galveston, TX; [3]University of Nebraska Medical Center, Omaha, NE; [4]St. David's Women's Center of Texas, Austin, TX; [5]Eastern Virginia Medical School, Norfolk, VA
3:15 PM	66	**Oral Analgesia in Fixed-Time Interval vs. On-Demand following Vaginal Delivery: A Randomized Controlled Trial** **Gal Bachar**[1]; Naphtali Justman[2]; Gili Buchnik Fater[3]; Naama Farago[3]; Chen Ben David[1]; Hiba Abu-Rass[3]; Yoav Siegler[2]; Areen Hajaj[1]; Yaniv zipori[4]; Nizar khatib[5]; Zeev Weiner[3]; Dana Vitner[6] [1]Rambam Healthcare Campus, Haifa, Hefa; [2]Rambam Medical Center, Haifa, Hefa; [3]Rambam Medical Health Campus, Haifa, HaZafon; [4]Rambam Health Care Campus, Haifa, Israel; [5]Rambam Healthcare Campus, Acre, Israel; [6]Rambam Medical Health Campus, Toronto, ON
3:30 PM	67	**Association of body mass index with pain and opioid use after cesarean delivery** **Hyagriv Simhan**[1]; Hector Mendez Figueroa[2] [1]University of Pittsburgh, Pittsburgh, PA; [2]University of Texas Health Science Center at Houston, Houston, TX, for the Eunice Kennedy Shriver National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network, Bethesda, MD
3:45 PM	68	**Prospective multicenter trial comparing balloon versus suction hemorrhage control devices for postpartum hemorrhage** **Laurence E. Shields**[1]; Mindy Foster[2]; Catherine Klein[2]; Jennie Torti[2]; Curtis Cook[3] [1]CommonSpirit Health, Santa Maria, CA; [2]CommonSpirit Health Women and Infant Clinical Institute, Denver, CO; [3]Dignity Health Medical Group, Chandler, AZ
4:00 PM	69	**Derivation and validation of an intrapartum algorithm to predict postpartum hemorrhage risk using photoplethysmography data.** **Kimberly K. Trout**[1]; Stefanie Modri[2]; Harish M. Sehdev[1]; James Weimer[3] [1]Pennsylvania Hospital, Philadelphia, PA; [2]University of Pennsylvania, School of Nursing, Philadelphia, PA; [3]Vanderbilt University, School of Computer Science and School of Biomedical Engineering, Nashville, TN
4:15 PM	70	**Management Approaches for Placenta Accreta Spectrum — Not a one size fits all approach** **Farah H. Amro**[1]; Michal Fishel Bartal[2]; Edgar Hernandez Andrade[3]; Elizabeth Nugent[3]; Lavanya Palvalli Parsons[3]; Jennie Coselli[1]; Nahla Daye[1]; Sandra Sadek[1]; Ramesha Papanna[3]; Sean C. Blackwell[4]; Baha M. Sibai[5] [1]McGovern Medical School at The University of Texas Health Science Center at Houston (UTHealth), Houston, TX; [2]McGovern Medical School at UTHealth Houston, Sheba Medical Center, Tel Hashomer, Sackler School of Medicine, Tel Aviv University, Tel Aviv, Israel, Houston, TX; [3]McGovern Medical School at UTHealth Houston, Houston, TX; [4]Children's Memorial Hermann Hospital, Houston, TX; [5]Hermann Memorial Hospital, Houston, TX

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WEDNESDAY, February 14, 2024 • 3:00 PM - 5:30 PM *(continued)*

Time	Abstract	Oral Concurrent Session 7 — Clinical Obstetrics & Postpartum
4:30 PM	71	**Reoperation following cesarean delivery: an analysis of incidence, indications, and procedures using a national database** **Luke P. Burns**[1]; Jourdan E. Triebwasser[2]; Christopher X. Hong[3] [1]University of Chicago Medicine, Chicago, IL; [2]University of Michigan, Ann Arbor, MI; [3]University of Michigan, Ann Arbor, MI
4:45 PM	72	**Increased risk of postpartum hemorrhage in women with resolved low placentation: a multicenter prospective study.** **Ornaghi Sara**[1]; Francesca Arienti[2]; Federica Fernicola[3]; Alessandra Abbamondi[1]; Sofia Giani[4]; Elisabetta Colciago[1]; Simona Fumagalli[5]; Anna Catalano[6]; Meroni Mario Giuseppe[7]; Sara Benedetti[7]; Camilla Bulfoni[7]; Clelia Callegari[8]; Andrea Sala[8]; Edoardo Barbolini[6]; Giulia Zangheri[9]; Giulia Dal Molin[9]; Michele Vignali[9]; Mirko Pozzoni[10]; Maria Castoldi[10]; Massimo Candiani[10]; Sara Consonni[11]; Irene Cetin[12]; Elisa Fabbri[12]; Valentina Sala[12]; Anna Locatelli[5] [1]University of Milan-Bicocca, Monza, Lombardia; [2]University of Milano Bicocca, Milano, Lombardia; [3]University of Milano-Bicocca, School of Medicine and Surgery, Monza, Lombardia; [4]University of Milan-Bicocca, School of Medicine and Surgery, Monza, Lombardia; [5]University of Milano-Bicocca, Monza, Lombardia; [6]Hospital Poliambulanza Foundation, Brescia, Lombardia; [7]Niguarda Hospital, Milan, Lombardia; [8]Alessandro Manzoni Hospital, Lecco, Lombardia; [9]Macedonio Melloni Hospital, Milan, Lombardia; [10]San Raffaele Hospital, Milan, Lombardia; [11]Carate Hospital, Carate Brianza, Lombardia; [12]Children Hospital Vittore Buzzi, Milan, Lombardia
5:00 PM	73	**Endocannabinoids and Related Lipids are Associated with Postoperative Opioid Use in Patients Undergoing Cesarean Delivery** **Amelie Pham**[1]; Sarah S. Osmundson[1]; Phillip J. Kingsley[1]; Sachin Patel[2]; Alex Pedowitz[3]; Laura Sorabella[1]; Stephen Bruehl[1] [1]Vanderbilt University Medical Center, Nashville, TN; [2]Northwestern University Feinberg School of Medicine, Chicago, IL; [3]University of Miami, Leonard M. Miller School of Medicine, Miami, FL
5:15 PM	74	**Predictors of intrauterine vacuum-induced device failure in management of postpartum hemorrhage: a multicenter experience** **Candace Levian**[1]; Logan Mauney[2]; Matthew H. Mossayebi[3]; Katherine Moran[4]; Andrew Florin[1]; Naomi Greene[1]; Ilona Goldfarb[5]; Mariam Naqvi[1] [1]Cedars-Sinai Medical Center, Los Angeles, CA; [2]Massachusetts General Hospital, Boston, MA; [3]Brigham and Women's Hospital, Boston, MA; [4]Cedars-Sinai Medical Center, W HOLLYWOOD, CA; [5]Massachusetts General Hospital, Newton, MA

WEDNESDAY, February 14, 2024 • 3:00 PM - 5:30 PM

Time	Abstract	Oral Concurrent Session 8 — Labor & Delivery
3:00 PM	75	**A contemporary assessment of uterine contractility in labor: what is adequate?** **Nandini Raghuraman**[1]; Candice Woolfolk[1]; Nicole McCandless[1]; Brianna Bradley[1]; Jeannie C. Kelly[2]; Ebony B. Carter[2]; Anthony O. Odibo[1]; Antonina I. Frolova[1] [1]Washington University School of Medicine in St. Louis, St. Louis, MO; [2]Washington University School of Medicine in St. Louis, Barnes Jewish Hospital, St. Louis, MO
3:15 PM	76	**Multi-Country Trial of Intrapartum Oral Azithromycin: Cultures of Neonatal Infections** **Alan T. Tita** University of Alabama at Birmingham, Birmingham, AL; for the Eunice Kennedy Shriver National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network.
3:30 PM	77	**Early or late Amniotomy Following Extra-Amniotic-Balloon Cervical Ripening: a Multicenter Randomized Controlled Trail** **Atara De Porto**[1]; Elad proiss[1]; Rina Hagege[2]; Sarit Tetro[1]; Yosef Tovbin[1]; Eran Barzilay[3]; Enav Yefet[4]; Natalia Seledets[5]; Dana Vitner[6]; Hadar Rosen[7]; Eran Weiner[8]; Yael Ganor Paz[9] [1]Assuta Ashdod Medical Center, Ashdod, HaDarom; [2]Samson Assuta Ashdod University Hospital, Ashdod, HaDarom; [3]Assuta Ashdod University Hospital, Ben Gurion University of the Negev, Ashdod, Israel; [4]Tzafon Medical Center, Afula, HaZafon; [5]Tzafon medical center, Poriya, Israel, Poria, HaZafon; [6]Rambam Medical Health Campus, Toronto, ON; [7]Sheba Medical Center, Tel Hashomer, Toronto, ON; [8]Wolfson Medical Center, Tel Aviv, HaMerkaz; [9]Edith Wolfson Medical Center, Shoham, HaMerkaz
3:45 PM	78	**Foley catheter+oral misoprostol versus misoprostol for cervical ripening in nulliparous-obese women: a French multicenter RCT** **Paul Guerby**[1]; Paul Berveiller[2]; Charles Garabedian[3]; Loïc SENTILHES[4]; Franck Perrotin[5]; Norbert Winer[6]; Alexandre Vivanti[7]; Céline Chauleur[8]; Malik Boukerrou[9]; Florent Fuchs[10]; Thierry Abossolo[11]; Denis Gallot[12]; Marie Victoire Senat[13]; Raoul Desbriere[14]; Vincent Letouzey[15]; Elie Azria[16]; Fabrice Pierre[17]; Pascale Olivier-Abbal[18]; Perrine Cassan[18]; Catherine Arnaud[18]; Laure Devlamynck[18]; Christophe Vayssiere[1] [1]Hopital Paule de Viguier, CHU Toulouse, Toulouse III University, Toulouse, Midi-Pyrenees; [2]Centre Hospitalier Intercommunal de Poissy Saint Germain, Poissy, France; [3]CHU Lille, Lille, Nord-Pas-de-Calais; [4]CHU Bordeaux, Bordeaux University Hospital, Aquitaine, France; [5]Bretonneau Hospital, Centre, France; [6]CHU Nantes, University Medecial Center of Nantes, Nantes, Pays de la Loire; [7]Antoine Béclère Hospital, Paris Saclay University Hospital, Clamart, Ile-de-France; [8]St. Etienne University Hospital, Rhone-Alpes, France; [9]CHU St. Pierre, University La Reunion, St Pierre; [10]Montpellier University Hospital, Languedoc-Roussillon, France; [11]CHU St. Denis, La Reunion University, St-Denis; [12]Clermond-Ferrand University Hospital, Centre, France; [13]Hopital Bicêtre, Paris-Saclay University, Bicêtre, Ile-de-France; [14]St. Joseph Hospital Marseille, Provence-Alpes-Cote d'Azur, France; [15]CHU Nimes, Montpellier-Nimes University, Nimes, Languedoc-Roussillon; [16]St. Joseph Hospital, Paris, Ile-de-France; [17]CHU Poitiers, Poitiers University, Poitiers, Poitou-Charentes; [18]CHU Toulouse, Toulouse III University, Toulouse, Midi-Pyrenees; on behalf of the GROG (Groupe de Recherche en Gynecologie Obstetrique)
4:00 PM	79	**Evaluation of standardized management of category II tracings: Category II action plan study (CAP Study)** **Alexandra G. Eller**[1]; Sean Esplin[2]; Donna Dizon-Townson[3]; Cempaka Martial[4]; Erick Henry[1]; Jessica Page[4]; Brett D. Einerson[5]; Flint Porter[6] [1]Intermountain Health, Murray, UT; [2]Intermountain Medical Center, Murray, UT; [3]Intermountain Health, Sandy, UT; [4]Intermountain Health, Salt Lake City, UT; [5]University of Utah Health, Salt Lake City, UT; [6]Intermountain Healthcare, Salt Lake City, UT
4:15 PM	80	**Vaginal dinoprostone versus Foley catheter for induction of labor: a randomized controlled trial** **Xiaohua Liu**[1]; Ding Huang[2]; Yang Liu[3]; cuicui Qu[4]; Huiqin Mo[3]; Xin Zhao[3]; Wentao Li[5]; Ben Willem W. Mol[6]; Hong Shen[2]; Weiwei Cheng[7]; Hao Ying[4] [1]Shanghai First Maternity & Infant Hospital, Tongji University School of Medicine, Shanghai; [2]International Peace Maternity & Child Health Hospital, Shanghai Jiaotong University, Shanghai, Shanghai; [3]Shanghai Key Laboratory of Maternal and Fetal Medicine, Shanghai First Maternity & Infant Hospital, Tongji University School of Medicine, Shanghai, Shanghai; [4]Shanghai First Maternity & Infant Hospital, Tongji University School of Medicine, Shanghai, Shanghai; [5]Monash University, Melbourne, Victoria; [6]Monash University, Clayton, Victoria; [7]International Peace Maternity & Child Health Hospital, Shanghai Jiaotong University, Shanghai, China (People's Republic)

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WEDNESDAY, February 14, 2024 • 3:00 PM - 5:30 PM *(continued)*

Time	Abstract	Oral Concurrent Session 8 — Labor & Delivery
4:30 PM	81	**The HOME-INDUCTION Randomized Controlled Trial — Women's Opinions on Outpatient Induction of Labor** **Sarah M. Nicholson**[1]; Orla Smith[2]; Corina Oprescu[2]; Eimear Wall[2]; Sara El Nimr[2]; Geraldine Gannon[2]; Sirisha Bellamkonda[3]; Ita Shanahan[4]; Bernard Kennedy[2]; Ronan Daly[2]; Claudia Looi[2]; Elena Fernandez[2]; Patrick Dicker[1]; Zara Molphy[1]; Karen Flood[1]; Fergal D. Malone[2] [1]Royal College of Surgeons in Ireland, Dublin, Ireland; [2]Rotunda Hospital, Dublin, Ireland; [3]RCSI, Dublin, Dublin; [4]Rotunda, Rotunda, Dublin
4:45 PM	82	**Obesity remains associated with cesarean delivery despite a standardized protocol for labor induction** **Melissa Riegel**[1]; Lisa D. Levine[1]; Samuel Parry[1]; Celeste Durnwald[1]; Rebecca F. Hamm[2] [1]University of Pennsylvania, Philadelphia, PA; [2]Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA
5:00 PM	83	**Application of Tension on Transcervical Foley Catheter for Induction of Labor in Term Nulliparous Women** Meagan V. Benson[1]; **Lena Younes**[1]; Alisha Watson[2]; George R. Saade[3]; Antonio F. Saad[1] [1]University of Texas Medical Branch, Galveston, TX; [2]UTMB, Galveston, TX; [3]Eastern Virginia Medical School, Norfolk, VA
5:15 PM	84	**Increasing Number of Cervical Examinations in Labor: Does a Risk of Intrapartum Fever Actually Exist?** **Chase Calvert**[1]; Miriam Alvarez[1]; Jeny Ghartey[2]; Emily Hall[1]; Elaine Avshman[3]; Sama Jwaied[1]; Nandini Raghuraman[4]; Lorie M. Harper[1]; Alison G. Cahill[1] [1]University of Texas at Austin, Dell Medical School, Austin, TX; [2]Seton Medical Center Austin, UT Austin, Dell Medical School, Austin, TX; [3]Texas A&M School of Medicine, Bryan, TX; [4]Washington University School of Medicine in St. Louis, St. Louis, MO

WEDNESDAY, February 14, 2024 • 3:00 PM - 5:30 PM

Time	Abstract	Oral Concurrent Session 9 — Fetal US Genetics
3:00 PM	85	**Clinical Utility of Genome Sequencing in Prenatal Diagnosis** **Allan Fisher**[1]; Jane Schuette[2]; Kendall Kaufmann[2]; Nicolette Sookar[2]; Reena Ray Sisk[2]; Christine Stanley[2] [1]St. Louis University, St. Louis, MO; [2]Variantyx, Inc., Framingham, MA
3:15 PM	86	**Genome sequencing as a first-tier prenatal diagnostic test: Is it time to change?** **Vaidehi Jobanputra**[1]; Jessica L. Giordano[2]; Josie Pervola[3]; Volkan Okur[1]; Amanda Thomas-Wilson[1]; Saurav Guha[1]; Atteeq U. Rehman[1]; Ashley Wilson[1]; Alexandra Tinfow[3]; Stephanie Galloway[2]; Avinash Abhyankar[1]; Vanessa Felice[1]; Cecilia Esteves[1]; Endre Hegedus[1]; Shruti Phadke[1]; Sowmya Thirumalai Srinivasa[1]; Shahid Y. Khan[1]; Caroline Nava[1]; Qi Yan[2]; Brynn Levy[3]; Ronald J. Wapner[4] [1]New York Genome Center, New York City, NY; [2]Columbia University, New York, NY; [3]Columbia University, New York, NY; [4]Columbia University Irving Medical Center, New York, NY; on behalf of the Women's Genetics Center.
3:30 PM	87	**Preoperative Predictors of Survival in Twin-Twin Transfusion Syndrome Undergoing Fetoscopic Laser Treatment** **Henry L. Galan**[1]; Michael V. Zaretsky[1]; Nicholas Behrendt[1]; Zhaoxing Pan[2]; Anthony Johnson[3]; Greg Ryan[4]; William Goodnight[5] [1]University of Colorado, School of Medicine, Aurora, CO; [2]University of Colorado, School of Medicine, School of Public Health, Aurora, CO; [3]McGovern Medical School at UTHealth Houston, Houston, TX; [4]Sinai Health Center, Toronto, ON; [5]UNC Hospitals, Chapel Hill, NC; on behalf of NAFTNet.
3:45 PM	88	**An assessment of the relation between first trimester fetal cardiac function and subsequent preeclampsia** **Rebecca Horgan**[1]; George R. Saade[1]; Alfred Abuhamad[1]; Erkan Kalafat[2]; Elena Sinkovskaya[1] [1]Eastern Virginia Medical School, Norfolk, VA; [2]Koc University School of Medicine, Istanbul, Istanbul
4:00 PM	89	**Umbilical arteries resistance indices in the management of FGR fetuses- Only half of the story?** **Misgav Rottenstreich**[1]; Swati Agrawal[2]; Homero Flores Mendoza[1]; Sarah D. McDonald[1]; Bryon DeFrance[1]; Jon F. Barrett[3]; Eran Ashwal[4] [1]McMaster University, Hamilton, ON; [2]Hamilton Health Sciences, Toronto, ON; [3]Sunnybrook Health Science, University of Toronto, Toronto, ON; [4]McMaster University, North York, Tel Aviv
4:15 PM	90	**Three-dimensional fetal body composition and organ volumes in pregnancies complicated by gestational diabetes mellitus** **Kathryn A. Wagner**[1]; Katherine Grantz[2] [1]Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, Bethesda, MD; [2]National Institute of Child Health and Development, National Institutes of Health, Bethesda, MD; on behalf of the NICHD Fetal 3D Study and the NICHD Fetal Growth Studies.
4:30 PM	91	**Quantitative Vessel Assessment for Fetal Growth Restriction using 3D Ultrasound Microvessel Imaging** **Janelle Santos**; Hannah Scott; U Wai Lok; Ping Gong; Elizabeth Cheek-Norgan; Shanshan Tang; Michael Nienow; Krystal Ruka; Mauro Schenone; Sihgao Chen; Chengwu Huang; Elizabeth Enninga; Jingke Zhang; Reade Quinton Mayo Clinic, Rochester, MN
4:45 PM	92	**Functional deterioration in fetuses with spina bifida on ultrasound** **Lennart Van der Veeken**[1]; Luc De Catte[2]; An Hindryckx[3]; Johannes van der Merwe[3]; Adalina Sacco[4]; Felix Debie[5]; Katrien Jansen[3]; Jan Deprest[6]; Francesca M. Russo[7] [1]Catholic University Leuven, Toronto, ON; [2]Cluster Woman and Child, Biomedical Sciences, KU Leuven, Leuven, Belgium; [3]UZ Leuven, Leuven, Belgium; [4]University College London Hospitals, London, England; [5]UZ Leuven, Leuven, Oost-Vlaanderen; [6]University Hospitals Leuven, Leuven, Vlaams-Brabant; [7]KULeuven, KULeuven, Vlaams-Brabant
5:00 PM	93	**Reliability of "lethal" ultrasound markers in identifying fetuses with truly life-limiting skeletal dysplasia** Haley Crane[1]; Erica M. Schindewolf[2]; Julie Moldenhauer[3]; Natalie Burrill[2]; Suzanne DeBari[2]; Nahla Khalek[1]; Christina Paidas Teefey[4]; Shelly Soni[4]; Beverly G. Coleman[5]; **Juliana S. Gebb**[2] [1]Richard D. Wood Jr. Center for Fetal Diagnosis and Treatment at CHOP, Philadelphia, PA; [2]Center for Fetal Diagnosis & Treatment, Children's Hospital of Philadelphia, Philadelphia, PA; [3]Richard D. Wood, Jr. Center for Fetal Diagnosis & Treatment, Children's Hospital of Philadelphia, Perelman School of Medicine of the University of Pennsylvania, Philadelphia, PA; [4]Children's Hospital of Philadelphia, Philadelphia, PA; [5]Richard D. Wood, Jr Center for Fetal Diagnosis and Treatment at CHOP, Perelman School of Medicine of the University of Pennsylvania, Philadelphia, PA

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WEDNESDAY, February 14, 2024 • 3:00 PM - 5:30 PM *(continued)*

Time	Abstract	Oral Concurrent Session 9 — Fetal US Genetics
5:15 PM	94	**Fully quantitative operator-independent numeric cervical softening device: Cervical softening rate associated with mode of delivery** **Molly J. Stout**[1]; Methodius G. Tuuli[2]; Adam K. Lewkowitz[3]; Julie Tumbarello[1]; Emily Diveley, BSN[4]; Wendy Sparks[1]; Maya Diab[1]; Michelle Moniz[1]; AnneMarie E. Opipari[1]; Jourdan E. Triebwasser[5]; Peinan Zhao[4] [1]University of Michigan, Ann Arbor, MI; [2]Women & Infants Hospital of Rhode Island, Warren Alpert Medical School of Brown University, Providence, RI; [3]Warren Alpert Medical School of Brown University, Women & Infants Hospital Rhode Island, Providence, RI; [4]Washington University in St. Louis, St. Louis, MO; [5]University of Michigan, Ann Arbor, MI

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Oral Plenary Session I and Late-Breaking

Abstracts 1–8, and LB01

MONDAY
February 12, 2024
3:45 pm – 6:00 pm

MODERATOR(S)

Anthony Sciscione, DO

Joanne Stone, MD, MS

Abstracts 1-8

1 Multicenter, prospective cohort of genome sequencing in 750 fetal structural anomalies

Ronald J. Wapner[1], Jessica L. Giordano[2], Jessica de Voest[3], Kelly L. Gilmore[4], Lauren Westerfield[5], Alexandra Tinfow[6], Stephanie Galloway[2], Leandra Tolusso[7], Beatrix Wong[8], Farrah Jackson[7], Grant Bonesteele[5], Theresa Wittman[9], Blair Stevens[10], Samantha Stover[11], Anthony Johnson[12], Nancy Doan Leslie[7], Daniel Swarr[7], Aaron B. Caughey[13], Wendy Chung[14], Rebecca Clifton[15], Ignatia B. Van den Veyver[16], Neeta L. Vora[4]
[1]Columbia University Irving Medical Center, New York, NY, [2]Columbia University, New York, NY, [3]George Washington University, Rochester, MD, [4]University of North Carolina at Chapel Hill, Chapel Hill, NC, [5]Baylor College of Medicine and Texas Children's Hospital, Houston, TX, [6]Columbia University, New York City, NY, [7]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, [8]Cincinnati Children's Hospital, Cincinnati, OH, [9]UT Health, Houston, TX, [10]UTPhysicians, Houston, TX, [11]Texas Children's Hospital, Houston, TX, [12]McGovern Medical School at UTHealth Houston, Houston, TX, [13]Oregon Health & Science University, Portland, OR, [14]Harvard and Boston Children's Hospital, Boston, MA, [15]George Washington University, Washington, DC, [16]Baylor College of Medicine, Houston, TX

OBJECTIVE: The incremental value of exome sequencing (ES) over chromosomal microarray (CMA) in the evaluation of fetal structural anomalies has been demonstrated. Genome sequencing (GS) is now utilized for postnatal genomic diagnostic evaluation given GS has a higher yield over other technologies (ES, CMA). We prospectively evaluated the diagnostic yield of trio GS in pregnancies with major structural fetal anomalies referred to five tertiary care centers.

STUDY DESIGN: From August 2019 to July 2023, pregnancies $<$ 36 weeks with major fetal structural anomalies, isolated fetal growth restriction $<$ 5th percentile identified $<$ 24 weeks, and/or an elevated nuchal translucency of $\geq$ 3.5mm were screened for eligibility into this five-center prospective cohort study. Exclusions included an explanatory CMA/karyotype and planned termination based on imaging findings. Prenatal diagnosis by either CVS or amniocentesis and consent of both parents was required. GS was performed at 1 of 4 diagnostic laboratories using local bioinformatic tools. Pathogenic (P), likely pathogenic (LP), and uncertain variants (VUS) related to the phenotype meeting specific study protocol criteria were reported.

RESULTS: 5495 pregnancies with anomalies were screened; 2147 were eligible and 750 (34.9%) were enrolled. The main reasons for ineligibility were $>$ 36 weeks (16.4%) and planned termination or fetal demise (16.2%). A P/LP finding causative of the phenotype was identified in 117 (15.6%) and a VUS related to the phenotype was found in 21 (2.8%). There were causative P/LP findings in 41 (9.5%) cases with a single organ system involved and in 76 (23.8%) cases with multiple organ system involvement (table). Recurrent diagnoses included *PTPN11* (8), *NIPBL* (5), *CHD7* (5), *MYRF* (4), *PIEZO1* (4). Notably, no case with NT >= 3.5 mm to $<$ 4.5 mm without evidence of cystic hygroma had a GS finding. The positivity rate for findings related to the phenotype was not significantly different between the 4 labs (p=0.09).

CONCLUSION: Prenatal trio GS provides incremental diagnostic information in pregnancies with fetal structural anomalies and a non-causal CMA.

Table. Reported Variants Related to the Phenotype by Organ System (n=750)

	Single Organ System			Multiple Organ Systems (most severely affected system)		
	Total (N=431)	Pathogenic/likely pathogenic (N=41)	VUS (N=13)	Total (N=319)	Pathogenic/likely pathogenic (N=76)	VUS (N=8)
CNS	52	7 (13.5%)	2 (3.8%)	50	14 (28.0%)	1 (2.0%)
Ear/Neck/Eye/Face/Nose	25	3 (12.0%)	0	18	6 (33.3%)	1 (5.6%)
Gastro-intestinal tract	24	0	0	14	1 (7.1%)	0
Genitourinary	41	4 (9.8%)	2 (4.9%)	58	9 (15.5%)	1 (1.7%)
Cardiac	84	9 (10.7%)	3 (3.6%)	41	12 (29.3%)	2 (4.9%)
Osteoarticular (includes arthrogryposis)	54	3 (5.6%)	1 (1.9%)	41	15 (36.6%)	0
Thorax/Respiratory	1	0	0	7	1 (14.3%)	0
Effusion/Hydrops	23	5 (21.7%)	3 (13.0%)	31	10 (32.3%)	2 (6.5%)
Nuchal translucency (NT) >= 3.5 mm to < 4.5 mm without evidence of cystic hygroma	18	0	0	0	0	0
Fetal growth restriction < 5th percentile	20	1 (5.0%)	1 (5.0%)	1	0	0
Cystic hygroma (NT >= 4.5 mm)	39	6 (15.4%)	1 (2.6%)	8	2 (25.0%)	0
Congenital diaphragmatic hernia	14	2 (14.3%)	0	29	6 (20.7%)	1 (3.4%)
Spina bifida	34	1 (2.9%)	0	20	0	0
Situs abnormality	2	0	0	1	0	0

Data are n (%).

2 Association between HDP and GDM and Child Cardiovascular Health in Early Adolescence

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OBJECTIVE: To examine the association of hypertensive disorders of pregnancy (HDP) and gestational diabetes (GDM) with child cardiovascular health (CVH) in early adolescence.

STUDY DESIGN: A secondary analysis from the prospective Hyperglycemia and Adverse Pregnancy Outcome (HAPO) Follow-up Study. The exposure (expressed as a multiple dichotomous variable) was HDP alone, GDM alone, or both HDP and GDM, compared with none of these (reference). The primary outcome was child CVH at ages 10 to 14 years, based on four metrics: body mass index, blood pressure, total cholesterol level, and glucose level. Each metric was categorized as ideal, intermediate, or poor using pediatric guidelines. The primary outcome was having at least one metric that was non-ideal versus all ideal (reference). We also secondarily examined to what extent the exposures were associated with progressive decrements in CVH by categorizing CVH according to the number of non-ideal metrics: at least one intermediate metric, one poor metric, or at least two poor metrics versus all ideal. Modified Poisson models adjusted for field center, parity, maternal age at enrollment, gestational age at enrollment, pregnancy alcohol or tobacco use, child's sex, and child's age at CVH assessment.

RESULTS: Among 3,317 assessed maternal-child dyads, 7.9% (n=263) pregnant individuals developed HDP alone, 12.1% (n=402) GDM alone, and 2.5% (n=82) both HDP and GDM. When the children were at a median age of 11.6 years, 55.5% (n=1808) had at least one metric that indicated less-than-ideal CVH. In adjusted models, individuals with HDP alone (aRR 1.16; 95% CI 1.04, 1.28), GDM alone (aRR 1.11; 95% CI 1.02, 1.21), and both HDP and GDM (aRR 1.17; 95% CI 1.00, 1.38) were more likely to have children with less-than-ideal CVH 10-14 years after delivery. Secondary analyses

revealed that the associations strengthened in magnitude as the adverse CVH metrics increased in number and severity (TABLE).

CONCLUSION: Pregnant individuals in the HAPO FUS cohort with HDP, GDM, or both were more likely to have children with worse CVH 10 to 14 years after their delivery.

TABLE. Frequency and association between HDP and GDM and Child Cardiovascular Health (CVH)

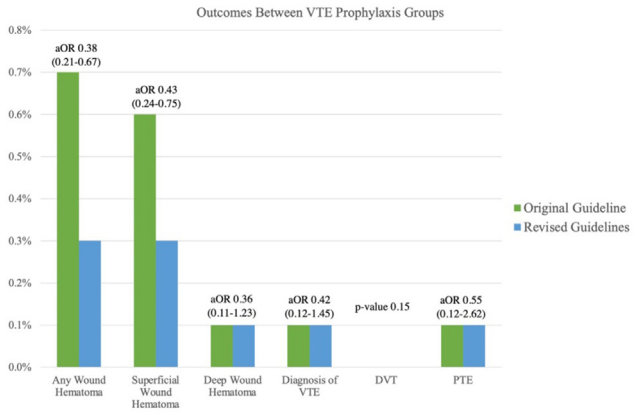
Frequency of child CVH (by composite of 4 metrics: body mass index, blood pressure, total cholesterol level, and glucose level) by HDP and GDM status (row percentage)

	All ideal	Any not ideal	≥ 1 intermediate	1 poor	≥ 2 poor
	n (%)	n (%)	n (%)	n (%)	n (%)
No HDP/GDM (n=2,570)	1,214 (47.2)	1,356 (52.8)	911 (35.4)	398 (15.5)	47 (1.8)
HDP alone (n=263)	103 (39.2)	160 (60.8)	96 (36.5)	58 (22.1)	6 (2.3)
GDM alone (n=402)	161 (40.0)	241 (60.0)	149 (37.1)	81 (20.1)	11 (2.7)
Both HDP and GDM (n=82)	31 (37.8)	51 (62.2)	26 (31.7)	22 (26.8)	3 (3.7)

Association between HDP and GDM and child CVH at 10 to 14 years[1,2]

	Any not ideal vs. all ideal (ref)	≥ 1 intermediate vs. all ideal (ref)	1 poor vs. all ideal (ref)	≥ 2 poor vs. all ideal (ref)
	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)
No HDP/GDM	Ref	Ref	Ref	Ref
HDP alone	**1.16 (1.04, 1.28)**	1.28 (0.94, 1.73)	**1.82 (1.26, 2.62)**	1.55 (0.62, 3.87)
GDM alone	**1.11 (1.02, 1.21)**	1.19 (0.93, 1.52)	**1.48 (1.09, 2.01)**	1.57 (0.78, 3.18)
Both HDP and GDM	**1.17 (1.00, 1.38)**	1.11 (0.64, 1.93)	**2.37 (1.30, 4.30)**	2.82 (0.79, 10.06)

[1]Poisson regression with robust error variance was used.
[2]Models adjusted field center, parity, maternal age at enrollment, gestational age at enrollment, pregnancy alcohol and tobacco use, child sex, and child age at CVH assessment.
Final N=3,317 mother-child dyads without maternal chronic hypertension in pregnancy and with child outcome data.
Bold findings are statistically significant associations (p<0.05).



3 Evaluation of a more restrictive, heparin-based, obstetric thromboprophylaxis protocol

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OBJECTIVE: In 2016 our institution adopted VTE prophylaxis guidelines based on ACOG recommendations. These guidelines recommended heparin-based chemoprophylaxis for those with ≥ 2 VTE risk factors (e.g. obesity, chorioamnionitis, preeclampsia). As institutional data showed increased wound hematomas and no difference in VTEs, we adopted a more restricted approach requiring ≥ 3 risk factors with fewer conditions considered risk factors (severe preeclampsia vs. all preeclampsia). Our objective was to evaluate outcomes after the implementation of this revised, more restrictive obstetric thromboprophylaxis protocol.

STUDY DESIGN: Retrospective cohort study of patients who delivered at our institution between January 1, 2016 and December 31, 2018 (original guidelines) and between December 1, 2021 and May 31, 2023 (revised guidelines). High-risk patients (thrombophilia, prior/current VTE) on antepartum anticoagulation were excluded. Our primary outcome was clinical diagnosis of wound hematoma up to 6 weeks postpartum. Secondary outcome was new diagnosis of postpartum VTE. We compared baseline characteristics and outcomes between groups and estimated adjusted odds ratios (aOR) with 95% confidence intervals (CI) of primary and secondary outcomes using the original guideline group as reference.

RESULTS: Of 17,489 patients included in our analysis, 12,430 (71%) were in the original guidelines group, and 5,029 (29%) in the revised group. Rates of chemoprophylaxis decreased by 50% - from 16% during the original guidelines to 8% after revision. Groups differed in baseline characteristics including age, race, insurance status, and comorbidities. Compared to the original guidelines, more restrictive guidelines were associated with a > 50% significant decrease in any wound hematoma (0.7% vs. 0.3%, aOR 0.38, [0.21-0.67]), specifically due to a 50% reduction in superficial wound hematomas (0.6% vs. 0.3%, aOR 0.43 [0.24-0.75]). There was no increase in VTE, DVT, or PTE (Figure).

CONCLUSION: A more conservative approach to VTE prophylaxis decreased rates of wound hematomas without an increase in postpartum VTE.

4 Cost-effectiveness of Azithromycin for the Prevention of Maternal Sepsis or Death in Planned Vaginal Births

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OBJECTIVE: Maternal sepsis is one of the top three causes of maternal death globally. In a multi-country randomized trial performed by the National Institute of Child Health and Human Development's Global Network for Women's and Children's Health Research, a single oral dose of azithromycin significantly reduced the risk of maternal sepsis or death in low- and middle-income countries (LMICs). To support policymakers considering recommendations regarding intrapartum azithromycin in LMICs, we estimate the cost per case of maternal sepsis or death averted, and the incremental cost of the intervention after accounting for cost-savings from reduced healthcare use.

STUDY DESIGN: In this cost-effectiveness analysis, we compared the costs and effects of azithromycin versus standard care using a probabilistic decision tree model informed by published results and primary data from the Azithromycin Prevention in Labor Use (A-PLUS) trial. From a healthcare sector perspective, we considered the costs of azithromycin treatment and its effect on maternal outcomes and healthcare use related to infection. We used country-specific costs and considered Zambia the median country based on the cost per day for hospital stays. Our model results represent the average of 100,000 model runs, each using a randomly selected set of parameters drawn from model distributions.

RESULTS: Azithromycin resulted in 769 maternal sepsis or death cases averted, 809 maternal infections averted and 495 maternal hospitalizations averted per 100,000 pregnancies (Table). The cost of the intervention was $90,963 per 100,000 pregnancies, or $0.91 per pregnancy. The reduction in healthcare use resulted in cost-savings for all countries except Bangladesh (which had the lowest cost for healthcare use). The median country cost-savings was $18,451 per 100,000 pregnancies.

CONCLUSION: Azithromycin in women planning a vaginal birth is a cost-saving, effective treatment to reduce maternal sepsis or death and maternal infection. This cost-savings strengthens the evidence in

support of implementing azithromycin in intrapartum care in LMICs.

Table: **Cost-effectiveness of intrapartum azithromycin expressed per 100,000 pregnancies**

	Overall						
Health outcomes (95% CI)							
Cases of sepsis or death averted	768.1 (682.6 - 821.9)						
Cases of infection averted	808.5 (688.4 - 896.7)						
Hospitalizations averted*	494.9 (525.5 - 459.7)						
Unplanned care visits averted*	859.1 (852.7 - 851.9)						
Antibiotic regimens averted (without hospitalization or unplanned care)	1,976.4 (1956.8 - 1976.5)						
YLDs averted	10.4 (11.2 - 9.3)						
Intervention cost in USD	$90,963						
	Bangladesh	**Kenya**	**DRC**	**Zambia**	**Pakistan**	**India**	**Guatemala**
Country-specific costs							
Hospital cost per day	$9.96	$21.67	$21.60	$28.00	$45.45	$48.43	$85.42
Clinic visit cost	$3.03	$11.56	$10.20	$10.64	$17.87	$13.62	$34.46
Antibiotic cost	$3.17	$7.22	$10.20	$4.87	$10.58	$7.26	$10.77
Cost-effectiveness outcomes in USD (95% CI)							
Incremental cost	$47,968	-$8,352	-$13,815	-$18,451	-$80,229	-$89,889	-$231,105
Cost per sepsis or death averted	$62	Cost-saving					
Cost per infection averted	$59	Cost-saving					
Cost per DALY averted	$4,592	Cost-saving					

Model results are based on maternal outcome and healthcare utilization probabilities and treatment effects from the A-PLUS trial, and azithromycin pricing from the 2015 International Medical Products Price Guide. All results represent the average with 95% CI of 100,000 model simulations, each using a randomly selected set of parameters drawn from model distributions. Country-specific analyses reflect healthcare utilization costs from that country. *Each hospitalization and unplanned care visit included one course of antibiotics. DRC=Democratic Republic of the Congo; CI=confidence interval; YLD=years lived with disability; USD=United States dollars; DALY=disability-adjusted life year.

5 Peripartum dapagliflozin improves late life cardiovascular outcomes in a mouse model of superimposed preeclampsia

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OBJECTIVE: Dapagliflozin (DAPA), an SGLT2 inhibitor, has been shown to improve outcomes in heart failure. We hypothesized that peripartum treatment with DAPA in a mouse model of chronic hypertension with superimposed preeclampsia would lead to a more favorable cardiovascular profile of blood pressure and potentially adverse cardiac remodeling in pregnancy and reduce the risk of later life cardiovascular pathology.

STUDY DESIGN: BPH/2J mice have chronic hypertension that worsens in pregnancy with proteinuria and elevated sFLT level (Fig.1). We randomly assigned 14 BPH/2J mice to dapagliflozin chow (N=7) versus control chow (N=7) from early gestation (E4) through the postpartum period (E21 + 21 days). Blood pressures were measured by an implanted telemetry device. Echocardiograms were obtained pre-pregnancy, in late gestation (E18), and in late life (9 months aged) along with obstetric ultrasounds.

RESULTS: Mid-gestation systolic blood pressures were higher in the control group than the DAPA group (Fig.1, P=2.53e-05), but comparable in early and late gestation. Controls had higher aortic peak velocities in late pregnancy compared to the DAPA group (745.8 vs 596.5 mm/s, P=0.02). Left ventricular base strain in pregnancy was higher in the control group (5.2 vs -1.7% in the DAPA group, P=3.58 e-03), though left ventricular ejection fractions were similar. There were no differences in estimated fetal weights or amniotic fluid levels between groups. In late life, the control group had a significant loss of left ventricular function from their pre-pregnancy baseline, whereas mice treated with DAPA during pregnancy had relatively preserved left ventricular function (-17% vs -5% change, P=0.02, Fig,1). There was no difference in late life systolic blood pressure or pulse pressure between groups.

CONCLUSION: DAPA treatment only during the peripartum period results in subtle differences in blood pressure and cardiac function during pregnancy for mice with superimposed preeclampsia, but is associated with a significant improvement in both clinical and echocardiographic measures of late life cardiovascular function.

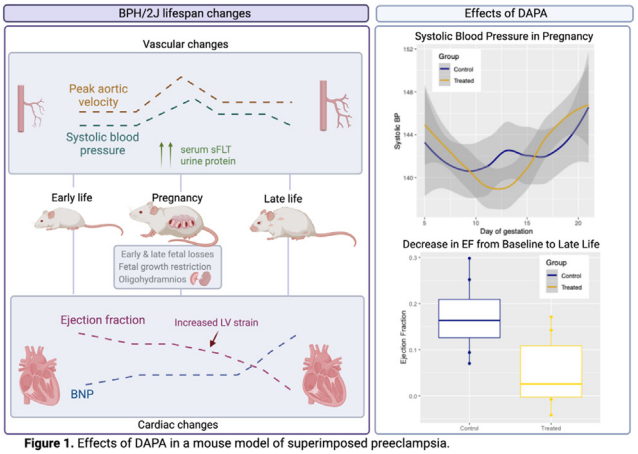

Figure 1. Effects of DAPA in a mouse model of superimposed preeclampsia.

6 Effect of supplemental oxygen for Category II resuscitation on oxidative stress: a randomized controlled trial

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OBJECTIVE: The Association of Women's Health, Obstetric and Neonatal Nurses recently recommended continued use of supplemental oxygen (O_2) for intrauterine resuscitation despite ACOG recommendations to the contrary. There is a need to address the safety of this practice given neonatal and adult literature that demonstrate a link between excess O_2 exposure and free radical-mediated oxidative cell damage. We tested the hypothesis that O_2, compared with room air (RA), for Category II fetal heart tracings (FHT) is associated with an increase in umbilical artery (UA) and maternal measures of oxidative stress.

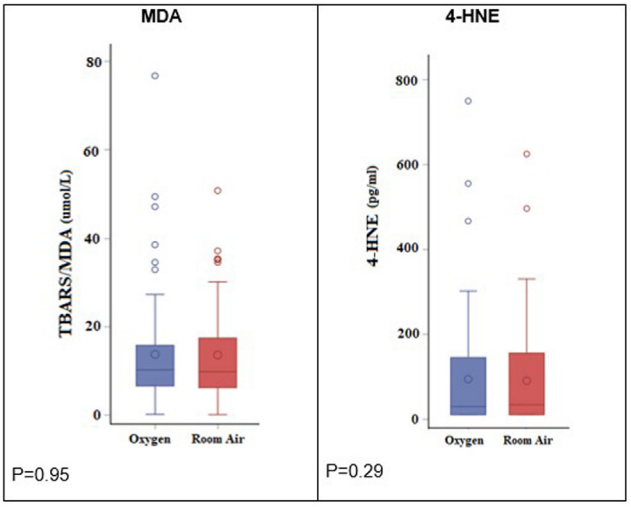
STUDY DESIGN: This was a single-center randomized controlled trial. Singleton pregnancies ^{3} 37 weeks with Category II FHT necessitating intrauterine resuscitation in active labor were randomized to RA or 10L/min O_2 by face mask until delivery. The primary outcomes were two UA markers of oxidative stress via free radical-mediated lipid peroxidation: malondialdehyde (MDA) and 4-hydroxynonenal (4-HNE). They were measured using commercially available thiobarbituric acid and competitive ELISA reactive substances' assays. Secondary outcomes were maternal plasma MDA and 4-HNE at time of delivery, UA cord gases, and mode of delivery.185 patients were needed for 80% power to detect a 10% difference in UA MDA levels between groups. We increased the sample size to 212 to accommodate 15% loss to unattainable UA samples. Analysis was by intention-to-treat.

RESULTS: Of the 212 patients randomized, 153 had UA samples that were adequate for oxidative stress analysis; 74 O_2 and 79 RA. Baseline characteristics and alternate intrauterine resuscitation techniques were similar between groups. There was no difference in median UA MDA or 4-HNE between O_2 and RA groups (**Figure**).

There was no difference in maternal MDA or 4-HNE, UA gases, or mode of delivery between groups.

CONCLUSION: Among patients with Category II FHT in active labor, intrauterine resuscitation with supplemental O_2 is not associated with an increase in fetal or maternal lipid peroxidation markers. Clinical outcomes were similar between O_2 and RA groups.

Figure: Umbilical artery malondialdehyde (MDA) and 4-hydroxynonenal (4-HNE) in patients randomized to Oxygen versus Room air



7 Association of Postpartum Oxytocin Dose and Postpartum Hemorrhage

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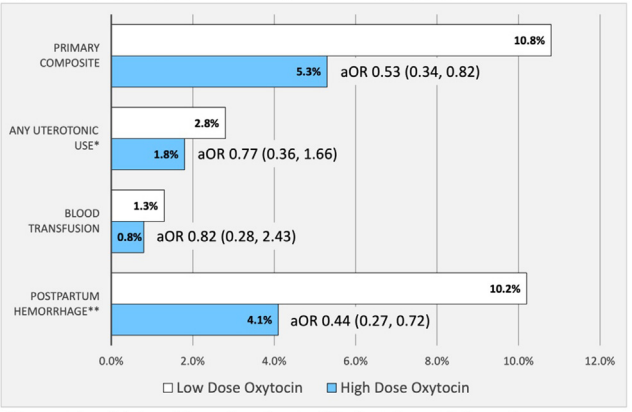
OBJECTIVE: The most effective dose of prophylactic oxytocin for the prevention of postpartum hemorrhage (PPH) is unknown. Our objective was to compare rates of PPH and the need for additional PPH interventions between postpartum (PP) high dose (80 units) and lower dose (10-30 units) oxytocin regimens.

STUDY DESIGN: Secondary analysis of a multicenter randomized control trial of 2,404 nulliparous women between 5/2014-12/2017 with term singleton pregnancies that investigated immediate versus delayed pushing in women in the 2nd stage. PP oxytocin regimens were ascertained from each of the 6 participating centers and categorized as high dose (80 units/500 mL over 1 hour after placental delivery) and lower dose (10-30 units/500-1000 mL over 1-4 hours). The primary outcome was a composite of uterotonic use, any blood transfusion, and PPH (see figure footnote). Secondary outcomes included individual composite components. Outcomes were compared between groups and logistic regression was used to estimate adjusted odds ratios and 95% confidence intervals using the lower dose group as the reference.

RESULTS: All 2,404 patients from the primary RCT were included: 455 (19%) in the high dose group and 1,949 (81%) in the lower dose group. Women in the high dose group were more likely to be younger, African American, obese, have magnesium sulfate exposure, and achieve vaginal delivery. Compared to lower dose oxytocin, patients receiving higher oxytocin doses had nearly a 50% reduction in odds of the primary composite outcome (aOR 0.53 [95% CI 0.34, 0.82]), primarily driven by a >50% decreased odds of PPH (aOR 0.44 [0.27-0.72])(Figure). While frequencies of other secondary outcomes were lower in the high dose group; there was no difference in odds of these outcomes after multivariable adjustment. Stratified analysis of low (10-20 units), moderate (30 units), and high dose (80 units) was consistent with primary results.

CONCLUSION: High dose PP oxytocin was associated with lower rates of PPH than traditional oxytocin doses. Future multicenter trials of PP oxytocin dose should be performed to improve outcomes.

Figure. Percentage of postpartum bleeding outcomes with adjusted odds ratios



*Any uterotonic use includes methylergonovine, carboprost, additional oxytocin, or rectal misoprostol.
**Postpartum hemorrhage is defined by EBL >500 mL for vaginal delivery and >1000 mL for cesarean section.
***Odds ratios are adjusted for delivery mode and race based on parsimonious modeling. Odds ratios are listed as aOR (95% CI).

8 A Randomized Controlled Trial (RCT) of Laser Surgery in Twin-Twin Transfusion Syndrome: The Sequential Trial

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OBJECTIVE: Sequential laser surgery in TTTS has been associated with improved donor twin survival in observational studies compared with the conventional selective technique (91% vs. 80%). In the sequential technique the arteriovenous (AV) communications from the volume-depleted donor to the volume-overloaded recipient twin are occluded before those from recipient to donor. In the selective technique, the anastomoses are occluded in no particular sequence. The trial tested whether: (1) the sequential technique improves donor survival compared to the selective technique; (2) intraoperative timing of laser ablation of superficial anastomoses (arterioarterial/venovenous) affects donor twin survival.

STUDY DESIGN: TTTS patients were randomized to sequential vs selective surgery. The study had >80% power to detect a 10% difference in donor survival. Nested within the trial, a second RCT randomized patients with superficial anastomoses to ablation of these connections first (before ablating the AV anastomoses) vs last. Trial registration: NCT02122328.

RESULTS: Over 12 years, 642 patients were randomly allocated to sequential vs selective techniques. The frequency of donor survival was 85.6% (274/320) and 84.2% (271/322), respectively (OR 1.12

[0.73-1.73], p=0.60). Thirty-day survival did not differ between the two groups (Table). The postoperative mean peak systolic velocity in the middle cerebral artery (MCA-PSV) was lower in the sequential vs selective group (1.00 ± 0.30 vs 1.06 ± 0.30 MoM, p=0.003). Superficial anastomoses occurred in 27.4% (176/642) of cases; donor survival was 71.0% (125/176) in those with superficial anastomoses vs 90.1% (420/460) in those without (OR 0.27 [0.17-0.42], p< 0.0001). In cases with superficial anastomoses, donor survival was independent of timing of ablation or surgical technique.

CONCLUSION: The primary outcome, donor survival, did not differ between the sequential and the selective techniques. Superficial anastomoses were associated with lower donor survival, which was independent of timing of occlusion or technique. The significance of the MCA-PSV results is unknown.

Table. Perinatal outcomes.

Outcome	Sequential Group N=320	Selective Group N=322	p-value
Alive at birth			
Donor (primary outcome)	85.6% (274)	84.2% (271)	0.7
Recipient	94.1% (301)	93.5% (301)	0.9
30-day survival			
Donor	82.2% (263)	80.7% (260)	0.7
Recipient	90.6% (290)	89.4% (288)	0.7
Dual survival	79.1% (253)	76.7% (247)	0.5
At least 1 survivor	93.8% (300)	93.5% (301)	0.9
30-day survival of donor by Stage			
Stage I	90.0% (45/50)	92.6% (50/54)	0.7
Stage II	87.8% (72/82)	84.5% (60/71)	1.0
Stage III D, D/R	73.1% (38/52)	64.1% (41/64)	1.0
Stage III R	79.5% (93/117)	78.5% (84/107)	0.8
Stage IV	78.9% (15/19)	96.2% (25/26)	0.2

LB01 Development of post-acute sequelae of SARS-CoV-2 (PASC) after infection in pregnancy: NIH RECOVER-Pregnancy Cohort

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OBJECTIVE: To estimate the prevalence of post-acute sequelae of SARS-CoV-2 infection (PASC or long COVID) after infection with SARS-Cov-2 during pregnancy, and characterize associated risk factors.

STUDY DESIGN: In a prospective, multicenter observational cohort study, individuals who had SARS-CoV-2 infection during pregnancy were enrolled across 41 sites from December 2021 through August 2023. The primary outcome was presence of PASC, as defined by the NIH RECOVER Consortium based on symptoms and severity, at least 6 months after first SARS-CoV-2 infection. Risk factors for PASC were evaluated including sociodemographic and pre-existing clinical characteristics, and SARS-CoV-2 infection severity (oxygen requirement). Univariable and multivariable logistic regression models, with multiple imputation for missing data, were fitted to estimate associations between these characteristics and presence of PASC.

RESULTS: Overall 1,503 participants were included; 61% had an index SARS-CoV-2 infection on or after December 1, 2021 (i.e., during Omicron variant dominance); and 51% were fully vaccinated prior to infection. The prevalence of PASC at first study visit 6 months or more after infection was 9.3% (95% CI 7.9-10.9%). The most common defining symptoms among individuals with PASC were post-exertional malaise (82%), fatigue (75%) and dizziness (62%). In a multivariable model, obesity (aOR 1.63, 95% CI 1.13-2.44), preexisting depression or anxiety disorder (aOR 2.64, 95% CI 1.80-3.87), economic hardship (self-reported difficulty covering expenses) (aOR 1.66, 95% CI 1.11-2.48), and treatment with oxygen during infection (aOR 1.88, 95% CI 1.01-3.50), were associated with increased odds of developing PASC in a multivariable model (Table).

CONCLUSION: PASC prevalence after SARS-CoV-2 infection during pregnancy was lower than published NIH RECOVER-Adult cohort estimates of 23%. This finding may reflect differential immune response in pregnancy, differences in sampling strategies, or lower rates of pre-existing comorbidities. Several socioeconomic and clinical characteristics were associated with the development of PASC.

Table. Demographic and Clinical Characteristics by PASC Status and Modeling Results

Characteristic	PASC Positive (n=140)	PASC Indeterminate (n=1363)	Unadjusted OR (95% CI)	aOR (95% CI)
Age at index infection, mean (SD)	32 (5)	32 (5)	1.00 (0.96, 1.03)	1.03 (0.99, 1.07)
Index infection pre-Omicron era (<2021/12/01)	72/140 (51%)	513/1363 (38%)	1.75 (1.24, 2.49)	1.38 (0.84, 2.28)
Medicare or Medicaid or No Insurance reported at enrollment	49/140 (35%)	377/1360 (28%)	1.40 (0.97, 2.03)	1.02 (0.64, 1.63)
Covering expenses reported Somewhat or Very Difficult at enrollment	81/140 (58%)	550/1360 (40%)	2.02 (1.42, 2.88)	1.66 (1.11, 2.48)
Discrimination index at enrollment, mean (SD) [OR for a 10-point increase]	2 (1)	1 (1)	1.44 (1.16, 1.78)	1.15 (0.91, 1.46)
Not fully vaccinated two weeks prior to index infection	87/140 (62%)	644/1361 (47%)	1.83 (1.28, 2.61)	1.41 (0.83, 2.42)
Any tobacco use (or prefer not to answer) in year prior to index infection	24/140 (17%)	154/1352 (11%)	1.61 (1.01, 2.58)	1.04 (0.62, 1.74)
Obesity during year prior to index infection	52/137 (38%)	298/1336 (22%)	2.14 (1.48, 3.10)	1.63 (1.11, 2.41)
Any of Asthma, CVD, Diabetes, or rheumatic/autoimmune disease present during year prior to index infection	55/139 (40%)	384/1352 (28%)	1.65 (1.15, 2.37)	1.27 (0.87, 1.86)
Depression or anxiety disorder during year prior to index infection	81/136 (60%)	470/1334 (35%)	2.72 (1.90, 3.90)	2.76 (1.87, 4.06)
Number of prior pregnancies, mean (SD)	3 (2)	2 (2)	1.07 (0.98, 1.17)	0.98 (0.88, 1.09)
Oxygen treatment of index acute SARS-CoV-2 infection	17/139 (12%)	77/1347 (6%)	2.32 (1.33, 4.04)	1.88 (1.01, 3.50)
Trimester of pregnancy at infection				
First Trimester	21/127 (17%)	224/1281 (17%)		Reference
Second Trimester	41/127 (32%)	444/1281 (35%)	0.95 (0.54, 1.67)	0.83 (0.47, 1.49)
Third Trimester	65/127 (51%)	613/1281 (48%)	1.09 (0.65, 1.84)	0.86 (0.49, 1.48)

Odds ratios reported from unadjusted univariable logistic regression models. Adjusted odds ratios reported from multivariable logistic regression model with all variables shown included as covariates. Regression models fit after multiple imputation of missing values.
Abbreviations: Post-Acute Sequelae of SARS-CoV-2 (PASC); Standard Deviation (SD); Odds Ratio (OR); Adjusted Odds Ratio (aOR); Confidence Interval (CI); CVD: Cardiovascular Disease

Oral Plenary Session II
Fellows Plenary and Late-Breaking

Abstracts 9–16, LB02, and LB03

TUESDAY
February 13, 2024
8:00 am – 10:30 am

MODERATOR(S)

Bryann Bromley, MD

Kristin Gerson, MD, PhD

FELLOWS PLENARY AND LATE-BREAKING

9 Pessary or Cerclage (PC Study) to prevent recurrent preterm delivery – a randomized controlled trial

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OBJECTIVE: Women with previous spontaneous preterm birth (sPTB) are at increased risk of recurrent PTB. Cervical cerclage has been proven effective in preventing recurrent PTB in women with multiple preterm births (history indicated) or a previous sPTB and a midpregnancy short cervix ≤ 25 mm (ultrasound indicated). We hypothesized that a cervical pessary might be non-inferior to cerclage.

STUDY DESIGN: This was an international, open-label, multi-center, non-inferiority, randomized controlled trial in 21 hospitals in the Netherlands and Switzerland. We included women with a singleton pregnancy with prior sPTB < 34 weeks and an obstetric history or ultrasound guided indication for an intervention. Participants were randomised (1:1 ratio) to pessary or cerclage, stratified per centre and indication. Primary outcome was PTB < 32 weeks. Secondary outcomes included obstetric, neonatal and maternal outcomes. Analysis was by intention-to-treat. Treatment effect was expressed as relative risk (RR) and 95% confidence intervals (CI). The non-inferiority margin for pessary was set at 10%, resulting in a sample size of 400 women. After the third interim analysis, recruitment was halted due to safety concerns and the apparent challenge in establishing non-inferiority of pessary treatment. (ICTRP Trial registration: NTR4415)

RESULTS: From March 2014 to December 2022, we randomized 261 participants to pessary (n=133) or cerclage (n=128). The primary outcome PTB < 32 weeks occurred in 33.8 % after pessary versus 24.0 % after cerclage (RR 1.4 , 95 % CI 0.95 – 2.1, p-value 0.09). Nearly all other PTB rates and obstetric outcomes significantly favored cerclage. Neonatal outcomes favored cerclage, although not statistically significant (Table).

CONCLUSION: In women with a singleton pregnancy, previous sPTB and an indication for an additional intervention based on obstetric history or a short cervix, we could not proof non-inferiority of cervical pessary compared to cerclage in preventing recurrent PTB. Women with an indication for additional treatment should be treated with cerclage.

	Pessary N=130	Cerclage N=125	RR (95% CI)	p-value
Obstetric outcomes				
Time to delivery (days), mean (SD)	101.4 (±56.4)	117.7 (±50.0)	NA	0.02
GA at delivery (weeks), mean (SD)	33^{+0} (±7.3)	34^{+5} (±6.6)	NA	0.046
PTB < 37 weeks	66 (50.8%)	49 (39.2%)	1.3 (0.97 – 1.7)	0.08
sPTB < 37 weeks	59 (45.4%)	37 (29.6%)	1.5 (1.1 – 2.1)	0.02
PTB < 34 weeks	52 (40.0%)	32 (25.6%)	1.5 (1.1 – 2.2)	0.02
sPTB < 34 weeks	48 (36.9%)	23 (18.4%)	2.0 (1.3 – 3.0)	0.002
PTB < 32 weeks (primary outcome)	***44 (33.8%)***	***30 (24.0%)***	***1.4 (0.95 – 2.1)***	***0.09***
sPTB < 32 weeks	41 (31.5%)	21 (16.8%)	1.9 (1.2 – 2.9)	0.008
PTB < 28 weeks	41 (31.5%)	24 (19.2%)	1.6 (1.1 – 2.5)	0.03
sPTB < 28 weeks	38 (29.2%)	18 (14.4%)	2.0 (1.2 – 3.3)	0.006
PTB < 24 weeks	21 (16.2%)	14 (11.2%)	1.4 (0.77 – 2.7)	0.26
sPTB < 24 weeks	20 (15.4%)	10 (8.0%)	1.9 (0.93 – 3.9)	0.08
Neonatal outcomes				
Composite neonatal outcome#	42 (32.3%)	29 (23.2%)	1.4 (0.93 – 2.1)	0.10
Perinatal death	29 (22.3%)	18 (14.4%)	1.5 (0.91 – 2.6)	0.11
Still birth	23 (17.7%)	14 (11.2%)	1.6 (0.85 – 2.9)	0.15
Neonatal death	6 (4.6%)	4 (3.2%)	1.4 (0.42 – 5.0)	0.57

Table – Obstetric and neonatal outcomes
GA: gestational age; sPTB: spontaneous preterm birth
 # Presence of chronic lung disease; IVH grade III or IV; PVL > grade 1; NEC > stage 1; Retinopathy of prematurity; Patent ductus Arteriosus; Treated seizures; Culture proven sepsis; Meningitis and/or perinatal death.

10 Optimal Misoprostol Dosing Among Patients with a BMI Greater Than 30: A Randomized Controlled Trial

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OBJECTIVE: Patients with obesity have longer lengths of labor with increased risk of perinatal morbidity. It is unclear whether the same dose of misoprostol should be used for induction of labor in obese compared to non-obese women. We aimed to determine if 50mcg (compared to 25mcg) of vaginal misoprostol reduces the time from induction start to delivery in obese patients.

STUDY DESIGN: Double-blinded, pragmatic randomized controlled trial, between June 2022, and July 2023. Patients with a BMI ≥ 30 kg/m^2 undergoing labor induction ≥ 36 weeks, singleton gestations, and a cervical dilation ≤ 3cm on admission, were included. Patients were randomized to 25 or 50 mcg of vaginal misoprostol. The primary outcome was time from induction to delivery. A priori, we estimated 90 subjects per group (N=180). This is based on 18 +/- 6 hours for time to delivery in the control (25mcg), alpha of 5%, and an 85% power to detect a 3-hour difference. Analysis was intention-to-treat. A two-sample t-test was used for the primary outcome, Cohen's *d* as a measure of effect, and P values were reported. Logistic regression was used to analyze secondary outcomes.

RESULTS: Of the 180 patients, 88 were assigned to the 25mcg group and 92 were assigned to the 50mcg group. Baseline characteristics were similar between groups. No difference was found in the primary outcome of time to delivery (21.59 hrs vs. 18.56 hrs; $d = 0.28$; 95% CI, -0.02-0.57). In a planned subgroup analysis, multiparous patients delivered faster in the 50mcg group (15.19 hrs. vs. 11.97 hrs; $d = 0.51$; 95% CI, 0.04-0.97). The rate of tachysystole was rare overall (2.2%) and non-significant between groups. No differences in maternal or neonatal adverse effects were observed.

CONCLUSION: Obese patients undergoing cervical ripening with 50mcg of vaginal misoprostol experienced similar time to delivery when compared to 25mcg. However, multiparous patients had a significantly reduced time to delivery when 50mcg was used. A higher dose of misoprostol may be a promising intervention for reducing time in labor by an average of 3 hours which warrants further study.

Primary Outcomes	25 mcg (n=88)	50 mcg (n=91)		
	Mean (SD)	Mean (SD)	*d* (95% CI)	P-value
Time to Delivery				
Overall (N=179)	21.59 (11.11)	18.56 (9.92)	0.28 (-0.02,0.57)	0.065
Nulliparous (n=106)	26.24 (11.43)	22.87 (10.00)	0.26 (-0.12,0.64)	0.187
Multiparous (n=73)	15.19 (6.67)	11.97 (4.98)	**0.51 (0.04, 0.97)**	**0.034**
Foley (n=109)	23.50 (11.91)	20.45 (10.53)	0.22 (-0.16, 0.59)	0.258
No Foley (n=70)	18.25 (8.77)	15.92 (8.44)	0.34 (-0.14,0.81)	0.164
BMI > 40 (n=50)	24.96 (12.76)	22.50 (11.55)	0.12 (-0.44, 0.67)	0.685
BMI 30-39 (n=129)	20.18 (10.3)	17.15 (8.95)	**0.34 (0.00,0.69)**	**0.055**
Time to Active Labor				
Overall (N=148)	16.76 (9.51)	14.31 (8.17)	0.28 (-0.05,0.60)	0.096
Nulliparous (n=76)	20.49 (10.63)	18.00 (8.94)	0.22 (-0.23, 0.67)	0.347
Multiparous (n=72)	13.03 (6.47)	10.20 (4.57)	**0.47 (0.00,0.93)**	**0.051**
	n (%)	n (%)	OR (95% CI)	P-value
Delivery within 24 hours				
Overall (N=179)	54 (30.0)	66 (36.7)	1.60 (0.86, 2.98)	0.141
Nulliparous (n=106)	21 (19.6)	30 (28.0)	1.64 (0.72, 3.81)	0.276
Multiparous (n=73)	33 (45.2)	36 (49.3)	---	--
Delivery within 12 hours				
Overall (N=179)	23 (12.8)	29 (16.1)	1.30 (0.68, 2.49)	0.426
Nulliparous (n=106)	8 (7.5)	8 (7.5)	0.89 (0.27, 3.01)	>0.999
Multiparous (n=73)	15 (20.5)	21 (28.8)	2.03 (0.73, 5.79)	0.198
Cesarean Delivery				
Overall (N=179)	24 (13.4)	25 (14.0)	0.99 (0.51, 1.91)	0.976
Nulliparous (n=106)	22 (20.8)	23 (21.7)	1.06 (0.49, 2.28)	0.891
Multiparous (n=73)	2 (2.7)	2 (2.7)	---	--
Secondary Outcomes	25 mcg (n=88)	50 mcg (n=91)		
	Median (IQR)	Median (IQR)		P-value
APGAR Score 1 minute				
Overall (N=179)	8 (7.5, 8)	8 (8, 8)		0.634
APGAR Score 5 minutes				
Overall (N=179)	9 (9,9)	9 (9,9)		0.467
	n (%)	n (%)	OR (95% CI)	P-value
Postpartum Hemorrhage				
Overall (N=179)	17 (9.5)	12 (6.7)	0.63 (0.28, 1.42)	0.268
Tachysystole with associated FHT changes *				
Overall (N=179)	2 (1.1)	2 (1.1)		>0.999
Terbutaline*				
Overall (N=179)	1 (0.6)	2 (1.1)		>0.999
Endometritis*				
Overall (N=179)	2 (1.1)	3 (1.7)		0.313

* P-value calculated using Fisher's exact test, no OR were calculated due to small cell sizes

11 Donor velamentous cord insertion: an omen for poor laser outcomes?

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OBJECTIVE: Velamentous cord insertion (VCI) occurring in monochorionic diamniotic (MCDA) pregnancies has been associated with the occurrence of twin-twin transfusion syndrome (TTTS) and adverse outcomes. However, literature associating VCI with TTTS fetoscopic laser surgery (FLS) outcomes is limited. This study aims to determine the impact of donor twin VCI (dVCI) detected on sonogram in a cohort of twin pregnancies that underwent FLS for TTTS.

STUDY DESIGN: This is a retrospective cohort study of MCDA twins that underwent FLS at a single fetal care center from 2009-22. Pregnancies with dVCI were compared to those without dVCI. Primary outcome was dual survival at time of first sonogram done after FLS. Secondary outcomes included gestational age (GA) at time of TTTS diagnosis, at time of FLS, and at time of delivery, as well as survival to neonatal intensive care unit (NICU) discharge. Categorical values were compared using chi-square or Fisher's exact test while continuous variables were compared using Kruskal-Wallis test.

RESULTS: Of the 226 MCDA pregnancies that underwent FLS, 57 were excluded (12 triplet gestations, 39 without documented cord insertion data, and 6 with incomplete data after FLS). Of the 169 remaining twins, there were 62 (37%) dVCI and 107 (63%) without dVCI. TTTS staging distribution and GA at time of diagnosis were similar between groups. Pregnancies with dVCI underwent FLS at an earlier GA compared to pregnancies without dVCI (19.5 weeks vs 20.4 weeks, $p< 0.05$). There was no difference in GA at time of delivery between groups.

Dual twin survival at first sonogram post-FLS was 71% in the dVCI group, compared to 89% without dVCI ($p< 0.01$). Subgroup analysis of 127 pregnancies (75%) with complete delivery data demonstrated the rate of dual twin survival to NICU discharge was 54% in the dVCI group compared to 73% without dVCI ($p< 0.05$).

CONCLUSION: In MCDA twin pregnancies undergoing FLS for TTTS, dVCI was associated with earlier fetal intervention and decreased likelihood of dual twin survival. These findings can help guide counseling of patients with MCDA twins with dVCI affected by TTTS.

Fetoscopic laser surgery for TTTS in pregnancies with and without donor twin VCI			
	Donors with VCI (n=62)	Donors without VCI (n=107)	P value *
Quintero stage n (%)			
I	10 (16%)	18 (17%)	p = 0.90
II	18 (29%)	26 (24%)	
III	31 (50%)	56 (52%)	
IV	3 (5%)	7 (7%)	
GA at TTTS diagnosis (weeks)	19.6 +/- 2.7 [19.0 - 20.3]	19.8 +/- 2.6 [19.3 - 20.3]	p = 0.60
GA at FLS (weeks)	19.5 +/- 2.1 [19.9 - 20.0]	20.4 +/- 2.7 [19.9 - 20.9]	p = 0.04 *
Twin survival at first sonogram post-FLS (done within 5 days)			
Dual survivor	44 (71%)	95 (89%)	p < 0.01 *
Single survivor	14 (23%)	10 (9%)	p = 0.02 *
At least 1 survivor	58 (93%)	105 (98%)	p = 0.12
GA at delivery (weeks)	32.1 +/- 4.8 [30.6 - 33.6]	31.9 +/- 3.7 [31.1 - 32.8]	p = 0.57
Twin survival to NICU discharge ++	n=48	n=79	
Dual survivor	26 (54%)	58 (73%)	p = 0.03 *
Single survivor	13 (27%)	15 (19%)	p = 0.29
At least 1 survivor	39 (81%)	73 (92%)	p = 0.06

GA = gestational age; VCI = velamentous cord insertion; FLS = fetoscopic laser surgery
Data are in n (%), mean +/- SD [95% CI]
* denotes significance
++ subgroup analysis of pregnancies with complete delivery data available

12 Outpatient Induction of Labor – Primary Outcome Results from the HOME INDUCTION Randomized Controlled Trial

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OBJECTIVE: The ARRIVE Trial has resulted in an increased demand for 39 week induction of labor (IOL) in normal-risk nulliparous patients, but this creates significant logistical challenges for over-stretched delivery units. A potential innovation is commencing induction by means of outpatient cervical ripening at home(H-IOL), using vaginal prostaglandin(Propess/Cervidil) or osmotic cervical dilator(Dilapan-S). Before widespread implementation however, there is a critical need for prospective data on safety and efficacy of H-IOL methods.

STUDY DESIGN: We randomized healthy nulliparous women, who had agreed to elective IOL at 39 weeks, to one of 3 forms of initial cervical ripening at home: 12 hours of Dilapan(D12), 24 hours of Dilapan(D24), or 24 hours of Propess(P24). Participants began the IOL process in hospital and returned home for 12/24 hours, following which they returned to the hospital to complete their delivery. The primary objective was to confirm relative safety and efficacy of the 3 protocols, using a non-inferiority analysis of Dilapan to Propess within a 10% margin. The primary outcome was failure to achieve vaginal delivery.

RESULTS: 327 women were recruited and randomised at 38 weeks, with 271 completing induction. D24 and P24 had similarly high rates of vaginal delivery of 75% vs 76%, respectively. D12 had a lower vaginal delivery rate of 64% and the criteria for non-inferiority of Dilapan to P24 were not met (difference of -6%, 95% CI= -17%,5%). While hyperstimulation was more likely with P24, this had no clinical consequences.

CONCLUSION: This RCT has confirmed similarly high vaginal delivery rates for both D24 and P24, with 75% of patients successfully delivering vaginally, and with no significant adverse maternal or

neonatal outcomes. This study empowers obstetricians to embrace outpatient H-IOL as a highly effective solution for handling the increasing numbers of nulliparous patients requesting 39 week induction. Use of either cervical ripening method enables patients to stay home for a large part of the IOL process, thereby significantly reducing resource demands in the Labor Ward.

Maternal outcomes			All (N=271)	Dilapan 24hr (N=96)	Dilapan 12hr (N=88)	Propess (N=87)	P-value
Gestational age at delivery (weeks)			39 [39,40]	40 [39,40]	39 [39,40]	39 [39,40]	0.064
Induction to delivery time (hours)			43 [33,52]	47 [42,58]	35 [31,46]	42 [29,52]	-
Induction agent: Removal to delivery time (hours)			21 [14,30]	22 [18,32]	20 [15,29]	20 [10,29]	0.574
Mode of Delivery	Vaginal delivery	All	194 (72%)	72 (75%)	56 (64%)	66 (76%)	0.272
		SVD	111 (41%)	40 (42%)	33 (38%)	38 (44%)	
		OVD	83 (31%)	32 (33%)	23 (26%)	28 (32%)	
	Cesarean delivery	All	77 (28%)	24 (25%)	32 (36%)	21 (24%)	
Shoulder dystocia			3 (1%)	1 (1%)	1 (1%)	1 (1%)	0.997
Obstetric anal sphincter injury			8 (3%)	3 (3%)	1 (1%)	4 (5%)	0.398
Postpartum haemorrhage >1000cc			17 (6%)	4 (4%)	6 (7%)	7 (8%)	0.540
Neontatal outcomes							
Liveborn	Yes		271 (100%)	96 (100%)	88 (100%)	87 (100%)	n/a
	No		0	0	0	0	
Birthweight (g)			3464 (353)	3507 (353)	3408 (392)	3473 (307)	0.160
Apgar < 7 at 5 min			3 (1%)	1 (1%)	2 (2%)	0	0.355
NICU admission			14 (5%)	7 (7%)	4 (5%)	3 (3%)	0.478
Cord pH (arterial)			7.2 (0.1)	7.2 (0.1)	7.2 (0.1)	7.2 (0.1)	0.440
Cord pH (venous)			7.2 (0.5)	7.1 (0.8)	7.3 (0.1)	7.3 (0.1)	0.257
Antibiotic for suspected infection			23 (8%)	10 (10%)	6 (7%)	7 (8%)	0.671
Antibiotic for confirmed infection			1 (0%)	1 (1%)	0	0	0.400

Table 1: Maternal and neonatal outcomes from the HOME INDUCTION RCT: Overall and stratified by study group.
Results presented are: n (%) and median [IQR].

13 The effect of enhanced recovery after surgery (ERAS) on neonatal glucose: A randomized, equivalence trial

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OBJECTIVE: Enhanced recovery after surgery (ERAS) is a protocol aimed at improving surgical recovery and is becoming the standard of care for women undergoing cesarean delivery. The protocol includes a pre-operative carbohydrate-containing drink. While the protocol appears to benefit the mother, the potential effects on the neonate are unknown. Our objective was to determine if administration of a pre-operative carbohydrate drink prior to cesarean delivery influences neonatal blood glucose.

STUDY DESIGN: We performed a randomized, controlled, equivalence trial of non-diabetic patients with term, non-anomalous pregnancies undergoing cesarean delivery. Participants were randomized to receive a pre-operative drink containing 50-g of carbohydrate or to a control group, who remained fasting. The primary outcome was neonatal glucose at 1-2 hours of life. Secondary outcomes included neonatal glucose at 24 hours of life, neonatal hypoglycemia (glucose $<$ 45 mg/dL), NICU admission, and other maternal and neonatal outcomes. *A priori* sample size of 108 was calculated using an equivalence margin of 10 mg/dl, and a power of 90%.

RESULTS: From October 2021 to April 2023, of 352 scheduled cesarean deliveries, 214 were eligible, and 108 agreed to enrollment and randomization with two withdrawals. Clinical characteristics were similar between groups (Table). Neonatal glucose at 1-2 hours of life was not equivalent between groups (TOST upper, $P = .366$; TOST lower, $P < .001$). Additionally, the incidence of neonatal hypoglycemia increased in the drink group (Table). No neonate had an Apgar score < 7 at 5 minutes of life and neonatal glucose at 24 hours of life was equivalent (TOST upper, $P < .001$; TOST lower, $P < .001$).

CONCLUSION: Neonatal glucose at 1-2 hours of life after maternal consumption of a carbohydrate drink was not equivalent to fasting. Maternal benefit should be weighed against the risk of neonatal hypoglycemia when considering adopting the ERAS protocol for cesarean delivery.

Table: Clinical characteristics and outcomes

Characteristics	Control (n=53)	Drink (n=53)	*P*-value
Age (years)	30.36 ± 5.9	29.68 ± 5.83	0.553
Hispanic ethnicity	28 (52.8)	27 (50.9)	0.85
Race Black White Other/Unknown	 1 (1.9) 43 (81.1) 9 (17)	 0 (0) 46 (86.8) 7 (13.2)	0.598
BMI (kg/m^2) at delivery	36.13 ± 6.39	34.6 ± 6.86	0.246
GA at delivery (weeks)	39 (38.57 - 39.14)	39 (39 - 39)	0.446
Birth weight (g)	3416.04 ± 432.69	3361.42 ± 480.88	0.540
Outcomes			
Neonatal glucose 1-2 hours (mg/dl)	50.00 ± 14.61	40.93 ± 13.18	TOST P-upper 0.366 P-lower < 0.001
Neonatal glucose 24 hours (mg/dl)	63.16 ± 13.74	61.38 ± 10.89	TOST P-upper < 0.001 P-lower < 0.001
Neonatal hypoglycemia	19 (35.85)	30 (56.60)	0.032
NICU admission for hypoglycemia	4 (7.55)	8 (15.01)	0.220

Data are mean ± SD, median (interquartile range), or n (%)

14 Persistent Programming of Offspring Gut Serotonin Pathway by Maternal Western-Style Diet in Non-Human Primates

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OBJECTIVE: Anxiety is a mood disorder associated with low levels of serotonin. Over 95% of the body's serotonin is produced in the gut by enterochromaffin cells, and it affects the brain and behavior via signaling at the vagus nerve (the gut-brain axis). We have previously shown that non-human primate offspring exposed to maternal Western-Style diet (WSD) display anxiety persistent into juvenile life. To investigate the connection between maternal WSD and serotonin as a mechanism for the observed anxiety, we hypothesized that maternal WSD can persistently program offspring gut enterochromaffin cells.

STUDY DESIGN: Macaques were fed WSD or Chow control diet during gestation/lactation. Offspring were sampled at fetal necropsy (late third-trimester, n=4) or born vaginally and weaned onto a Chow diet for sampling at 3 years of age (peripuberty, n=8) (Fig. 1A). *Ex vivo* intestinal organoids were generated from fresh descending colon biopsy tissue at both timepoints and differentiated to contain serotonin-producing enterochromaffin cells. Secreted serotonin and serotonin-related gene expression were measured.

RESULTS: Maternal WSD-programmed fetal and juvenile intestinal organoids secreted decreased serotonin compared to Chow control organoids (fetal 0.006 versus 0.011 pg/cells, p= 0.021, Fig. 1B; 3 year-olds 0.010 versus 0.014 pg/cells, p= 0.033, Fig. 1C). At the Fetal stage, maternal WSD-programmed intestinal organoids expressed increased enterochromaffin cell marker expression (*CHGA* p= 0.0004) and decreased serotonin transporter expression (*SERT*, p=0.0009), with no statistical difference in serotonin rate limiting enzyme expression (*TPH1*) (Fig. 1D).

CONCLUSION: We have observed that maternal WSD exposure disrupts enterochromaffin cell secretion of serotonin in the colon beginning in fetal life. This disruption is not normalized by a normal offspring diet, as low serotonin secretion is still observed when offspring are 3-years-old. Maternal WSD programs an altered serotonin pathway gene expression equilibrium, which may predispose the gut-brain axis of these offspring towards anxiety.

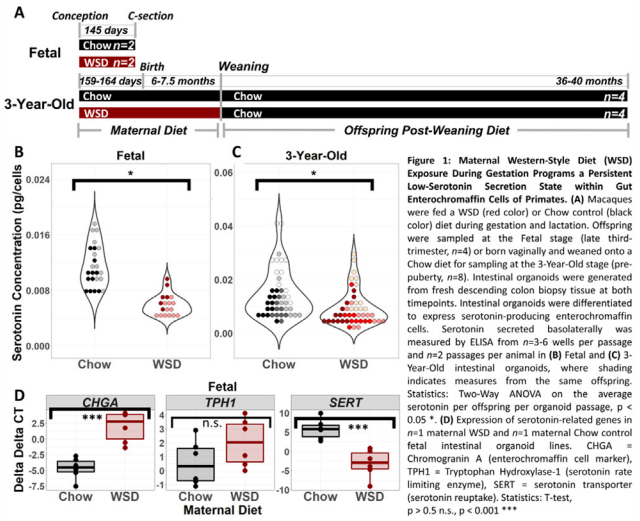

Figure 1: Maternal Western-Style Diet (WSD) Exposure During Gestation Programs a Persistent Low-Serotonin Secretion State within Gut Enterochromaffin Cells of Primates. (A) Macaques were fed a WSD (red color) or Chow control (black color) diet during gestation and lactation. Offspring were sampled at the Fetal stage (late third-trimester, *n*=4) or born vaginally and weaned onto a Chow diet for sampling at the 3-Year-Old stage (pre-puberty, *n*=8). Intestinal organoids were generated from fresh descending colon biopsy tissue at both timepoints. Intestinal organoids were differentiated to express serotonin-producing enterochromaffin cells. Serotonin secreted basolaterally was measured by ELISA from *n*=3-6 wells per passage and *n*=2 passages per animal in **(B)** Fetal and **(C)** 3-Year-Old intestinal organoids, where shading indicates measures from the same offspring. Statistics: Two-Way ANOVA on the average serotonin per offspring per organoid passage, $p < 0.05$ *. **(D)** Expression of serotonin-related genes in *n*=1 maternal WSD and *n*=1 maternal Chow control fetal intestinal organoid lines. CHGA = Chromogranin A (enterochromaffin cell marker), TPH1 = Tryptophan Hydroxylase-1 (serotonin rate limiting enzyme), SERT = serotonin transporter (serotonin reuptake). Statistics: T-test, $p > 0.5$ n.s., $p < 0.001$ ***

15 Panniculus retractor use for visualization of fetal anatomy: a randomized controlled trial

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OBJECTIVE: The detection of fetal anomalies decreases as maternal body mass index (BMI) increases. Panniculus retraction provides access to the suprapubic acoustic window and could improve sonographer ergonomics. We tested the hypothesis that use of a panniculus retractor during the detailed fetal anatomic survey improves visualization of fetal anatomy for participants with obesity and a panniculus.

STUDY DESIGN: This was a randomized controlled trial conducted at a single academic center (NCT05764408). Pregnant participants with a BMI $\geq$ 40 kg/m^2 and a panniculus were randomized 1:1 to undergo a detailed anatomy ultrasound with or without use of a panniculus retractor. The primary outcome was adequate visualization of 16 prespecified anatomic views. Secondary outcomes included adequate visualization of all detailed anatomic views, detection of fetal anomalies, and survey satisfaction for participants and sonographers. A sample size of n=150 provided 80% power to detect a two-fold improvement in the primary outcome, assuming a historical baseline visualization rate of 23% and 2-sided alpha of 0.05. Analysis was by intention-to-treat.

RESULTS: 2123 participants were screened from March 2023 to July 2023, of which 216 met inclusion criteria and 150 were randomized (n=74 to retractor, n=76 to no retractor). Baseline characteristics were similar between groups apart from panniculus grade. Adequate visualization of the 16 prespecified anatomic views did not differ between groups (25.7% retractor vs. 31.6% no retractor, RR 0.81; 95% CI 0.49-1.35). This finding persisted after adjusting for panniculus grade. There were also no differences in adequate visualization of all detailed anatomic views (13.5% retractor vs. 15.8% no retractor, RR 0.86; 95% CI 0.39-1.86). No major fetal anomalies were detected in either group. Sonographer and participant survey scores were similar between groups (Table).

CONCLUSION: Use of a panniculus retractor during the detailed fetal anatomic survey for participants with a BMI $\geq$ 40 kg/m^2 and a panniculus did not improve visualization of 16 prespecified fetal anatomic views.

Table: Primary and Secondary Outcomes

Outcome	Retractor (n=74)	No retractor (n=76)	Relative risk (95% CI)	P value
Primary Outcome				
Adequate visualization of 16 prespecified views [a]	19 (25.7)	24 (31.6)	0.81 (0.49-1.35)	0.47
Secondary Outcomes				
Adequate visualization of all anatomic views	10 (13.5)	12 (15.8)	0.86 (0.39-1.86)	0.82
Sonographer survey [b]				
Pain while performing ultrasound	3.7 ± 1.21	3.9 ± 1.03	-	0.41
Body habitus affected ultrasound	4.1 ± 1.05	4.3 ± 0.94	-	0.20
Confidence about image quality	3.8 ± 0.99	3.6 ± 0.98	-	0.18
Participant survey [b]				
I felt comfortable	4.6 ± 0.84	4.8 ± 0.44	-	0.06
I am satisfied with the quality of pictures	4.6 ± 0.70	4.5 ± 0.60	-	0.37
I enjoyed the ultrasound experience	4.6 ± 0.69	4.7 ± 0.52	-	0.54

Data presented as n(%) or mean ± standard deviation.
[a] Prespecified views: lateral ventricles, cerebellum, cavum septum pellucidum, face, four chamber heart view, right and left ventricular outflow tracts, three vessel view, three vessel trachea view, spine, ventral wall, umbilical cord, stomach, kidneys, and bladder.
[b] Responses recorded as Likert scale ranging from strongly disagree (1) to strongly agree (5).

16 Early amniotomy after Foley balloon in labor induction: a randomized clinical trial

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OBJECTIVE: To investigate if early amniotomy (within two hours) post-Foley balloon expulsion shortens active labor and quickens vaginal delivery compared to amniotomy after greater than four hours.

STUDY DESIGN: In a single-center, randomized trial of 150 participants undergoing labor induction with Foley balloon from October 2020 to March 2023, subjects were categorized into early or delayed amniotomy post-Foley balloon removal. Primary outcome: time between Foley balloon placement and active labor initiation. Secondary outcomes: time to delivery, rates of vaginal delivery within set intervals, cesarean section rates, maternal complications, and neonatal outcomes. Outcomes were analyzed both with intention-to-treat and per-protocol analyses.

RESULTS: 149 out of 150 participants were analyzed. Protocol adherence was 90.7% of subjects in the early amniotomy group and 77% in the delayed amniotomy group. The most common reason for protocol non-adherence was spontaneous rupture of membranes. Both groups had comparable characteristics. Early amniotomy led to quicker progression to active labor (312.5 vs. 442.5 mins, P=0.02) and delivery (484 vs. 587 mins, P=0.03). Moreover, a higher proportion delivered within 36 hours (96% vs. 85%, P=0.03). The early group advanced to active labor and delivery 1.5 times faster post-Foley balloon placement (HR, 1.5; 95% CI, 1.1-2.2; P = 0.02). The delayed group had more cases of postpartum hemorrhage (0% vs. 9.5%, P=0.01), but other outcomes, like cesarean rates and maternal/neonatal outcomes, did not differ significantly.

In the per-protocol analysis, early amniotomy consistently resulted in quicker progression to active labor and delivery and higher delivery rates within specific timeframes. Postpartum hemorrhage was again more common with delayed amniotomy (0% vs. 8.8%, P=0.02).

CONCLUSION: Early amniotomy post-Foley balloon promotes faster active labor onset and time to delivery without increasing adverse outcomes. Additionally, it is associated with reduced postpartum hemorrhage risk.

Table 1. Study outcomes in the intent-to-treat population.

	Early N=75	Delayed N=74	P
Time from Foley balloon placement to active labor (minutes)	885 (161-2340)	975 (250-2760)	0.08
Time from Foley balloon placement to delivery (minutes)	1032 (179-2849)	1131 (252-3448)	0.18
Time from Foley balloon removal to active labor (minutes)	**312.5 (0-1155)**	**442.5 (0-1620)**	**0.02**
Time from Foley balloon removal to delivery (minutes)	**484 (16-1485)**	**587 (6-1867)**	**0.03**
Time from amniotomy to delivery (minutes)	420 (2-1425)	299.5 (4-1597)	0.20
Amniotomy time per protocol	**68 (90.7)**	**57 (77)**	**0.03**
Reached active phase	68 (90.7)	65 (87.8)	0.61
Delivered within 24 hours	55 (73.3)	47 (63.5)	0.22
Delivered within 36 hours	**72 (96)**	**63 (85.1)**	**0.03**
Delivered within 48 hours	75 (100)	70 (94.6)	0.06
Type of amniotomy			**0.02**
Spontaneous	**3 (4)**	**11 (14.7)**	
Artificial	**72 (96)**	**62 (83.8)**	
Method of delivery			0.28
Spontaneous vaginal delivery	61 (81.3)	54 (73)	
Operative vaginal delivery	1 (1.3)	4 (5.4)	
Cesarean section	13 (17.3)	16 (21.6)	
Indication for cesarean section			0.68
Failed induction of labor	2 (2.7)	4 (5.4)	
Arrest of active phase	1 (1.3)	1 (1.4)	
Arrest of descent	1 (1.3)	0	
Nonreassuring fetal condition	7 (9.3)	5 (6.8)	
Maternal request	2 (2.7)	5 (6.8)	
Other	0	1 (1.4)	
Length of hospital stay (days)	3 (1-7)	3 (1-4)	0.92
Maternal infection composite	13 (17.3)	23 (31.1)	0.06
Isolated maternal fever	3 (4%)	7 (9.5%)	0.21
Chorioamnionitis	9 (12)	15 (20.3)	0.19
Endometritis	1 (1.3)	1 (1.4)	1.00
Wound infection	0	0	
Postpartum hemorrhage	**0**	**7 (9.5)**	**0.01**
Umbilical cord prolapse	0	0	
Neonatal outcome composite	4 (5.3)	3 (4.1)	1.00
Arterial umbilical cord pH < 7.0	0	0	
5 minute APGAR < 7	0	0	
NICU admission	4 (5.3)	3 (4.1)	1.00
Sepsis	0	0	

Data presented as median (range) or n/N (%).

LB02 Long Term Outcomes for The Milking In Non-Vigorous Infants (MINVI) Trial

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OBJECTIVE: In our initial trial (Katheria et al), umbilical cord milking (UCM) compared to early cord clamping (ECC) in non-vigorous term and near-term newborns, reduced delivery room cardiorespiratory support, hypoxic-ischemic encephalopathy, and therapeutic hypothermia. However, long-term safety of UCM in term infants is not known. We investigated if infants randomized to UCM would have better scores on the Ages & Stages Questionnaire, third Edition (ASQ-3) and a lower frequency of medium or high scores on the Modified Checklist for Autism in Toddlers (M-CHAT-R) compared to ECC at 22 to 26 months.

STUDY DESIGN: In a cluster-randomized crossover trial of non-vigorous infants born at 35 to 42 weeks, 10 hospitals were randomized to UCM or ECC for 1 year and then crossed over until study completion. Waiver of consent was approved in all centers, families consented for long term neurodevelopmental follow-up via the ASQ-3 and the M-CHAT-R at 22-26 months of age.

RESULTS: Among 1730 newborns in the primary trial, 1207 consented for long term follow-up, 4 infants died in the hospital and 3 post discharge. 971 infants (81%) had ASQ-3 scores available for analysis, and 927 parents (77%) completed the M-CHAT-R. There were no major differences in maternal and neonatal characteristics (Table 1). Median (IQR) ASQ-3 total scores (UCM: 255 (225-280) vs ECC 255 (230-280), p=0.49) or any of its 5 sub-domains (Table 2). Medium to high M-CHAT-R scores (UCM 9.3% vs ECC 8.4%, p=0.59) were similar between groups. No interaction between treatment group, maternal education or sex was observed.

CONCLUSION: Among non-vigorous infants born at 35 to 42 weeks' gestation, neurodevelopmental scores at 22-26 months of age were similar between the UCM and ECC groups. These data, combined with the previously reported short-term benefits, suggest that UCM is a safe intervention. UCM is a no-cost intervention that can be easily implemented even in resource-limited settings and may improve short-term outcomes without long-term neurodevelopmental risks to development.

Table 1. Maternal and Neonatal Baseline Characteristics

Characteristic	Umbilical cord milking (n=502)	Early cord clamping (n=469)	P-value
Maternal			
Race-ethnicity			.74
Hispanic	86 (17)	88 (19)	
Non-Hispanic Black	34 (7)	34 (7)	
Non-Hispanic Asian	39 (8)	45 (10)	
Non-Hispanic White	290 (58)	254 (54)	
Other/Unknown	53 (11)	48 (10)	
Age, yr.	31 (28-35)	31 (27-35)	.29
At least some college education	349/446 (78)	321/406 (79)	.77
Any diabetes	72 (14)	63 (13)	.68
Any hypertension	89 (18)	81 (17)	.85
Intrauterine inflammation or infection	54 (11)	62 (13)	.24
GBS positive	114/501 (23)	88/469 (19)	.17
*Rupture of membranes before delivery, hr.	6 (1-14)	5 (1-14)	.36
†Narcotic/CNS depressant < 2 hrs. pre-delivery	51 (10)	51 (11)	.72
General anesthesia	32 (6)	33 (7)	.67
Neonatal			
Female sex	224 (45)	201 (43)	.58
Cesarean mode of delivery	246 (49)	206 (44)	.01
Multiple gestation	13/501 (3)	18/467 (4)	.27
Gestational age at delivery, wk.	39 (38-40)	39 (38-40)	.77
Treated per protocol	486 (96.8)	465(99.1)	0.01
Death before 22-26 months	2 (0.4)	5 (1)	.22

Data are n (%), or median (IQR), unless otherwise noted. P-value from a Wilcoxon test or Chi-square test evaluating differences between the two groups. Denominators for all variables are as per column headers unless otherwise noted.
GBS – Group B Streptococcus
*Status of rupture of membranes available for 501 infants in the UCM group and 467 subjects in the ECC group.
†Oral or intravenous administration

Table 2. Developmental Screening Characteristics by Randomization Group

	Overall (n=971)			*Infants with abnormal scores		
	Umbilical cord milking (n=502)	Early cord clamping (n=469)	P-value	Umbilical cord milking (n=502)	Early cord clamping (n=469)	P-value
ASQ-3 Domains						
Communication	55 (40-60)	55 (40-60)	.79	54 (11)	51 (11)	.95
Gross Motor	60 (50-60)	60 (50-60)	.40	33 (7)	25 (5)	.41
Fine Motor	50 (45-60)	50 (45-60)	.66	25 (5)	20 (4)	.60
Problem Solving	50 (40-55)	50 (40-60)	.71	29 (6)	26 (6)	.87
Personal-Social	50 (40-55)	50 (45-55)	.12	47 (9)	35 (8)	.29
Overall score	255 (225-280)	255 (230-280)	.49	-	-	-
All domains indicate typical development	393 (78)	389 (83)	.07	-	-	-
	Overall (n=927)					
	Umbilical cord milking (n=486)	Early cord clamping (n=441)	P-value			
M-CHAT-R			.59			
Score 0-2	441 (91)	404 (92)	-			
Score 3-7	34 (7)	31 (7)	-			
Score 8-20	11 (2)	6 (1)	-			

Data are n (%) or median (IQR), unless otherwise noted. P-value from a Wilcoxon test or Chi-square test evaluating differences between the two groups. The interaction between randomization group and sex was not significant (P-value >.05) for any of the ASQ-3 or M-CHAT-R measures. Additional analyses accounting for the clustered and crossover study design provided similar to the unadjusted analyses shown in the above table. Results were similar in models adjusted for sex and maternal education
*Defined as n (%) with score ≥2 standard deviations below the mean in at least one domain or death before 2 years of age.

LB03 Randomized trial of screening for preterm birth in low-risk women. The Preterm Birth Screening Study

Gabriele Saccone[1], Daniele Di Mascio[2], Fabrizio Zullo[3]
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OBJECTIVE: It is unclear whether the introduction of a universal transvaginal ultrasound cervical length screening program in women at low risk for preterm delivery is associated with a reduction in the frequency of preterm birth.

STUDY DESIGN: This was a multicenter non-blinded randomized trial of screening, of asymptomatic singleton pregnancies without prior spontaneous preterm birth, who were randomized to either transvaginal ultrasound cervical length screening program (i.e. intervention group) or no screening (i.e. control group). Participants were consented and randomized at the time of their routine anatomy scan between 18 0/7 and 23 6/7 weeks. Women randomized in the screening group received a single transvaginal ultrasound cervical length measurement. Those who were found to have cervical length ≤25 mm were offered 200 mg vaginal progesterone daily along with cervical pessary. The primary outcome was preterm birth < 37 weeks. The risk of primary outcome was quantified by the relative risk (RR) with 95% confidence interval (CI), and was based on the intention-to-screen principle.

RESULTS: 1,334 asymptomatic women with singleton pregnancies and without prior preterm birth, were included in the trial. Out of the 675 women randomized in the TVU CL screening group, 13 (1.9%) were found to have TVU CL ≤25 mm during the screening. Preterm birth at less than 37 weeks of gestation occurred in 48 women in the TVU CL screening group (7.5%), and 54 women in the control group (8.7%) (RR 0.86, 95% CI 0.59 to 1.25). Women randomized in the TVU CL screening group had no significant differences in the incidence of preterm birth at less than 34, 32, 30 weeks, 28, and 24 weeks of gestation. Perinatal outcomes were also not different between the two groups.

CONCLUSION: The introduction of a universal cervical length screening program at 18 0/6 – 23 6/7 weeks in singleton pregnancies without a history of spontaneous preterm birth, with treatment for those with transvaginal ultrasound cervical length ≤25 mm, did not result in lower incidence of preterm delivery than the incidence without the screening program.

Oral Concurrent Session 1

Prematurity

Abstracts 17–24

TUESDAY
February 13, 2024
1:30 pm – 3:30 pm

MODERATOR(S)

Joseph Biggio, MD, MSc

Molly Stout, MD, MSCI

PREMATURITY

Abstracts 17-24

17 Risk markers for recurrent adverse pregnancy outcomes

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OBJECTIVE: Nulliparas are at increased risk of adverse pregnancy outcomes [APOs]; once an individual has an APO, they are at risk of recurrence. Little is known about markers, independent of prior APO, that are associated with recurrent APO. This analysis proposed to ascertain factors identified early in a first pregnancy that are associated with an APO in a second pregnancy.

STUDY DESIGN: The nuMoM2b Heart Health Study is a cohort of nulliparas followed from the first trimester through delivery who attended an in-person visit 2-7 years after their pregnancy. This analysis is restricted to those who had two pregnancies that extended to at least 20 weeks' gestation. Demographics, clinical measures, and laboratory values from the first trimester of the first pregnancy were considered as potential risk markers. Race and ethnicity, as social constructs, were evaluated given known disparities in APO. An APO was defined as any of the following: hypertensive disorders of pregnancy, preterm birth < 37 weeks', small-for-gestational-age birth (< 5th%ile), fetal demise, or gestational diabetes. Logistic regression estimated the association between risk markers and APO in a second pregnancy, controlling for a first pregnancy APO, in order to identify risk markers independent of prior APO.

RESULTS: Of 4484 participants, the 2830 who met inclusion criteria and comprised the analytic population had a mean (SD) time between pregnancies of 2.9 (1.3) years. Of the 32% with an APO in the first pregnancy, 40% had an APO in the second pregnancy. Of those without an APO in the first pregnancy, 15% developed an APO in a second pregnancy. Multiple markers from the first trimester of the first pregnancy (BMI, race/ethnicity, blood pressure, and cardiometabolic serum analytes) were associated with an APO in the second pregnancy. The magnitude of APO recurrence risk associated with having had an APO in the first pregnancy varied by race/ethnicity (TABLE).

CONCLUSION: Multiple markers in a first pregnancy, including some that are modifiable, are associated with an APO in a second pregnancy, suggesting potential targets for intervention.

Association of Maternal Characteristics with Adverse Pregnancy Outcomes during a Second Pregnancy

Characteristics during nuMoM2b Index Pregnancy	Prevalence of Second Pregnancy APO	Second Pregnancy APO vs no APO
	% (n/N)	aOR (95% CI)
APO at nuMoM2b Index Pregnancy (vs no APO)	40% (364/910)	3.39 (2.79, 4.12)
Maternal race and ethnicity*		
White, Non-Hispanic	21% (407/1970)	4.11 (3.23, 5.22)
Black, Non-Hispanic	32% (92/287)	1.79 (1.05, 3.05)
Hispanic	27% (101/375)	2.41 (1.44, 4.03)
Asian	27% (23/86)	3.36 (1.14, 9.92)
Other	28% (31/112)	1.75 (0.73, 4.22)
BMI (kg/m^2), category		
<18.5	25% (13/52)	1.81 (0.92, 3.58)
18.5 to <25	17% (252/1479)	ref
25 to <30	26% (174/667)	1.27 (1.00, 1.63)
30 to <35	31% (97/315)	1.40 (1.01, 1.92)
≥35	40% (108/272)	1.48 (1.04, 2.13)
SBP, per 5 mmHg		1.04 (0.99, 1.10)
DBP, per 5 mmHg		1.09 (1.01, 1.17)
Glucose, per 10 mg/dL		1.03 (0.97, 1.10)
hsCRP, per doubling in value[1/]		1.08 (1.00, 1.16)
Triglycerides, per doubling in value[1/]		1.41 (1.16, 1.71)

Abbreviations: APO = adverse pregnancy outcome; BMI = body mass index; CI = confidence interval; DBP = diastolic blood pressure; hsCRP = high sensitivity C-reactive protein; aOR = adjusted odds ratio; SBP = systolic blood pressure.

Note: Eligibility for this analysis includes nuMoM2b-HHS1 participants who participated in the 2-7 year postpartum in-person visit and who carried their nuMoM2b pregnancy to at least 20 weeks gestation. This analysis cohort is comprised of eligible participants with a documented second pregnancy carried to at least 20 weeks gestation and nonmissing composite APO information for the first (index) and second pregnancy.

Note: Explanatory variables are included in the statistical model as measured at the time of the first (nuMoM2b index) pregnancy: presence of any APO in the first pregnancy, maternal race, BMI category, SBP, DBP, glucose, hsCRP, and triglycerides. *An interaction term for (maternal race) × (presence of any APO in the first pregnancy) is also included in the model.

[1/] This characteristic is included in statistical models after a log2 (logarithm with base 2) transformation. Odds ratios for log-transformed quantities are interpreted on the multiplicative scale.

^ Indicates confidence interval excludes the null value.

18 Prenatal heat stress and birth outcomes in a rural Ghanaian cohort

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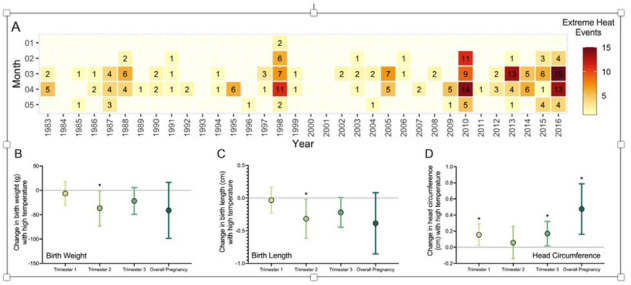
OBJECTIVE: Climate change is increasing exposures to higher ambient temperatures, particularly for rural developing communities where people have limited access to indoor cooling. We aimed to examine associations between prenatal heat exposure with birth outcomes in rural Ghana.

STUDY DESIGN: We leveraged the GRAPHS prenatal cohort recruited from 35 rural communities in the Brong Ahafo East Region of Ghana between 2013-2015. We assigned prenatal heat stress from conception to delivery using weekly averages of satellite-derived daily Wet Bulb Globe Temperature (WBGT) estimates corresponding to the community of each participant. We performed multivariable linear regression with both WBGT averaged over pregnancy and trimester (TM)-specific

averages included in the same model to understand associations with birth weight, length, head circumference, SGA, and LBW.

RESULTS: 1,173 pregnant individuals with delivery ≥ 28 weeks were available for analysis. Weekly prenatal WBGT averages in the cohort ranged from 22.7-30.8°C. Extreme heat events (WBGT >30°C) are occurring with increasing frequency (Figure A); 82% of participants experienced ≥ 1 extreme heat event in pregnancy. Increasing WBGT in the 2nd TM was associated with lower mean birth weight (β = -36.5 g per 1°C increase in average 2nd TM exposure, 95% CI: -72.9, -0.2) and birth length (β = -0.32 cm, 95% CI: -0.61, -0.02). Third TM exposure was suggestive of similar reductions, although not statistically significant (Figure B&C). Increasing WBGT across gestation, and in 1st and 3rd TMs, was associated with increased head circumference, possibly a head sparing effect (Figure D). No significant associations of WGBT with SGA or LBW were identified.

CONCLUSION: We demonstrate impacts of heat stress on newborn anthropometrics in this rural Ghanaian population where the range of temperatures is relatively narrow. Given the link between size at birth and future disease, it is critical to better understand how rising global temperatures impacts newborn health, and more importantly, identify interventions to mitigate these effects.



19 Neonatal Hypoglycemia in Pregnancies at Risk for Late Preterm Birth: Childhood Neurodevelopmental Outcomes

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OBJECTIVE: Persistent neonatal hypoglycemia is related to adverse neurodevelopment in infants born preterm, but it is unknown whether late preterm hypoglycemia, often transient and more frequent with maternal antenatal steroid treatment, is similarly related. Our objective was to evaluate whether hypoglycemia in neonates at risk for late preterm delivery was related to adverse childhood neurodevelopment.

STUDY DESIGN: Secondary analysis of a prospective, follow-up study of ≥ 6 year-old children delivered in the NICHD Antenatal Late Preterm Steroids study, which excluded patients with pregestational diabetes. Certified psychologists performed neurocognitive testing using the Differential Ability Scales, 2nd Edition (DAS-II) core components of general conceptual ability (GCA): verbal, non-verbal reasoning, and spatial ability. Hypoglycemia was defined as blood glucose concentration < 40 mg/dL within 24 hours of birth. Primary and secondary outcomes were compared in children with and without hypoglycemia and by severity: 25-39 mg/dL (moderate) and < 25 mg/dL (severe) vs none. The primary outcome was the proportion of GCA scores < 85 (-1 standard deviation) and secondary outcomes included the Gross Motor Function Classification System, Social Responsiveness Scale, and Child Behavior Checklist. Log-binomial regression was used to calculate relative risks (RR) and quantile regression and mixed linear models to estimate differences.

RESULTS: Of 1,026 children enrolled, 1,020 (99.4%) had blood glucose data. 234 (22.9%) had hypoglycemia, 852 (83.5%) delivered late preterm and 97 (41.5%) with hypoglycemia were treated. Those with hypoglycemia were more likely to have private insurance, older mothers, received betamethasone, and identify as White. There were no differences in the primary, GCA score < 85 (15.9% vs 18.5%; aRR 1.03; 95% CI: 0.74, 1.45), or secondary outcomes. Severity of hypoglycemia was also not associated with primary or secondary outcomes.

CONCLUSION: Hypoglycemia was not associated with neurodevelopmental outcomes in children born predominantly late preterm.

Table 1. Primary and Secondary Outcomes by Neonatal Hypoglycemia

Outcome	Hypoglycemia (< 40 mg/dL) (N=234)	No Hypoglycemia (N=786)	Adjusted RR or Mean/Median Difference*
GCA < 85	33/208 (15.9%)	136/736 (18.5%)	1.03 (0.74,1.45)
GCA	97.0 +/- 13.4	96.4 +/- 13.9	-0.10 (-1.93,1.74)
Verbal ability	99.0 +/- 18.4	96.8 +/- 20.3	0.65 (-2.09,3.39)
Nonverbal reasoning	95.9 +/- 15.7	95.8 +/- 15.1	-0.09 (-2.30,2.12)
Spatial ability	97.8 +/- 13.1	98.0 +/- 14.7	-0.55 (-2.60,1.49)
SRS t-score > 65	35/233 (15.0%)	106/783 (13.5%)	1.18 (0.83,1.69)
GMFCS > Level I	0	2 (0.3%)	
CBCL			
Total problems t-score	49.0 +/- 11.2	48.6 +/- 11.1	0.09 (-1.55,1.73)
Internalizing behavior t-score	50 (43-58)	48 (41-57)	0.56 (-1.19,2.32)
Externalizing behavior t-score	48 (41-54)	48 (41-56)	-1.42 (-3.31,0.48)
Dysregulation profile t-score	157 (152-170)	156 (151-169)	-0.14 (-2.03,1.75)
Anxious/depressed t-score	51 (50-57)	51 (50-54)	0.04 (-0.31,0.40)
Attention problems t-score	52 (50-57)	52 (50-57)	0.08 (-0.44,0.61)
Aggressive behavior t-score	51 (50-55)	51 (50-56)	0.00 (-0.36,0.36)

GCA denotes General Conceptual Ability, SRS Social Responsiveness Scale, GMFCS Gross Motor Function Classification System, and CBCL Child Behavior Checklist.
Data are n (%), mean +/- standard deviation, median (Q1-Q3), relative risk (95% CI), mean difference (95% CI) or median difference (95% CI).
CBCL missing in 3.
*Adjusted by pre-specified characteristics including maternal age, gestational age at delivery, child age, gender, maternal education, treatment assignment, and center.

20 Pessary versus cerclage with/without progesterone in twin pregnant women and a short cervix: a RCT

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OBJECTIVE: Women with a twin pregnancy and a short cervical length (CL) are at increased preterm birth (PTB) risk. We aimed, in a factorial randomized clinical trial (RCT), to compare the effectiveness of pessary versus cerclage, with or without 400mg-progesterone for PTB prevention in these women.

STUDY DESIGN: We conducted a multi-center, two-by-two factorial RCT at two hospitals in Vietnam. The protocol has been published (Dang et al, 2020). Asymptomatic twin pregnant women with a CL

≤ 28mm (at 16-22 weeks) were randomized (1:1:1:1 ratio) to pessary alone, cerclage alone, pessary+progesterone or cerclage+progesterone. Primary outcome was PTB < 34 weeks. Secondary outcomes were maternal and neonatal complications. We planned to recruit 340 women to assess a 50% reduction in PTB < 34 weeks (alpha-error 0.05, power 80%, 5% lost to follow-up/protocol deviation). Analysis was by intention-to-treat. The recruitment was terminated in July 2023 given advice by the Data Safety Monitoring Committee because women had a higher rate of perinatal deaths and deliveries < 28 weeks in the pessary group.

RESULTS: Between March 2019 and January 2023, we randomized 219 women to pessary alone (N=54), cerclage alone (N=54), pessary+progesterone (N=56) or cerclage+progesterone (N=55). Two women withdrew consent while 11 women were lost to follow-up. The PTB < 34 weeks rates occurred in 19% women receiving pessary versus 19.8% women receiving cerclage (RR 0.96, 95%CI 0.55-1.7) and in 18.4% women treated with progesterone versus 20.4% women without progesterone (RR0.9, 95%CI 0.52-1.6). Perinatal death occurred in 12 (5.7%) babies in the pessary group versus two (1%) in the cerclage group (RR 5.8, 95%CI 1.3-26). Secondary outcomes are presented in the Table.

CONCLUSION: Since in women with a twin pregnancy and a short cervix, pessary resulted in a higher rates of PTB < 28 weeks and perinatal death compared to cerclage, we recommend cerclage as the treatment of choice. Addition of vaginal progesterone to cerclage/pessary probably has no beneficial effect.

		Pessary vs Cervical cerclage				Progesterone vs No Progesterone			
	All women (N=206)	Pessary (N=105)	Cervical cerclage (N=101)	RR (95% CI)	p-values	Progesterone (N=103)	No Progesterone (N=103)	RR (95% CI)	p-values
Obstetrics outcomes									
PTB < 34 weeks	40 (19.4)	20 (19)	20 (19.8)	0.96 [0.55 to 1.7]	0.89	19 (18.4)	21 (20.4)	0.9 [0.52 to 1.6]	0.73
PTB < 24 weeks	3 (1.5)	3 (2.9)	0 (0.00)	-	-	3 (2.9)	0 (0.0)	-	-
PTB < 28 weeks	10 (4.9)	9 (8.6)	1 (1)	8.7 [1.1 to 67]	0.01	6 (5.8)	4 (3.9)	1.5 [0.44 to 5.2]	0.54
PTB < 32 weeks	21 (10.2)	12 (11.4)	9 (8.9)	1.3 [0.56 to 2.9]	0.56	14 (13.6)	7 (6.8)	2 [0.84 to 4.8]	0.12
PTB < 37 weeks	127 (61.7)	61 (58.1)	66 (65.3)	0.9 [0.72 to 1.1]	0.29	63 (61.2)	64 (62.1)	0.98 [0.79 to 1.2]	0.89
Gestational age at delivery, wks, median [range]	36.3 [34.9-37.0]	36.3 [34.8-37.1]	36.3 [34.9-37.0]	-	0.91	36.1 [34.9-37.1]	36.6 [34.7-37.0]	-	0.67
Time from randomization to delivery, days	127 [111-140]	128 [111-140]	127 [111-139]	-	0.92	127 [111-136]	129 [112-142]	-	0.33
Perinatal outcomes	N=412	N=210	N=202			N=206	N=206		
Stillbirth	10 (2.4)	9 (4.3)	1 (0.5)	8.7 [1.1 to 68]	0.01	6 (2.9)	4 (1.9)	1.5 [0.43 to 5.3]	0.53
Neonatal death	4 (1)	3 (1.4)	1 (0.5)	2.9 [0.3 to 28]	0.39	2 (1)	2 (1)	1 [0.14 to 7.1]	0.99
Perinatal death	14 (3.4)	12 (5.7)	2 (1)	5.8 [1.3 to 26]	0.02	8 (3.9)	6 (2.9)	1.3 [0.48 to 3.7]	0.51
Mean birthweight, g	2248±577	2214±645	2283±498	-	0.23	2231±628	2265±523	-	0.55
Birthweight < 1500g	39 (9.5)	26 (12.4)	13 (6.4)	1.9 [1.02 to 3.6]	0.04	24 (11.7)	15 (7.3)	1.6 [0.86 to 3]	0.13
Birthweight < 2500g	243 (59)	117 (55.7)	126 (62.4)	0.9 [0.76 to 1.1]	0.17	125 (60.7)	118 (57.6)	1 [0.91 to 1.2]	0.48
Admission to NICU	140 (34)	66 (31.4)	74 (36.6)	0.9 [0.66 to 1.1]	0.30	64 (31.1)	76 (36.9)	0.9 [0.65 to 1.2]	0.27
Composite of poor perinatal outcomes	105 (25.5)	46 (21.9)	59 (29.2)	0.8 [0.54 to 1.1]	0.09	52 (25.2)	53 (25.7)	1 [0.71 to 1.4]	0.91

21 Vaginal polyamines mitigate inflammasome activation: potential immune mechanisms governing barrier function in preterm birth

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OBJECTIVE: Vaginal metabolomics from our group previously identified a role for polyamines in delineating preterm birth (PTB) risk among pregnant individuals with a *Lactobacillus*-deplete or high-risk microbiota, suggesting that spermine and spermidine may function in a protective capacity. As immune perturbations contribute to barrier dysfunction and tissue remodeling on the pathway to PTB, we sought to explore whether polyamines mitigate these molecular processes. We investigated the innate immune system, including the inflammasome, which is heavily regulated by metabolic cues in other systems and emerging as a key first line of defense in epithelial barriers.

STUDY DESIGN: Ectocervical and endocervical epithelial cells were treated with 10^7 CFUs *Gardnerella vaginalis* (GV), an anaerobe prevalent in a *Lactobacillus*-deplete microbiota. THP-1 monocytes were activated into macrophages with PMA and treated with 10^5 CFUs GV or NLRP3 inflammasome agonist nigericin 5mM. Treatments occurred in the presence or absence of polyamines at concentrations ranging from 50-400uM. Inflammatory cytokine IL-8 and inflammasome activation marker IL-1β were measured in cell culture media by ELISA. One-way ANOVAs with Dunnet's multiple comparisons tests were performed.

RESULTS: Spermidine and spermine partially mitigate GV-induction of IL-8 and IL-1β-in ectocervical and endocervical cells ($p < 0.05$ for all, Fig. 1A and B). Spermine partially mitigates GV-induction of IL-1β in macrophages ($p < 0.001$, Fig. 1C). Spermidine and spermine partially mitigate nigericin-activation of NLRP3 as measured by IL-1β induction in macrophages ($p < 0.001$ for both, Fig. 1D).

CONCLUSION: Our data support the paradigm that low concentrations of vaginal spermidine and spermine may contribute to increased inflammation and inflammasome activation in the cervicovaginal space, thereby rendering the barrier more suspectable to microbial challenge. These findings carry translational potential — vaginal polyamine repletion may serve as a novel postbiotic strategy to reduce PTB risk in the setting of a *Lactobacillus*-deplete microbiota. SMFM-AAOGF Award (KDG)

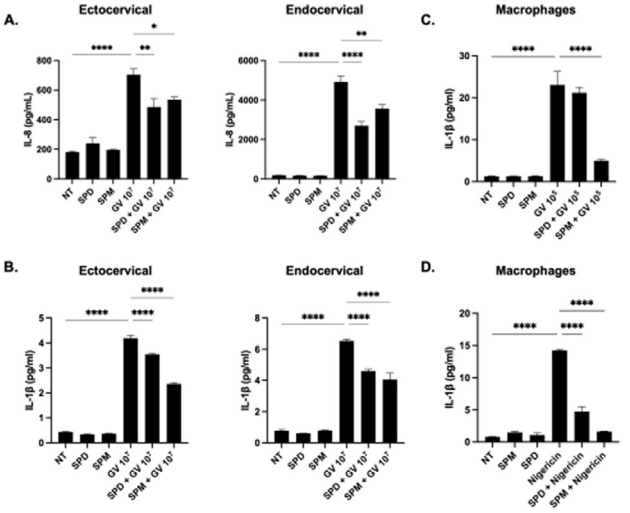

Figure 1. Cytokine concentrations in cell culture media. **A.** IL-8 concentrations after *Gardnerella vaginalis* (GV) +/- polyamines in ectocervical and endocervical epithelial cells. **B.** IL-1β concentration after GV +/- polyamines in ectocervical and endocervical epithelial cells. **C.** IL-1β concentrations after GV +/- polyamines in macrophages. **D.** IL-1β concentrations after inflammasome NLRP3 agonist nigericin +/- polyamines. SPD: spermidine; SPM: spermine. *p<0.05, **p<0.01, ****p<0.0001.

22 Vaginal progesterone for the prolongation of pregnancy after arrested pre-term labor-multicenter randomized controlled trial

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OBJECTIVE: To evaluate the efficacy of vaginal micronized progesterone 200 mg given twice daily for the prolongation of pregnancy after arrested pre-term labor.

STUDY DESIGN: Multicenter randomized controlled trial was conducted during 2018-2022 at three university affiliated medical

centers. Women with a history of preterm delivery or cervical shortening in the current pregnancy were excluded. Patients with arrested pre-term labor following tocolytics at 24-34 gestational weeks were randomly allocated to receive vaginal micronized progesterone 200 mg twice daily or no treatment until 36.6 weeks. The primary outcomes were the number of days from enrollment to delivery and the rate of spontaneous preterm delivery prior to 37 weeks of gestation. A sample size of 128 women was required to detect a difference of 7 ± 14 days in pregnancy prolongation and a reduction from 50% to 25% in the rate of spontaneous preterm delivery (5% two-sided alpha, 80% and 84% power, respectively).

RESULTS: Sixty four and 65 women were allocated to the no treatment and treatment groups, respectively. Demographic characteristics were similar. Study outcomes are presented in the table. Comparing no treatment with treatment, there was no difference in the number of days from enrolment to delivery (37.4±20.3 versus 40.0±17.8, respectively; P=0.44), the overall rate of preterm delivery (28 (44%) versus 19 (30%), respectively; P=0.09), and the rate of spontaneous preterm delivery (19 (30%) versus 16 (25%), respectively; P=0.52). In twins (table), compared with no treatment, micronized progesterone was associated with increased number of days from enrolment to delivery (26.1±15.2 versus 43.7±18.1, respectively; P=0.02), later delivery week (34.7±2.2 versus 36.5±1.4, respectively; P=0.01) and increased birth weight (2018±430 versus 2444±528 gr, respectively; P=0.01).

CONCLUSION: Vaginal micronized progesterone following arrested preterm labor was not an effective treatment to prolong pregnancy or prevent spontaneous preterm delivery. Further research should be conducted regarding possible favorable effect in twins.

Table. Study outcomes

	No treatment	Micronized progesterone	P value
Entire group	N=64	N=65	
Delivery week	36.9±2.4	37.4±2.8	0.28
Pregnancy prolongation from recruitment (days)	37.4±20.3	40±17.8	0.44
Pregnancy prolongation beyond 7 days	59 (92%)	62 (95%)	0.49
Overall preterm delivery	28 (44%)	19 (29%)	0.09
Spontaneous preterm delivery	19 (30%)	16 (25%)	0.52
Need for additional tocolytic treatment	5 (8%)	3 (5%)	0.49
Preterm premature rupture of membranes	9 (14%)	13 (20%)	0.37
Delivery mode: Vaginal	45 (71%)	49 (77%)	0.76
Vacuum extraction delivery	4 (6%)	2 (3%)	
Cesarean delivery	14 (22%)	14 (22%)	
Labor induction	17 (27%)	19 (30%)	0.74
Birth weight (gr)	2641±661	2762±650	0.25
Apgar score at 1 minute	8.9±1.1	9±0.9	0.9
Apgar score at 5 minutes	9.8±0.6	9.8±0.5	0.28
Cord pH	7.3±0.1	7.3±0.1	0.22
Twins	N=15	N=12	
Delivery week	34.7±2.2	36.5±1.4	0.01
Pregnancy prolongation from recruitment (days)	26.1±15.2	43.7±18.1	0.02
Pregnancy prolongation beyond 7 days	13 (87%)	12 (100%)	0.49
Overall preterm delivery	12 (80%)	5 (42%)	0.06
Spontaneous preterm delivery	6 (40%)	3 (25%)	0.68
Need for additional tocolytic treatment	1 (6.7%)	0 (0%)	1
Preterm premature rupture of membranes	3 (20%)	1 (8.3%)	0.61
Delivery mode: Vaginal	7 (25%)	7 (29%)	0.72
Vacuum extraction delivery	1 (4%)	2 (8%)	
Cesarean delivery	20 (71%)	15 (63%)	
Labor induction	5 (36%)	7 (58%)	0.25
Birth weight (gr)	2018±430	2444±528	0.01
Apgar score at 1 minute	8.9±1	8.7±1.1	0.51
Apgar score at 5 minutes	9.6±0.7	9.7±0.6	0.67
Cord pH	7.3±0.1	7.3±0.1	0.42

Values are presented as mean±SD or number (percent)
One woman with twins in the no treatment group gave birth in another medical center. Data regarding neonatal outcomes were missing.
Neonatal outcomes were analyzed for all neonates (N=28 and N=24 in the no treatment and treatment groups, respectively).

23 Investigating the Association between Preterm Delivery and Autism Spectrum Disorder in Childhood

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OBJECTIVE: Preterm infants are at an increased risk for neurodevelopmental outcomes. Autism spectrum disorder (ASD) is a neurodevelopmental condition clinically evident from early childhood. The association between preterm birth and the risk of ASD is unclear. In this study, we have examined the contributory role of preterm birth on ASD diagnosis.

STUDY DESIGN: We conducted a cohort analysis using population-based data from community clinics and a tertiary referral hospital, encompassing deliveries between 2005-2017. This time frame was selected since children born after 2017 have not yet been diagnosed with ASD in our population. Our study aimed to compare the occurrence of ASD diagnoses in offspring based on their delivery period: early preterm (< 34w), late preterm (34-37w) or term (37-42w). To assess the cumulative incidence of ASD, we employed a Kaplan-Meier survival curve. A Cox proportional hazards model was utilized to account for potential confounding variables.

RESULTS: The analysis included 139,859 pregnancies, 1.2% delivered before 34 gestational weeks, 4.1% at 34-37w and the remaining delivered at term. Earlier gestational age at delivery was linked with certain obstetrical characteristics; primiparity, lower 5-minute Apgar score and male gender (p< 0.001 for all). There was no significant association between preterm delivery and the occurrence of ASD (0.4% vs. 0.5% vs. 0.5% for early preterm, late preterm, and term deliveries, respectively; p< 0.961). This finding was supported by a Kaplan-Meier survival curve, which demonstrated comparable cumulative morbidity across the groups (log-rank p=0.74). When adjusting for ethnicity, SGA, maternal age, and fetal gender using a Cox proportional hazards model, no significant association was observed between any preterm delivery group and ASD (adjusted HR = 1.24 for < 34w vs. term, 95% CI 0.58-2.64, p=0.58 and adjusted HR = 0.98 for 34-37w vs. term, 95% CI 0.67-1.44, p=0.92).

CONCLUSION: There appears to be no discernible association between preterm birth and the diagnosis of ASD.

Table. Selected obstetrical and perinatal outcomes of pregnancies, according to gestational age group at delivery.

	Early preterm (<34 gestational weeks) (n= 1,609)	Late preterm (34-37 gestational weeks) (n= 5,734)	Term (37-42 gestational weeks) (n=132,516)	P-value
Obstetrical outcomes				
Maternal age (years ± SD)	27.0 ± 6.2	27.4 ± 6.0	28.1 ± 5.6	<0.001
Primiparity (%)	37.3	33.9	24.4	<0.001
5-min Apgar score <7 (%)	13.8	0.4	0.3	<0.001
Neonate gender (male, %)	55.9	53.8	50.3	<0.001
Autism spectrum disorder				
ASD (Cases%)	7 (0.4)	28 (0.5)	625 (0.5)	0.961
Adjusted HR[a]	1.24 (95% CI 0.58-2.64, p=0.58)	0.98 (95% CI 0.67-1.44, p=0.92)	1 (reference)	

[a] Adjusted to ethnicity, small for gestational age newborn, maternal age, and fetal gender

24 Vaginal putrescine attenuates microbe-mediated inflammation in the cervical epithelium

Briana Ferguson[1], Aaron Loder[1], Scott M. Gordon[2], Lauren Anton[1], Kristin D. Gerson[3]

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OBJECTIVE: A *Lactobacillus*-deplete vaginal microbiota confers increased risk of preterm birth (PTB). Our group previously uncovered a role for vaginal polyamines in distinguishing individuals at greatest risk of PTB among those with similar microbiota-related risk. Putrescine is a polyamine primarily produced by anaerobes and abundant in a *Lactobacillus*-deplete microbiota. We have shown that vaginal metabolites, including select polyamines, can modify immune responses at the host-microbial interface. As immune perturbations can contribute to cervical remodeling preceding PTB, we hypothesized that putrescine promotes inflammation in the cervical epithelium as a mechanism underlying barrier disruption.

STUDY DESIGN: Ectocervical and endocervical epithelial cells were treated with putrescine (500-4000uM) for 24h. For microbial experiments, cells were treated with 10^7 CFUs *Gardnerella vaginalis* (GV), an anaerobe prevalent in a *Lactobacillus*-deplete microbiota, in the presence or absence of putrescine. Inflammatory cytokines IL-8 and IL-1β were measured in cell culture media by ELISA. One-way ANOVAs with Dunnet's multiple comparisons tests were performed.

RESULTS: Putrescine has no effect on basal levels of IL-8 or IL-1β in ectocervical and endocervical cells (Fig. 1). Putrescine partially mitigates GV-induction of IL-8 in ectocervical and endocervical cells in a dose-dependent manner (Fig. 1A). Putrescine partially mitigates GV-induction of IL-1β in endocervical cells in a dose-dependent manner (Fig. 1B). While a similar trend was observed in ectocervical cells, putrescine did not significantly modify GV-induction of IL-1β (Fig. 1B).

CONCLUSION: Contrary to our hypothesis, vaginal putrescine exerts an anti-inflammatory effect on the cervical epithelium. Our data suggest that this microbial metabolite may blunt host immune responses and promote tolerance of a *Lactobacillus*-deplete anaerobe-rich microbiota. The extent to which this molecular process may modify epithelial barrier stability, cervical remodeling, and PTB risk warrants future investigation. SMFM-AAOGF Award (KDG)

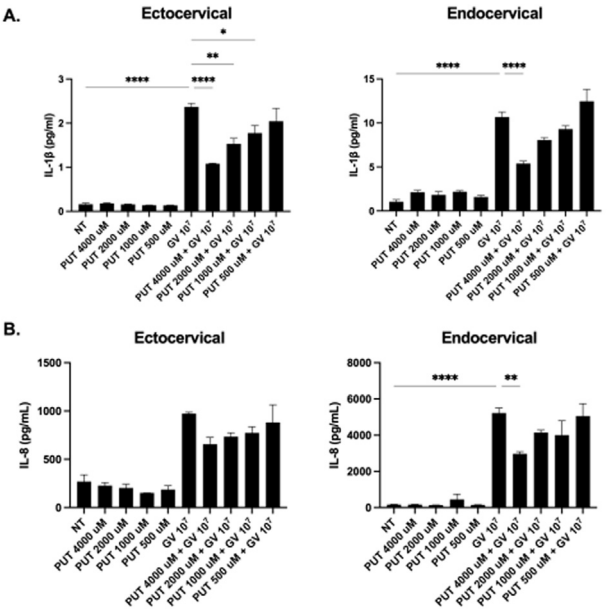

Figure 1. Cytokine concentrations in cervical epithelial cell culture media. **A.** IL-1β concentrations after *Gardnerella vaginalis* (GV) +/- putrescine in ectocervical and endocervical epithelial cells. **B.** IL-8 concentration after GV +/- polyamines in ectocervical and endocervical epithelial cells. PUT: putrescine. *p<0.05, **p<0.01, ****p<0.0001.

Oral Concurrent Session 2

Diabetes

Abstracts 25–32

TUESDAY
February 13, 2024
1:30 pm – 3:30 pm

MODERATOR(S)

Edward Miller, MD

Catherine Spong, MD

DIABETES

Abstracts 25-32

25 Initiation of Metformin in Pregnancy Results in Fetal Bioaccumulation, Growth Restriction & Renal Dysmorphology

Kjersti M. Aagaard[1], Paul Kievit[2], Maureen Gannon[3], Carrie McCurdy[4], Stephanie Wesolowski[5], Jed Friedman[6], Tyler Dean[2], Kristin Sauter[2], Maxim D. Seferovic[7], Brandon T. Garcia[7], Feng Li[8], John Hicks[1], Xuan Qin[9], Erin Bolte[9], Gwendolynn Hummel[9], Melissa Suter[1]

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OBJECTIVE: Traditional maternal drug toxicity studies focus on fetal malformations, overlooking potential childhood outcomes not recognized at birth. Metformin evades 1st pass liver metabolism & crosses the placenta. Based on its pharmacodynamics & limited clinical studies suggesting risk for childhood obesity & insulin resistance, we hypothesized that metformin initiated periconception would lead to fetal bioaccumulation with aberrant fetal growth. We developed a highly novel primate model and applied triple-quadruple pole LC mass spectrometry (UHPLC-QQQ) for direct quantitation of maternal and fetal metformin levels with detailed fetal biometry & histopathology.

STUDY DESIGN: Within 30d of confirmed conception, n=19 Rhesus macaque dams fed a control chow or Western style diet (mWSD) were initiated on twice daily, human dose-equivalent (10mg/kg) metformin or vehicle control (dose weight-adjusted Q trimester). G145 fetuses were delivered via Cesarean, measured, and necropsied by primate center experts. All fetal organs & tissue were processed per pediatric clinical pathology standards. Fluid and tissue metformin levels were assayed using UHPLC-QQQ.

RESULTS: Of n=19 pregnancies, 3 were late-term stillbirths unrelated to drug exposure. Viable pregnancies demonstrated significant bioaccumulation of metformin within the fetal kidney, urine, amniotic fluid, & placenta (Fig1A-D). These findings were associated with significant ($p < .05$) and specific restriction of overall growth, and decreased kidney, liver, skeletal muscle & retroperitoneal fat mass (Fig1E), driving significantly lower birthweight. Fetal kidney sagittal sections demonstrated delayed maturation with disorganized glomeruli & increased cortical thickness (Fig1F,G).

CONCLUSION: We are the first to directly demonstrate fetal bioaccumulation of metformin driving fetal growth restriction & significant renal dysmorphology. These findings are consistent with limited clinical trial data suggesting risk of SGA leading to paradoxical childhood obesity & insulin resistance. Additional investigation of the enduring effects of prenatal metformin use is warranted.

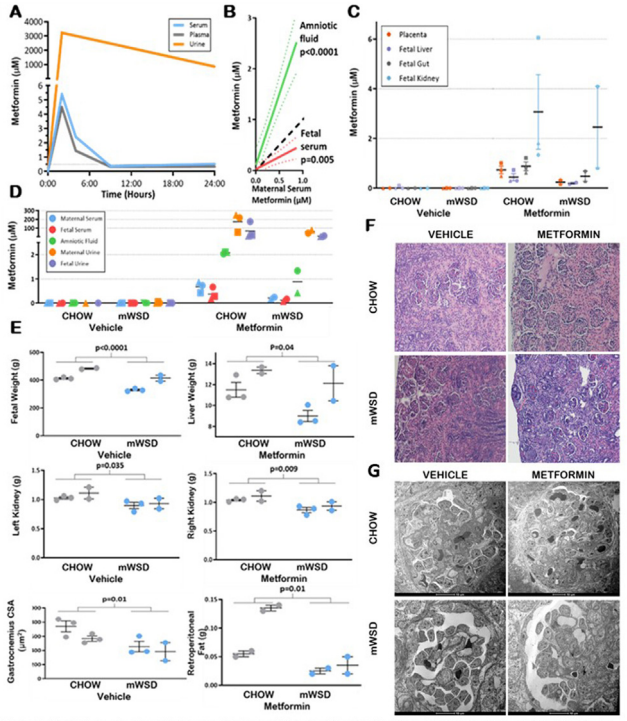

Figure. Metformin does not undergo first pass metabolism and bioaccumulates in maternal-equivalent concentrations in fetal kidney, urine and amniotic fluid and is associated with a significantly reduced fetal weight, and restricted fetal skeletal muscle and visceral growth with fetal renal dysmorphology. (A) Orally administered Metformin at a clinically relevant standard dose of 10 mg/kg (112.5mg=840μM) in adult rhesus macaques every 9 hours, with urine concentrations at log-fold higher than serum or plasma. (B-H). Dams initiated on 10 mg/kg twice daily metformin or vehicle control at G30, and fetuses were delivered via Cesarean at G145. (B-C) Serum, urine, amniotic fluid & fetal tissues (colors and symbols/shapes) from paired maternal-fetal dyads compared within treatment groups. Metformin was not detected with vehicle alone, and levels did not differ by maternal diet. (E) Significantly decreased fetal body weight, liver weight & mass, gastrocnemius muscle cross sectional area & volume, retroperitoneal fat mass, and right and left kidney weight & mass were observed independently of fetal sex. (F) Fetal kidney H&E and (G) electron microscopy was read by blinded-to-treatment pediatric renal pathologist examination. *Spearman's correlation, dashed colored lines for 95% CI.

26 IRELAnD—Investigating the Role of Early Low-dose Aspirin in Diabetes: a multicenter placebo-controlled blinded randomized trial

Catherine Finnegan[1], Patrick Dicker[2], Denisa Ramona Asandei[3], Mary Higgins[4], Neil O'Gorman[5], Fidelma Dunne[6], Geraldine Gaffney[7], Christine Newman[8], Fionnuala M. Mcauliffe[9], Mairead O'Riordan[10], Vineta Ciprike[11], Elena Fernandez[1], Fergal D. Malone[1], Fionnuala M. Breathnach[12]

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OBJECTIVE: Aspirin is widely advocated for obstetric risk modification, yet trials rarely include pre-gestational diabetes (PGDM). The aim of this study was to assess the effect of aspirin on adverse perinatal outcome (APO) in pregnancies complicated by PGDM.

STUDY DESIGN: We conducted a double-blinded, placebo-controlled RCT at 6 university-affiliated centers. Type 1 or 2 DM patients were randomly allocated to aspirin 150mg daily or placebo from 11-14 weeks' gestation until 36 weeks. The primary outcome was a composite measure of APO (PET, FGR, PTB < 34 weeks' gestation or

perinatal mortality). Secondary endpoints were composite maternal morbidity, composite neonatal morbidity and glycemic control. A sample size of 328 was required for 35% reduction in the primary outcome with 85% power (2-sided type I error 0.05), however the trial was stopped for recruitment challenges within the study timeframe. Treatment groups were compared using t-tests, chi-square tests and Repeated Measures analysis for longitudinal data.

RESULTS: 191 patients were eligible; 134 were enrolled (67 randomized to aspirin and 67 placebo). Baseline characteristics were similar between groups. Treatment compliance was very high (97% for aspirin, 94% for placebo). The composite measure of APO did not differ between groups (25% aspirin vs 21% placebo, $p = 0.796$).

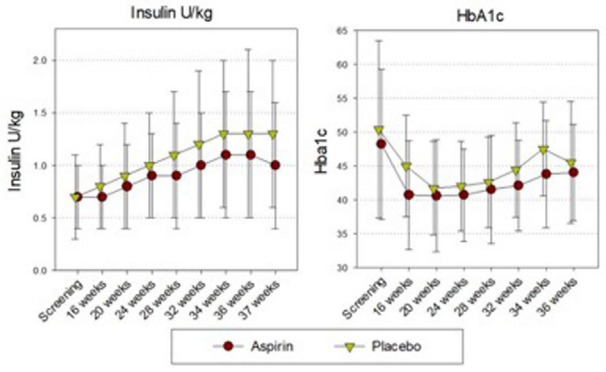
The aspirin group required significantly lower insulin dosing throughout pregnancy. On average, a 86% increase in insulin requirements was observed in the placebo group, compared to a 57% increase for aspirin-treated patients over the same gestational period ($p = 0.002$, Fig 1). Serial HbA1c measurements across gestation were observed to be lower in the aspirin group, although this was not statistically significant.

CONCLUSION: In this double-blinded, placebo-controlled RCT, aspirin did not reduce the risk of APO. Compared to placebo, aspirin-treated patients required significantly less insulin throughout pregnancy, indicating a beneficial effect of aspirin on DM control. Aspirin may exert a plausibly placenta-mediated effect on PGDM that is not limited to its antithrombotic properties.

Table 1. Study Outcomes

Primary Outcome		Aspirin (N=65)	Placebo (N=61)	P-value
Preeclampsia *[1]*		11 (17%)	7 (11%)	0.382
Preterm birth (< 34+0 weeks) *[2]*		3 (5%)	4 (7%)	0.634
Low birthweight (<10th centile) *[3]*		0	1 (2%)	0.304
Stillbirth *[4]*		2 (3%)	1 (2%)	0.597
Primary outcome: Composite of placental dysfunction: *[1],[2],[3]or[4]*		14 (22%)	12 (20%)	0.796
Secondary Outcomes				
Gestational age at delivery (weeks)		37.3 (2.1)	37.3 (2.4)	0.911
Mode of delivery	SVD	14 (22%)	14 (23%)	0.975
	OVD	5 (8%)	5 (8%)	
	CS	46 (71%)	42 (69%)	
Birthweight (g)		3661 (738)	3495 (774)	0.221
IUGR		1 (2%)	3 (5%)	0.280
NICU admission		23 (35%)	22 (36%)	0.936
IV glucose required		11 (17%)	10 (16%)	0.936
Respiratory morbidity		7 (11%)	8 (13%)	0.685
Need for assisted ventilation		10 (15%)	8 (13%)	0.716
Radiologic features consistent with RDS		2 (3%)	2 (3%)	0.935
Jaundice treatment		10 (15%)	8 (13%)	0.716
Shoulder dystocia		1 (5%)	1 (5%)	1.000
3rd/ 4th degree perineal tear		2 (11%)	1 (5%)	0.547

Figure 1: Serial insulin requirements and HbA1c levels across gestational age



27 Relationship between metformin use and preterm preeclampsia in pregnancies with type 2 diabetes

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OBJECTIVE: Pregnant patients with type 2 diabetes (T2DM) are at increased risk of preeclampsia, and both T2DM and preeclampsia increase risk for cardiovascular disease (CVD). Metformin is used to treat T2DM in nonpregnant patients. In addition to hypoglycemic effects, metformin may lower preeclampsia risk in pregnancy and CVD risk in non-pregnant patients. Our objectives were 1) to estimate the association between maternal metformin use for T2DM and preterm preeclampsia, and 2) to measure the effect of metformin use for T2DM in pregnancy on maternal CVD biomarkers.

STUDY DESIGN: Secondary analysis of data collected from an RCT comparing the effect of metformin vs placebo on composite neonatal outcome in singleton pregnancies with insulin-treated early diabetes or T2DM. Participants were randomized at 11 - 23 weeks to 1000 mg metformin BID or placebo until delivery. In a subset, maternal blood was collected at 24-30 wks for CVD biomarker measurement. We defined preterm preeclampsia as preeclampsia or HELLP syndrome requiring delivery at < 34 or < 37 wks. We used multivariable regression analysis to estimate the association between metformin use and preterm preeclampsia and maternal CVD biomarker levels.

RESULTS: Of 831 participants, 119 (14.3%) developed preeclampsia requiring delivery < 37 weeks: 57 (13.7%) of 416 in the placebo group and 62 (14.9%) of 415 in the metformin group. 37 (4.4%) of 831 developed preeclampsia requiring delivery < 34 weeks: 15 (3.6%) of 416 in placebo group and 22 (5.3%) of 415 in metformin group. Metformin did not significantly reduce the odds of early preeclampsia (Table). There was also no association between metformin and maternal soluble endoglin, apolipoprotein B, VCAM-1, or hsCRP level (Table).

CONCLUSION: Among pregnant patients with diabetes early in pregnancy or T2DM, the addition of metformin to insulin does not reduce odds of developing preterm preeclampsia or improve maternal serum CVD biomarker measurements in the early third trimester.

Table

Association Between Metformin Use and Preterm Preeclampsia		
	Unadjusted OR (95% CI)	***Adjusted OR (95% CI)**
Preeclampsia < 37 wks	0.96 (0.65-1.41)	1.06 (0.71-1.57)
Preeclampsia < 34 wks	1.43 (0.73-2.81)	1.44 (0.73-2.28)
Association Between Metformin Use and Maternal CVD Biomarkers		
	Unadjusted β (95% CI)	****Adjusted β (95% CI)**
Soluble endoglin (ng/mL)	-0.21 (-2.06 to 1.64)	-0.17 (-2.01 to 1.67)
Apolipoprotein B (mcg/mL)	-0.02 (-0.12 to 0.07)	-0.02 (-0.12 to 0.07)
VCAM-1 (ng/mL)	-82.69 (-292.0 to 126.7)	-90.29 (-298.0 to 117.5)
hsCRP (mcg/mL)	-4.22 (-12.0 to 3.59)	-4.03 (-11.87 to 3.81)

*Logistic regression, adjusted for presence of CHTN and low dose aspirin use
**Linear regression, adjusted for presence of CHTN and low dose aspirin use

28 Oral antihyperglycemic agent strategy versus insulin for gestational diabetes mellitus – a randomized controlled trial

Doortje Rademaker[1], Leon de Wit[2], Ruben G. Duijnhoven[1], Daphne N. Voormolen-van Münster[2], Joris van der Post[1], Judith E. Bosmans[3], Harold W. de Valk[2], Inge M. Evers[4], Ben Willem W. Mol[5], Arie Franx[6], Hans de Vries[1], Rebecca Painter[7], Bas van Rijn[8], SUGAR-DIP Investigator Group[9]

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OBJECTIVE: Metformin and glibenclamide monotherapy as first-line treatment for gestational diabetes (GDM), are often used as a patient-friendly alternative to insulin. However, whether a combination of these agents offers perinatal outcomes comparable to insulin alone is unknown.

STUDY DESIGN: In this multicenter, non-inferiority randomized controlled open-label trial, participants with singleton pregnancies between 16-34 weeks of gestation, who had insufficient glycemic control by diet, were randomly assigned to a treatment strategy with oral antihyperglycemic agents (OAS), starting with metformin and, if needed, additional glibenclamide and/or supplemental insulin, or treatment with insulin alone. The primary outcome was neonatal large-for-gestational age (LGA), with a non-inferiority margin of 8%. Secondary outcomes included patient preference and other perinatal and maternal endpoints.

RESULTS: Between 2016 and 2022 we randomized 821 women, 409 to OAS and 412 to insulin. The LGA rate was 23.9% versus 19.9% (absolute risk difference 4.0% (95% CI -1.7% - 9.8%, p=0.09 for non-inferiority, p=0.17 for superiority). In the OAS group, neonates more often required intravenous glucose therapy (6.4% vs 3.2% p=0.04). Gestational weight gain was lower after OAS than insulin treatment (9.2 kg vs 10.4 kg p=0.03). Maternal hypoglycemia affected 21% of those allocated to OAS and 11% of those allocated to insulin (p=0.003). Eighty-two (20%) of OAS participants received insulin therapy. Participants receiving OAS reported more gastrointestinal adverse events. Serious adverse events were similar between groups. Overall, participants in both groups were satisfied with treatment, but participants assigned to OAS would more often recommend their treatment to others (5.1 vs 4.1, scale 0-6), and were more inclined to continue their current treatment (4.7 vs 3.9, both p< 0.001).

CONCLUSION: In this study, a treatment strategy for GDM using metformin and additional glibenclamide if needed, did not show non-inferiority to insulin for the primary outcome of LGA infants.

	Oral treatment N=407	Insulin N=403	Rel. risk (95% CI) or Absolute difference	p-value
Large for gestational age	97 (23.9%)	79 (19.9%)	4.04%(-1.66%-9.75%)	0.088[7]
Birth weight percentiles				
>90th	97 (23.8%)	79 (19.6%)	1.20 (0.93 – 1.57)	0.166
Neonatal intravenous glucose therapy	26 (6.4%)	13 (3.2%)	1.98 (1.03 – 3.97)	0.036
Gestational age at delivery (wks)	37.6 (1.6)	37.7 (1.1)	-0.38 (-0.23 – 0.16)	0.701[8]
< 37 wks gestation	39 (9.6%)	33 (8.3%)	1.16 (0.74 – 1.80)	0.514
Hospital admission				
NICU	18 (4.4%)	16 (4.8%)	1.14 (0.59 – 2.21)	0.689
Culture proven sepsis	3 (0.8%)	0 (0%)	n/a	0.25[9]
Shoulder dystocia	18 (4.4%)	11 (2.8%)	1.62 (0.77 – 3.38)	0.197
Neonatal death	1 (0.2%)	1 (0.2 %)	1.00 (0.99 – 1.01)	0.987
Birth injury	4 (0.9%)	0 (0%)	1.01 (1.00 – 1.02)	0.124
Pregnancy induced hypertension	48 (11.8%)	46 (11.6%)	0.99 (0.68 – 1.46)	0.602
Preeclampsia/HELLP	28 (6.9%)	22 (5.5%)	1.25 (0.73 – 2.14)	0.427
Gestational weight gain (kg, sd)	9.3(6)	10.4 (7)	1.06(-0.03– 2.14)	0.028
Drug related Adverse Events				
No Adverse Events	62 (24.4%)	124 (51.9%)	0.35 (0.24 – 0.51)	<0.001
Headache	51(20.1%)	31 (13.0%)	1.69 (1.04 – 2.74)	0.04
Nausea	100 (39.4%)	31 (13.0%)	4.36 (2.77 – 6.86)	<0.001
Vomiting	37 (14.6%)	4 (1.7%)	10.0 (3.51 – 28.6)	<0.001
Diarrhoea	98 (38.6%)	12 (5.0%)	11.9 (6.31 – 22.4)	<0.001
Hypoglycemia	53 (20.9%)	26 (10.9%)	2.16 (1.30 – 3.59)	0.003
Fatigue	73 (28.7%)	51 (21.3%)	1.49 (0.99 – 2.24)	0.06
Patient satisfaction (scale 0-6)				
Satisfaction current treatment (mean, sd)	4.8 (1.0)	4.8 (1.1)	-0.04 (-0.23 – 1.16)	0.70
Recommendation of treatment to someone else	5.1 (1.3)	4.1 (1.7)	-0.93 (-1.20 - -0.66)	<0.001
Satisfied to continue treatment	4.7 (1.3)	3.9 (1.5)	-0.78 (-1.03 - -0.53)	<0.001

29 Permissive Glucose Control Versus Usual Care for Diabetes in Labor: An Equivalence Randomized Control Trial

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OBJECTIVE: There is limited high quality data to determine best practices for maternal blood glucose (BG) management during labor. We compared permissive control (target maternal BG 70−180mg/dL) to usual care (BG 70−110mg/dL) among laboring individuals with diabetes (DM).

STUDY DESIGN: We performed a multi-site equivalence RCT (NCT05553275) for individuals with DM (pregestational or gestational) at ≥ 34 weeks in labor. Individuals were randomly allocated to usual care or permissive control. Capillary BG monitoring was performed in latent and active labor every 4 and 2 hours, respectively. Insulin drip was initiated if maternal BG exceeded the upper bounds of the allocated target. Primary outcome was neonatal heel stick BG within two hours of birth. For usual care, we assumed a mean neonatal BG of 50 ± 10 mg/dL (standard deviation). To ensure that use of permissive control did not increase or decrease the mean neonatal BG > 10 mg/dL (two-tailed, α= 0.05, β= 0.2), 96

participants total were required. We calculated relative risk (RR) and 95% confidence intervals (CI) in an intention-to-treat analysis. A Bayesian analysis was preplanned to estimate the probability of equivalence with a neutral informative prior.

RESULTS: Of 6,628 deliveries (10/2022 - 6/2023), 280 (4.2%) met eligibility criteria, and 96 (34.3%) agreed and were randomized, with similar baseline characteristics between groups. 17% of individuals in the usual care required an insulin drip compared to none in permissive care. There was equivalence in the primary outcome between usual and permissive care (57.9 vs. 57.1 mg/dL, mean difference [MD] -0.72, 95% CI -8.87,7.43). Bayesian analysis indicated 89% posterior probability of MD not being greater than ±10 mg/dL and 99% probability of the MD not being more than 10 mg/dL lower (95% credible interval -3.5,13.2). There was no difference in other neonatal or maternal outcomes (Table).

CONCLUSION: In this RCT, while almost 1 in 6 individuals with DM required an insulin drip during usual maternal BG care in labor, permissive BG care was associated with equivalent neonatal BG when compared to usual care.

Table. Intrapartum characteristics followed by neonatal and maternal outcomes in usual versus permissive blood glucose care in labor

Outcome	Usual care N = 48	Permissive care N = 48	Relative Risk (95% CI)
Intrapartum and Delivery Characteristics			
Gestational age at delivery	37.7 (36.7, 38.9)	37.5 (36.1, 38.4)	-
Insulin drip utilization	8 (16.7)	0 (0.0)	-
Hours of insulin drip utilization	5.9 (2.7, 9.5)	-	-
Any glucose > 110 mg/dL	17 (35.4)	24 (50.0)	1.39 (0.87, 2.23)
Any glucose > 180 mg/dL	2 (4.2)	0 (0.0)	-
Hypoglycemia, symptomatic	3 (6.3)	3 (6.3)	0.97 (0.21, 4.42)
Hypoglycemia < 60 mg/dL	4 (8.3)	1 (2.1)	0.25 (0.03, 2.09)
Hyperglycemia > 200 mg/dL	1 (2.1)	0 (0.0)	-
Neonatal Outcomes			
Primary outcome[a], mg/dL	57.9 ± 18.1	57.1 ± 22.7	-0.72 (-8.87, 7.43)[b]
Minutes from delivery to first BG	53 ± 30	59 ± 32	6.6 (-5.7, 19.0)[b]
Composite outcome	21 (43.8)	25 (52.1)	1.19 (0.79, 1.79)
5-minute Apgar score < 7	1 (2.1)	2 (4.2)	1.99 (0.18, 21.8)
Arterial cord gas pH < 7.1	1 (5.3)	1 (3.0)	1.01 (0.07, 14.8)
Admission to NICU	14 (29.2)	12 (25.0)	0.86 (0.45, 1.65)
Hypoglycemia[c]	12 (25)	14 (29.2)	1.14 (0.60, 2.17)
Need for PO or IV glucose	14 (29.2)	13 (27.1)	0.90 (0.49, 1.67)
First BG <40 mg/dL	10 (20.8)	8 (16.7)	0.79 (0.34, 1.82)
C- peptide, ng/mL	1.0 (0.6,1.8)	1.0 (0.6, 2.1)	0.34 (-0.55, 1.24)
Respiratory distress[d]	4 (8.3)	2 (4.2)	0.50 (0.09, 2.62)
CPAP	2 (4.2)	2 (4.2)	1.0 (0.14, 6.88)
Hyperbilirubinemia[e]	7 (14.6)	3 (6.3)	0.43 (0.12, 1.57)
Maternal Outcomes			
Cesarean delivery	17 (35.4)	15 (31.3)	0.88 (0.50, 1.53)
Shoulder dystocia	1 (2.1)	2 (4.2)	1.94 (0.19, 20.2)
Chorioamnionitis	4 (8.3)	3 (6.3)	0.78 (0.19, 3.21)
Estimated blood loss ≥1,000 mL	2 (4.2)	2 (4.2)	1.04 (0.16, 6.84)
Length of stay, days	4.1 ± 5.6	3.4 ± 1.7	-0.67 (-2.31, 0.98)[b]

Data reported in n (%), median (interquartile range), or mean ± standard deviation unless otherwise specified
BG, blood glucose; NICU, neonatal intensive care unit; PO, oral; IV, intravenous; CPAP, continuous positive airway pressure
[a] Mean first blood glucose within 2 hours of delivery, before feeding
[b] Mean difference (95% confidence interval)
[c] Defined as <40 mg/dL in the first 24 hours of life and <50 mg/dL thereafter
[d] Defined as need for 4 hours of respiratory support with supplemental oxygen, CPAP or ventilation in the first 24 hours of life
[e] Defined as hyperbilirubinemia requiring phototherapy

30 Breastfeeding and Long-Term Maternal and Child Cardiometabolic Health at 10-14 years after delivery

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OBJECTIVE: To examine the association between breastfeeding and maternal and child cardiometabolic health 10-14 years after delivery in the Hyperglycemia and Adverse Pregnancy Outcome (HAPO) Follow-up Study.

STUDY DESIGN: Secondary analysis of maternal-child dyads from HAPO Follow-up Study. The primary exposure was self-reported breastfeeding. Cardiometabolic outcomes included maternal measures of prediabetes, diabetes, hypertension, and hyperlipidemia, and child measures of glucose metabolism disorders, defined as either type 2 diabetes or impaired glucose tolerance, increased body fat defined as >85%tile, and increased body mass index (BMI) defined as BMI >85%tile. Multivariate logistic regression was used and adjusted for baseline maternal covariates at HAPO enrollment.

RESULTS: Of 4,685 assessed maternal-child dyads, 79.7% reported breastfeeding. Mothers who breastfed were older at the time of follow-up (42.4y [38.8, 45.9] vs. 41.4y [37.1, 45.4], p=0.012), less likely to smoke (5.9% vs. 15.4%, p< 0.001), and more likely to use alcohol (35.0% vs. 22.9%, p< 0.001). When looking at the outcomes, mothers who breastfed had lower HOMA insulin resistance (1.8 [1.2, 2.8] vs. 1.9 [1.3, 3.0], p=0.001) and body fat percentage (34.9% vs. 35.9%, p=0.013). In multivariate analysis, breastfeeding was not associated with maternal cardiometabolic outcomes (Table). However, breastfeeding was associated with improved child cardiometabolic health, including lower rates of glucose metabolism disorders (10.7% vs. 13.7%; aOR 0.77, 95% CI 0.62, 0.96), impaired fasting glucose (6.1% vs. 9.4%; aOR 0.67, 95% CI 0.51, 0.88), HOMA insulin resistance >85% (13.0% vs. 15.6%; aOR 0.79, 95% CI 0.64, 0.98), body fat >85%, (13.6% vs. 17.5%; aOR 0.79, 95% CI 0.65, 0.97), and BMI >85% (26.6% vs. 30.0%; aOR 0.81, 95% CI 0.69, 0.96) (Table).

CONCLUSION: Breastfeeding was associated with improved child but not maternal cardiometabolic health 10-14 years postpartum, including lower rates of glucose metabolism disorders and lower rates of body fat and BMI being >85%tile.

Table 1. Association of breastfeeding with maternal and childhood metabolic measures

	No Breastfeeding N = 950	Breastfed N = 3,735	Odds Risk (95% CI)	Adjusted odds risk* (95% CI)
Maternal				
Type 2 diabetes	26 (2.7%)	108 (2.9%)	1.06, (0.69, 1.64)	1.12 (0.71, 1.76)
Glucose metabolism disorder (type 2 diabetes or Impaired glucose tolerance)	233 (24.5%)	901 (24.1%)	0.98 (0.83, 1.16)	1.04 (0.87, 1.23)
Pre-diabetes	207 (21.8%)	793 (21.2%)	0.97 (0.82, 1.16)	1.03 (0.86, 1.24)
Hypertension	92 (9.7%)	319 (8.5%)	0.87 (0.68, 1.11)	0.83 (0.64, 1.08)
Hyperlipidemia – low density lipoprotein	207 (21.8%)	742 (19.9%)	0.88 (0.74, 1.05)	0.88 (0.73, 1.06)
Hyperlipidemia – total cholesterol	312 (32.8%)	1099 (29.4%)	**0.85 (0.73, 0.99)**	0.85 (0.73, 1.00)
Hyperlipidemia - triglycerides	46 (4.8%)	138 (3.7%)	0.75 (0.53, 1.06)	0.89 (0.62, 1.27)
Child				
Glucose metabolism disorder (type 2 diabetes or Impaired glucose tolerance)	130 (13.7%)	400 (10.7%)	**0.72 (0.58, 0.89)**	**0.77 (0.62, 0.96)**
Impaired fasting glucose	90 (9.4%)	227 (6.1%)	**0.59 (0.45, 0.76)**	**0.67 (0.51, 0.88)**
HOMA insulin resistance > 85%tile	148 (15.6%)	487 (13.0%)	**0.77 (0.63, 0.94)**	**0.79 (0.64, 0.98)**
Body fat percentage > 85th%tile	166 (17.5%)	609 (13.6%)	**0.75 (0.62, 0.91)**	**0.79 (0.65, 0.97)**
Midpoint waist circumference > 85th%tile	161 (16.9%)	529 (14.2%)	**0.81 (0.67, 0.98)**	0.84 (0.69, 1.03)
Sum of skinfold > 85th%tile	162 (17.1%)	519 (13.9%)	**0.78 (0.65, 0.95)**	0.83 (0.68, 1.01)
BMI >85th%tile	283 (30.0%)	993 (26.6%)	**0.85 (0.73, 1.00)**	**0.81 (0.69, 0.96)**

HOMA, homeostatic model assessment, CI, Confidence Interval, BMI, body mass index.
*Adjusted for age, tobacco, alcohol use, and history of hypertensive disorder of pregnancy.
Additionally adjusted for birthweight for child outcomes.
Bolded results were statistically significant (p<0.05).

31 Association of glucose profiles based on daily continuous glucose monitoring metrics with adverse perinatal outcomes

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OBJECTIVE: While individual continuous glucose monitoring (CGM) metrics are associated with pregnancy outcomes, the combination of CGM metrics is more difficult to study. Our goal was to 1) identify discrete glucose profiles based on daily CGM metrics among pregnant individuals with pregestational diabetes and 2) investigate their association with adverse perinatal outcomes.

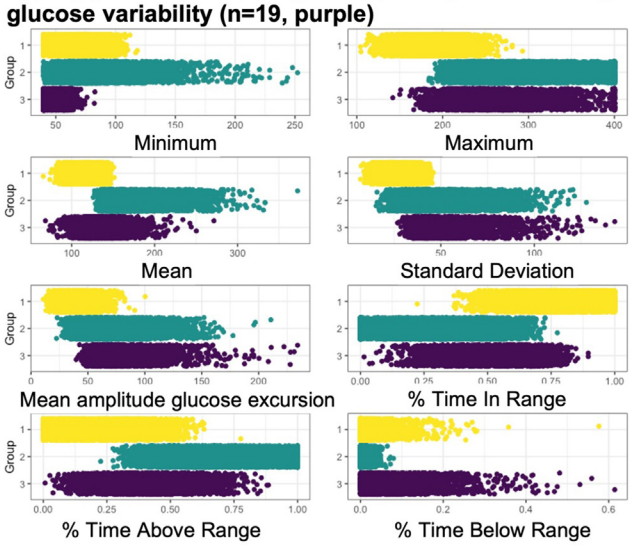
STUDY DESIGN: Retrospective cohort study of pregnant individuals with type 1 or type 2 diabetes who used Dexcom G6 CGM from at least 24-30wga and delivered at a tertiary center (2019-2023). CGM data was transformed into eight daily CGM metrics: minimum, maximum, mean, standard deviation, mean amplitude of glucose excursion, and time spent in range (65-140 mg/dL), above range, and below range. K-means clustering identified distinct glucose profiles, and individuals were classified based on which profile best summarized their CGM data. Last, the association between glucose profiles and outcomes was estimated using logistic regression

adjusted for diabetes type, maternal age, insurance, CGM use before pregnancy, and parity.

RESULTS: Of 90 pregnant individuals, 53 (58.9%) had type 1 diabetes and 47 (41.1%) had type 2 diabetes. We identified three glucose profiles: 1) well-controlled, 2) suboptimal control with hyperglycemia, and 3) suboptimal control with high glucose variability (Figure). Compared to the well-controlled profile, the hyperglycemia profile had higher odds of preterm birth (aOR 3.23, 95%CI 1.04-11.0), cesarean (aOR 3.42, 95%CI 1.09-11.9), LGA (aOR 3.88, 95% CI 1.14-15.1), neonatal hypoglycemia (aOR 4.10, 95%CI 1.36-13.5), and NICU admission (aOR 7.82, 95%CI 2.44-29.0). Compared to the well-controlled profile, the high variability profile had higher odds of preterm birth (aOR 5.49, 95%CI 1.34-25.8) and NICU admission (aOR 10.7, 95%CI 2.41-58.5). Neither was associated with preeclampsia.

CONCLUSION: In addition to avoiding maternal hyperglycemia in pregnant individuals with pregestational diabetes, high glucose variability with excursions in both directions should be minimized given high risk of preterm birth and NICU admission.

Glycemic characteristics of 3 glucose profiles: 1) well-controlled (n=33, yellow), 2) suboptimal with hyperglycemia (n=38, teal), and 3) suboptimal with high glucose variability (n=19, purple)



32 Classifying patients based on weekly continuous glucose monitoring metrics and their association with pregnancy outcomes

Sara Sauer[1], **Ayodeji Sanusi**[2], **Isabel Fulcher**[3], **Ashley N. Battarbee**[4]
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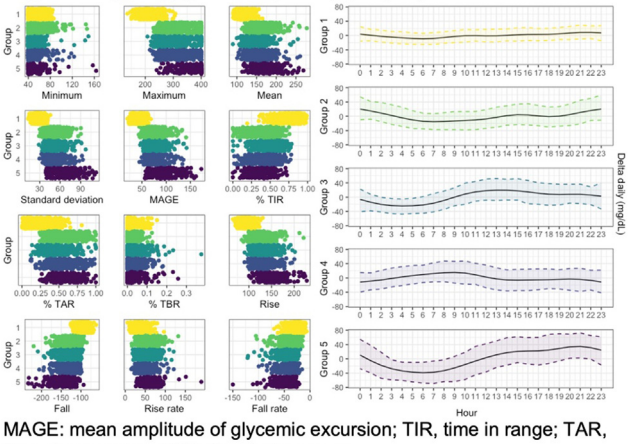
OBJECTIVE: Continuous glucose monitoring (CGM) data is complex and can be difficult to interpret. Using machine learning techniques, we sought to 1) identify groups of patients based on CGM metrics, and 2) compare patient characteristics and outcomes across groups.

STUDY DESIGN: Retrospective cohort study of patients with type 1 or type 2 diabetes who used real-time CGM during pregnancy and delivered at a tertiary center (2019-2023). CGM data were collapsed into weekly glycemic summaries related to centrality, spread, excursions, and circadian cycle patterns. Principal component analysis and k-means clustering were used to identify 5 discrete groups, and patients were assigned to the group that best represented their CGM patterns. Finally, patient characteristics and outcomes were compared across groups.

RESULTS: We identified five glucotype groups using 2040 weeks of CGM data from 145 patients: 1) well-controlled and sub-optimally controlled with 2) nocturnal hyperglycemia, 3) daytime hyperglycemia, 4) early morning hyperglycemia, and 5) high variability with fasting hypoglycemia and daytime hyperglycemia (Figure). Patients in groups 1 and 2 were more likely to be older and have type 2 diabetes whereas groups 3, 4 and 5 more likely to be younger and have type 1 diabetes ($p< 0.01$ for both). Groups 1, 2 and 5 were more likely to be non-Hispanic Black and groups 3 and 4 non-Hispanic White ($p< 0.05$). Insurance and parity were similar between groups ($p=0.44$ and 0.87). With regards to outcomes, groups 2 and 5 were most likely to have NICU admission and neonatal hypoglycemia ($p< 0.01$ for both). Groups 2 and 4 were most likely to have preterm birth, with group 5 next ($p< 0.01$). Preeclampsia and cesarean delivery did not differ ($p=0.08$ and 0.40).

CONCLUSION: Weekly CGM metrics successfully classified pregnant patients into discrete glucotype groups integrating glycemic excursions and circadian cycle patterns. Nocturnal hyperglycemia and high glycemic variability with hypo- and hyperglycemia should be avoided as these patients appear most likely to experience adverse outcomes.

Characteristics of 5 glucotype groups: 1) well-controlled (n=47, yellow), 2) nocturnal hyperglycemia (n=29, green), 3) daytime hyperglycemia (n=24, teal), 4) early morning hyperglycemia (n=32, blue), 5) high glucose variability with morning hypoglycemia and daytime hyperglycemia (n=13, purple)



MAGE: mean amplitude of glycemic excursion; TIR, time in range; TAR, time above range; TBR, time below range

Oral Concurrent Session 3

Basic Science

Abstract 33–40

TUESDAY
February 13, 2024
1:30 pm – 3:30 pm

MODERATOR(S)

Irina Burd, MD, PhD

Katherine Leonard, DO

BASIC SCIENCE

Abstracts 33-40

33 Bioaccumulation of Microplastics in Placentae Associated with Environmental Chemical Exposures and Obstetrical Outcomes

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OBJECTIVE: Inhalation and ingestion of millions of microplastics (particles < 20 μm) occur annually in people. Microplastic exposures have been linked to increased levels of inflammatory markers in experimental animal models. Given the putative role of disrupted inflammatory pathways in preterm birth risk, we hypothesized that microplastics quantitatively differ in human placentae.

STUDY DESIGN: We visualized and quantified cumulative microplastics (Fig. 1A) by Fourier-transformed infrared microscopy (FTIR; n=31), quantified microplastics species by pyrolysis followed by quantitative time of flight gas chromatography-mass spectrometry (pyro-qTOF/GC-MS; n=10), and quantified polycyclic aromatic hydrocarbons (PAHs; n=70) BaP, BbF, and DBA by GC/MS. We then applied machine learning algorithms correlating environmental toxicants (n=24 with PAH and microplastics data) with social deprivation scores and obstetrics outcomes.

RESULTS: Microplastics were detected in 100% of placentae (1.45-26.3 mg/g, mean 6.91 mg/g ±1.1 SEM). With pyro-qTOF/GC-MS, we detected 12 polymers with high specificity, with polyethylene being the most prominent (Fig. 1B). There was more variation between placentae in terms of the total plastics (p=0.002), compared contributions from individual plastic types (p< 0.0001). Machine learning identified the top predictive features of microplastics were gestational age and APGAR scores. Pearson's correlation analysis (Fig. 1C) revealed significantly higher polyethylene in the placentae of male offspring compared to females (Fig. 1D; p=0.032). Bulk and spatial transcriptomics (n=10) identified significant (q< 0.05) gene expression alterations associated with quartile distributions of toxicants.

CONCLUSION: To our knowledge, this is the first study to quantitate and speciate the bioaccumulation of microplastics in placentae. Further, we utilized these data to train a predictive model of environmental exposures at the maternal-fetal interface, which will only become more translational with additional integration.

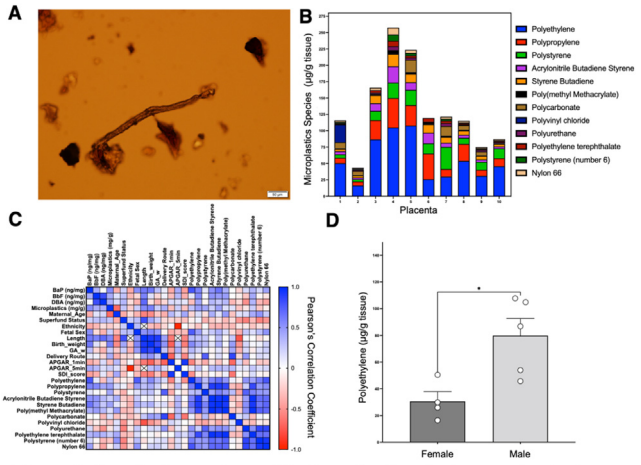

Figure 1. Visualization and quantification of microplastics species in human placentae. A, Human placentae were digested and visualized by FTIR. **B,** Individual microplastic species were quantified by pyro-GC/MS. **C-D,** Specimen with PAH, microplastics, and corresponding subject metadata were analyzed by Pearson's correlation analysis (**C**), revealing a significant increase in polyethylene associated with fetal biological sex (**D**; p=0.032, Mann-Whitney).

34 Safety and efficacy of open fetal repair of complex gastroschisis in the fetal lamb model

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OBJECTIVE: *In utero* repair of complex gastroschisis (cGS) may prevent progressive and irreversible bowel damage due to inflammation and ischemia. We aimed to assess the safety and efficacy of open fetal repair of cGS in a previously validated fetal lamb model.

STUDY DESIGN: Standardized cGS was induced in fetal lambs at 75 days' gestation (Fig.1A). At 90 days, we repaired the defect using a stepwise fetal procedure that involved reducing the bowel into the abdominal cavity and suturing of the abdominal wall. At term (143d), we compared the outcomes of repaired cGS lambs to unrepaired and normal lambs. Outcomes were survival, small bowel gross examination, *in vivo* motility (primary) and structure on MRI, *ex vivo* contractility and permeability, and histological analysis.

RESULTS: 71% (n=5/7) of repaired cGS fetal lambs survived to term compared to 45% (n=5/11) unrepaired lambs. At term, there was no macroscopic evidence of stenosis, atresia, necrosis, perforation, or volvulus in repaired lambs, whereas 100% of the non-repaired lambs exhibited one or more of these features (Fig.1A). Repaired cGS lambs had significantly improved bowel motility and decreased bowel dilation and wall thickness on postnatal MRI to levels that were not significantly different from normal lambs (Fig.1B).

Repaired lambs had increased bowel contractility on *ex vivo* analysis with an increase in smooth muscle contractions comparable to normal lambs (Fig.1C). There was no difference in small bowel permeability and integrity. Histological examination revealed that repaired lambs exhibited restoration of smooth muscle architecture mainly in the proximal jejunum with a trend toward normal crypt and villi architecture, compared to the characteristic thickened and inflamed bowel in unrepaired cGS (Fig. 1D).

CONCLUSION: Open fetal repair of cGS in the fetal lamb model is safe and effective. Prenatal intervention improves bowel anatomy and physiology in cGS. Future studies will investigate the feasibility and safety of fetoscopic repair before envisioning clinical implementation.

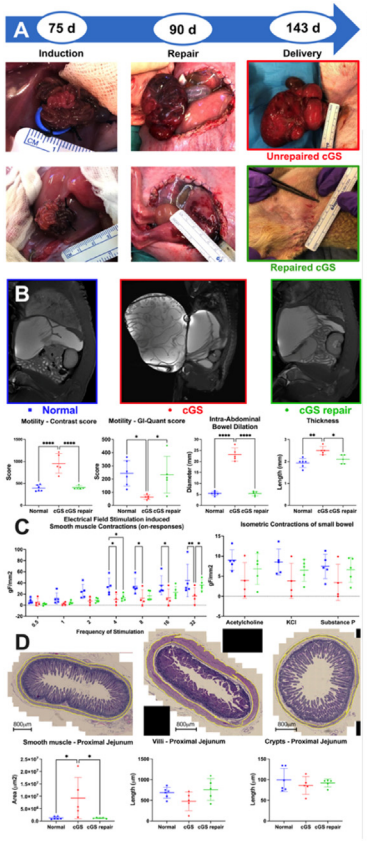

Figure 1 - Bowel structure and function after fetal repair in cGS lambs (green, n=5) at term, compared to unrepaired cGS (red, n=5) and normal controls (blue, n=6).
(A) Experimental timeline from induction until term delivery. Standardized cGS was induced in fetal lambs using a 1cm abdominal incision and a 1cm diameter silicone constrictive ring fixed to the abdominal wall followed by small bowel evisceration through the defect.
(B) *In vivo* bowel MRI: in repaired cGS lambs, significant decrease in motility contrast score of the proximal jejunum (406±39, vs. 954±223, p<0.0001), increase in GI-Quant motility score of the entire small bowel (233±139, vs. 63±17, p<0.05), and decrease in intra-abdominal bowel dilation (5.4±1.0 vs. 23.2±3.0 mm, p<0.0001) and thickness (2.1±0.2 vs. 2.5±0.2 mm, p<0.05).
(C) Ex vivo contractility assay: in repaired cGS lambs , increase in smooth muscle contractions at a maximum intensity of 4, 8, 16 and especially 32 Hz (36.1±20.1 vs. 16.5±30.1, p<0.05) and trend toward increase in isometric contractions.
(D) Quantitative histological analysis: decrease in smooth muscle area of the proximal jejunum (1.19±0.18 vs. 9.26±8.30 x10^6 um2, p<0.05), and trend toward increase of villi and crypt lengths.
One- or two-way ANOVA to compare the outcomes of repaired lambs n=5 to control lambs (*n*=6); p<0.05 is significant.

35 Potential mechanism of neuroprotection by magnesium sulfate and betamethasone in microglia and neural stem cells

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OBJECTIVE: The use of antepartum magnesium sulfate ($MgSO_4$) and corticosteroids is associated with reductions in developmental disability among preterm infants. The protective mechanisms of these drugs remain unclear but may relate to neurodevelopment. As the brain grows in-utero, neural stem cells (NSCs) decline in number while microglia increase. We hypothesize that the mechanism of $MgSO_4$/corticosteroids relate to drug interactions in these cells and their proportion within the fetal brain at the time of preterm birth. We aimed to characterize the neuroprotective actions of these drugs by evaluating cytokine production in stimulated human fetal microglia and NSCs *in-vitro*.

STUDY DESIGN: Commercially available fetal derived microglia (HMC3) and NSCs (ReNcells) were given PBS as a control or stimulated for 24-hours with IL-1B, a mediator of perinatal neuroinflammatory injury. Cells were also given the vehicle, $MgSO_4$, betamethasone (BTMZ) or $MgSO_4$/BMTZ. The production of twelve cytokines/chemokines were compared in cell media collected 24-hours post exposure using a Milliplex immunology assay.

RESULTS: In controls, cytokines/chemokines were absent or at low levels. With IL-1B exposure, the production of five cytokines/chemokines was elevated by NSCs (Figure 1) while microglia upregulated 11 of the 12 (Figure 2). Substantial production of pro-inflammatory IL-6 and IL-8 was observed by both cell types yet only microglia produced the anti-inflammatory cytokine IL-10. Treatment with $MgSO_4$ but not BTMZ or $MgSO_4$/BTMZ lowered IL-8 but not IL-6 in IL-1B exposed NSCs. For microglia, BTMZ alone and $MgSO_4$/BTMZ reduced most cytokines upregulated by IL-1B.

CONCLUSION: In stimulated microglia and NSCs, proinflammatory cytokines were lowered selectively by each drug. BTMZ reduces inflammatory responses in microglia whereas NSCs are incrementally affected by $MgSO_4$. Further research is needed to determine whether neuroprotection by these drugs relates to gestational age, as there are differences in the brain's composition of microglia and NSCs at different times of exposure.

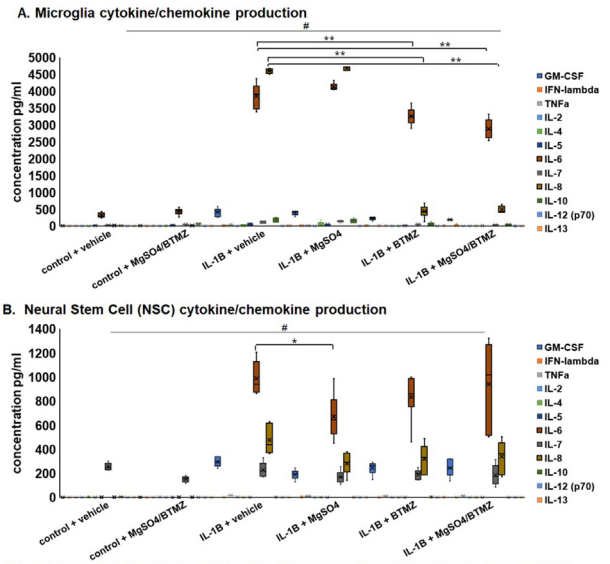

Figure 1. Box and whisker plots show cytokines/chemokine measured in media from cultured microglia and NSCs collected 24-hours following exposure to IL-1B or PBS (controls), in combination with normal saline (vehicle), MgSO4, Betamethasone (BTMZ) or MgSO4/BTMZ. Errors bars reflect the standard deviation, center lines within each box the medians, x's denote means. The horizontal axis specifies exposure-treatment (n=4-6 technical replicates per condition), vertical axis the absolute concentration. **Panel A Microglia.** # p<0.05 by ANOVA for all cytokines/chemokines across all conditions with exception to IL-4 which was not detected. ** p<0.005 by Tukey's post hoc test for IL-6 and IL-8 between IL-1B + vehicle vs. IL-1B + BTMZ and IL1B + MgSO4/BTMZ. **Panel B NSCs.** # p<0.05 by ANOVA for GM-CSF, TNF, IL-6, IL-7 and IL-8 across all conditions. * p<0.05 by Tukey's post hoc test for IL-8 between IL-1B + vehicle vs. IL-1B + MgSO4.

36 Evaluation of transplacental transfer of cancer therapies in melanoma via the perfused human placental model

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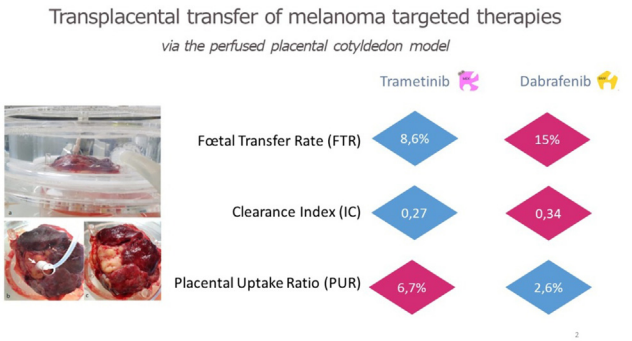
OBJECTIVE: Treating melanoma during pregnancy is becoming increasingly common. The targeted therapies directed at the mutations that cause 50% of melanomas, including dabrafenib (anti-BRAF) and trametinib (anti-MEK), have revolutionized the prognosis of advanced cancers. However, there are scarce on their use during pregnancy. It is essential to provide clinicians with preliminary data on the placental passage of these molecules. The objective of our study is to determine the Foetal Transfer Rate (FTR), Clearance Index (CI) and Placental Uptake Ratio (PUR) of dabrafenib and trametinib using the experimental ex vivo reference model of the human perfused cotyledon.

STUDY DESIGN: Placentas from normal term pregnancies were collected immediately after delivery. Cotyledons were placed in a 37°C perfusion chamber and perfused in a double open circuit with a solution containing trametinib or dabrafenib and its metabolites (hydroxy-dabrafenib and desmethyl-dabrafenib). The concentration found in the foetal circulation was evaluated by mass spectrometry, on samples taken every 5 minutes for 90 minutes. The validity of the manipulations was verified by the determination of antipyrine concentration, of which the transfer rate is known.

RESULTS: In the trametinib arm, 11 placentas were successfully tested. The trametinib FTR was 8.6%, the CI was 0.27, and the PUR was 6.7%. In the dabrafenib and metabolites arm, 12 placentas were successfully tested. The FTR for dabrafenib was 14.9%, the CI was 0.34, and the PUR was 2,6%. Analyses for hydroxy-dabrafenib and desmethyl-dabrafenib are ongoing.

CONCLUSION: There is a significant passage of the 2 molecules through the placental barrier, less for trametinib. These results are the first pharmacokinetic data on the placental passage of targeted melanoma therapies, an essential prerequisite for the treatment of pregnant women. Comparing this molecules will help oncologists and obstetricians chosing the best individual treatment plan for each pregnant cancer patient.



37 Refractoriness of chorion trophoblast cells to epithelial mesenchymal transition (EMT) by pPROM risk factors

Benjamin A. Bush[1], Enkhtuya Radnaa[2], Ryan Lintao[3], Mary Severino[4], RamKumar Menon[5]

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OBJECTIVE: Fetal membrane inflammation is one of the drivers of pPROM. Epithelial-mesenchymal transition (EMT) of amnion epithelial and chorion trophoblast cells (CTC) at cellular-level generate inflammation that can weaken the membranes. In amnion, progesterone (P4) through receptor membrane components (PGRMC 1 and 2) restricts EMT to avoid inflammation. CTCs at the fetomaternal interface are vulnerable to maternal risk factors that can cause EMT. This study tested the influence of PGRMC 1 and 2 on EMT of CTCs in response to stressors associated with pPROM.

STUDY DESIGN: PGRMC1 or PGRMC2 knock out (KO) CTCs were prepared by CRISPR/Cas9 (Fig 1). The cells were treated with stressors Bafilomycin (BafA1) and TGF-β (EMT inducers), immunogens lipopolysaccharide (LPS), chlamydial antigen, and Ureaplasma-conditioned media (UP) to simulate various infections known to be associated with pPROM. Primary endpoints included morphologic evidence of EMT, cell-shape index, N-Cadherin to E-Cadherin ratio, TNF-α, IL-6, and progesterone production (P4).

RESULTS: Progesterone from chorion self regulates, providing anti-inflammatory barrier function. In PGRMC1 KO, there was no difference in EMT compared to wild type (WT) under normal conditions (Fig 1). In PGRMC2 KO, only LPS, but no other agent, induced EMT compared with WT ($p=0.045$) and an increase in P4 ($p=0.033$). Inflammatory cytokines (TNF-α, IL-6) significantly increased in PGRMC1 and PGRMC2 KO in response to BafA1, TGF-β, LPS, and UP ($p< 0.05$) (Table 1). P4 and PGRMC do not impact CTC EMT. CTCs are refractory to EMT in response to risk factors of pPROM (LPS, Chlamydia and U parvum antigens) and inducers of EMT (TGF-β). Increases in proinflammatory cytokines in PGRMC KO compared to WT suggest P4-PGRMC axis regulating CTC inflammation, which is independent of EMT.

CONCLUSION: CTCs are resistant to EMT to maintain its barrier functions. Chorionic inflammation, independent of EMT, is regulated by P4/PGRMC mediated autocrine signaling. Risk factors of pPROM do not induce chorion cell derangements and membrane dysfunctions are likely resulting from EMT of the amnion cells.

Table 1. Genotype-specific response to inflammatory and non-inflammatory stressors

Treatment	WT *vs.* PGRMC1 KO				WT *vs.* PGRMC2 KO			
	EMT	TNF-α	IL-6	P4	EMT	TNF-α	IL-6	P4
BafA1	-	↑↑	↑↑	-	-	↑↑	↑	-
TGF-β	-	↑↑↑↑	↑	-	-	↑↑↑↑	↑	-
LPS	-	↑↑↑	↑↑	-	↑	↑↑	↑↑	↑
Chl	-	-	-	-	-	-	-	-
UP	-	↑↑↑↑	↑	-	-	↑	↑	-

Summary table of EMT, progesterone release, TNF-α release, and IL-6 release differences in genotype-specific responses. ↑ = increased ($p \le 0.5$), ↑↑ = increased ($p \le 0.01$), ↑↑↑ = increased ($p \le 0.001$), and ↑↑↑↑ = increased ($p \le 0.0001$).

38 Impact of Gestational E-Cigarette Aerosols on Uterine Artery Function in Rats

Alexander Juusela[1], Vishal D. Naik[2], Alexander Carabulea[2], Joseph Janeski[2], Hong Jiang[2], Jayanth Ramadoss[2]

[1]Wayne State University, Detroit, MI, [2]C.S. Mott Center for Human Growth and Development, School of Medicine, Wayne State University, Detroit, MI

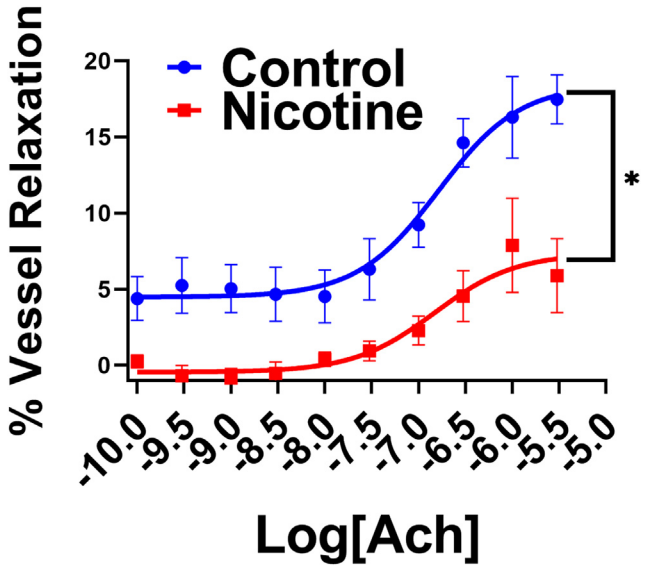
OBJECTIVE: Many perceive e-cigarettes (e-cig) as safer than cigarettes. There is a major knowledge gap surrounding the effects of e-cig aerosols (AE) on pregnancy and fetal development. We hypothesized that e-cig vaping during pregnancy will result in endothelium-dependent uterine artery (UA) dysfunction mediated by the nitric oxide system (NOS).

STUDY DESIGN: In a validated Sprague-Dawley rat model system, a custom-engineered vaping system was used to generate and deliver e-cig AE that mimic the AEs produced by commercial e-cigs. E-cig

aerosols and blood nicotine concentrations were characterized by mass spectrometry. UA function was measured via pressure arteriography. Immunoblotting and histology approaches were used to assess and validate the role of endothelial NO system.

RESULTS: Mass spec identified major AE constituents including vegetable glycerin, propylene glycol, nicotine, and carcinogenic compounds. Median peak serum nicotine concentration in dams=27.7 ng/mL, comparable to moderate/high level human smokers. As compared to the pair-fed control group, mean fetal weight (↓16.9%, one-way ANOVA P< 0.001), CRL (↓13.0%, P=0.019), and placental weight (42.3%, P=0.488). Pair-wise comparisons showed a concentration-dependent vasodilatory effect on UAs of the e-cig exposed rats, with vessel relaxation improved (P< 0.0001), treatment effect (P=0.0010). Acetylcholine induced UA relaxation was impaired in e-cig exposed rats ([1e-5 M] Control 16.3% vs. E-cig 7.89%, ↓69.5%). L-NAME↓UA vasodilation in both control and e-cig (P=0.09). The ↓ in vessel dilation due to NO inhibition in control was higher than the e-cig group, suggesting that the ↓ was due to the NO component. Immunoblotting showed that e-cig exposure↓P-Ser1177 eNOS levels in the UAs. L-NAME treatment inhibited P-Ser1177 eNOS levels in both control and e-cig exposed UAs, showing that L-NAME inhibited eNOS. Histology validated immunoblot data.

CONCLUSION: E-cig exposure during pregnancy decreases endothelial-dependent vascular relaxation in the rat UA by impairing NO-mediated vasodilation via alteration of eNOS excitatory post-translational modification.



39 Developing an Approach for In Utero Gene Editing: Lessons Learned

Courtney Breckenfelder[1], Patrick McGrath[1], Jennifer Matsuda[2], Ganna Bilosouva[1], Paul Rozance[1], Russell Anthony[3], Michael V. Zaretsky[4]

[1]University of Colorado Denver Anschutz Medical Campus, Aurora, CO, [2]National Jewish Health, Denver, CO, [3]Colorado State University, Fort Collins, CO, [4]University of Colorado, School of Medicine, Aurora, CO

OBJECTIVE: Cystic fibrosis is a genetic disorder resulting from mutations in the CFTR gene, and CRISPR/Cas9 genome editing offers potential treatment. Our objective was to develop CRISPR/Cas9 constructs targeting the F508 codon of the CFTR gene, deliver them to wild-type fetal sheep in utero, and assess the efficiency of CRISPR/Cas9-mediated genome editing in vivo to provide insights into its future feasibility.

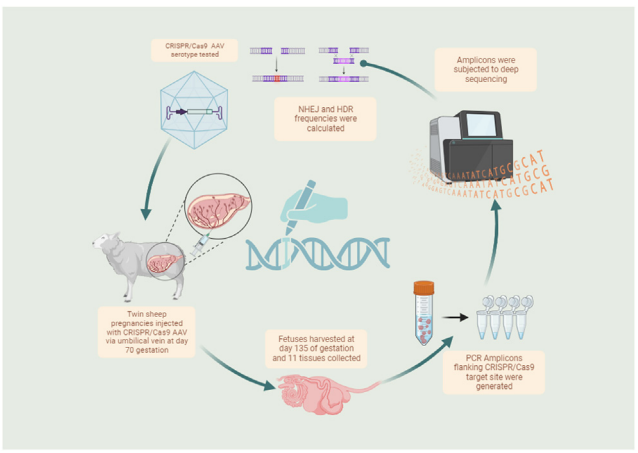
STUDY DESIGN: Several CRISPR/Cas9 orthologs were designed to target the F508 codon. The gene editing efficiency was determined in fetal sheep trophoblasts utilizing T7 endonuclease I assay. The CRISPR/Cas9 ortholog with the highest nuclease activity, smallest size and cuts closest to F508 codon was packaged into a single AAV[9]. Four fetuses from two twin sheep pregnancies at day 70 of gestation were injected with 0.5 mL of 1.5 x 10^{12} viral particles injected via the umbilical vein. The fetuses were harvested on day 135.

Eleven tissues of interest underwent genomic DNA extraction, PCR amplicons flanking the CRISPR/Cas9 target site were generated and amplicons were subjected to deep sequencing by Quintara Biosciences, NGS Division. NHEJ and HDR frequencies were calculated using the CRISPResso webtool.

RESULTS: All 4 fetuses successfully received injections and survived to term. No evidence of adverse effects were observed in treated fetuses. Amplicon NextGen sequencing revealed that CRISPR/Cas9 construct was unsuccessful at inducing indel formation in the target site. There was no significant evidence of NHEJ nor HDR.

CONCLUSION: Despite promising in vitro work, in vivo delivery of CRISPR-Cas9 systems remains complex. Off-target effects may cause unsuccessful results when using the CRISPR/Cas9 system, despite its high specificity in targeting specific genes. It is also possible that the stage of fetal development at which the gene editing is performed may impact its efficacy.

Strategies such as lipid nanoparticles for packaging and delivery as well as ongoing work in organoids is expected to provide valuable insights into the safety and efficacy of CRISPR-Cas9 editing prior to further in vivo work.



40 Increased Offspring Anxiety Following Maternal Western-Style Diet Exposure During Gestation and Lactation in Non-Human Primates

Erin Bolte[1], Geoff Dunn[2], Thomas Horvath[3], Maxim D. Seferovic[4], Sigmund Haidacher[5], Kathleen Hoch[5], Derek O'Neil[1], Anthony Haag[3], Kjersti M. Aagaard[6]

[1]Baylor College of Medicine, Houston, TX, [2]Ohio State University, Beaverton, OR, [3]Texas Children's Microbiome Center Mass Spectrometry Laboratory, Texas Children's Hospital, Houston, TX, [4]Baylor College of Medicine and Texas Children's Hospital, Houston, TX, [5]Texas Children's Hospital, Houston, TX, [6]Texas Children's Hospital, Baylor College of Medicine, Houston, TX

OBJECTIVE: Maternal Western-Style diet (mWSD) feeding and obesity during pregnancy/breastfeeding have been linked to increased offspring anxiety. Anxiety is the result of decreased serotonin, an important neurotransmitter in mood regulation. Serotonin is synthesized from tryptophan and degraded into 5-hydroxyindoleacetic acid (5-HIAA). We hypothesized that mWSD feeding in a primate model would alter her offspring's serotonin pathway metabolites, leading to persistent and evident offspring anxiety at 3 years of age (peripuberty).

STUDY DESIGN: Japanese macaque dams were fed a Chow control diet or mWSD during gestation and lactation, then offspring were weaned onto Chow or Western-Style diet (Fig. 1A). Anxiety was tested by multiple validated measures at 34 months and scored by blinded reviewers. Serum was collected at 36-40 months and analyzed by targeted liquid chromatography-mass spectrometry of all known serotonin pathway metabolites and other metabolites known to affect behavioral neuroactivity (gamma-aminobutyric acid and short-chain fatty acids).

RESULTS: Anxiety was calculated as the sum of four components: high energy outbursts and reactive, ritualized, and inactive behaviors (Fig. 1B). Total anxiety scores display a right shift (more frequent occurrence) in males (Z-test p= 0.005, Fig. 1C). We detected 18 neuroactive metabolites in serum which withstood confirmatory factor analysis, revealing statistically significant inverse relationships between 5-HIAA levels and ritualized anxiety (p=0.004) and high energy outbursts (p=0.048, Fig. 1D).

CONCLUSION: We demonstrated that mWSD feeding programs male offspring with persistently increased anxiety, despite 2.5 years of control diet feeding. Analysis of serotonin metabolites showed an inverse correlation between 5-HIAA and anxiety, indicating low levels of serotonin inferred from its degradation product that correspond with higher levels of anxiety. These data underscore the importance of dietary counseling during pregnancy and lactation to potentially prevent unintended programming of offspring neuroactivity and anxiety behavior.

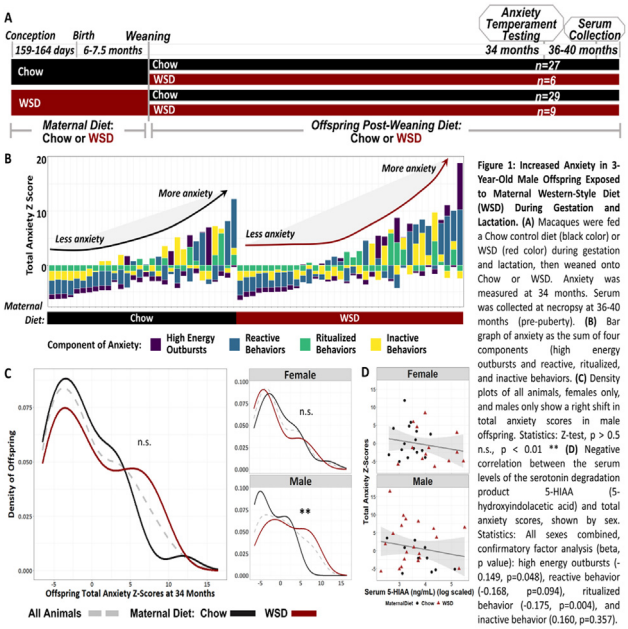


Figure 1: Increased Anxiety in 3-Year-Old Male Offspring Exposed to Maternal Western-Style Diet (WSD) During Gestation and Lactation. (A) Macaques were fed a Chow control diet (black color) or WSD (red color) during gestation and lactation, then weaned onto Chow or WSD. Anxiety was measured at 34 months. Serum was collected at necropsy at 36-40 months (pre-puberty). **(B)** Bar graph of anxiety as the sum of four components (high energy outbursts and reactive, ritualized, and inactive behaviors. **(C)** Density plots of all animals, females only, and males only show a right shift in total anxiety scores in male offspring. Statistics: Z-test, $p > 0.5$ n.s., $p < 0.01$ ** **(D)** Negative correlation between the serum levels of the serotonin degradation product 5-HIAA (5-hydroxyindolacetic acid) and total anxiety scores, shown by sex. Statistics: All sexes combined, confirmatory factor analysis (beta, p value): high energy outbursts (-0.149, p=0.048), reactive behavior (-0.168, p=0.094), ritualized behavior (-0.175, p=0.004), and inactive behavior (0.160, p=0.357).

Oral Concurrent Session 4

Hypertension

Abstracts 41–48

WEDNESDAY
February 14, 2024
10:00 am – 12:00 pm

MODERATOR(S)

Judette Louis, MD, MPH

Laurence Shields, MD

HYPERTENSION

Abstracts 41-48

41 ASpirin in Placental and maternal Endothelial cell Regulation IN pre-eclampsia (ASPERIN Trial): Primary Outcome

John O'Brien, Aarthi Srinivasan, Katherine Vignes, Cynthia Cockerham, Wendy Whitley, Hong Huang, Arnold J. Stromberg, John A. Bauer
University of Kentucky, Lexington, KY

OBJECTIVE: Recent findings suggest biophysical differences in uterine artery Doppler profile can be identified with exposure to low dose aspirin. Dose effects however have not been adequately investigated. We hypothesized variations in uterine artery pulsatility index (UtA PI) may be identified based on dose.

STUDY DESIGN: Between April 2019 and July 2022, a phase II open-label, randomized trial was performed to compare UtA PI in three subpopulations: high-risk randomly assigned to 81 mg aspirin daily, high-risk randomly assigned 162 mg of aspirin daily, and a convenience control group (no risk factor) (NCT03893630). Singletons with or without a major criterion risk factor defined by the USPSTF were enrolled and randomized by a scheme stratified by BMI. Patients initiated treatment after first trimester measurement of UtA PI. Serial UtA PI assessments were performed at 18-22 weeks and 28-32 weeks. Repeated measures using a mixed model analysis was performed to assess the effect of dose over time.

RESULTS: The ASPERIN trial enrolled 209 subjects (69 treated with 81 mg, 75 to 162 mg, and 65 controls). Demographics differed between groups (Table). Analysis of change in UtA PI over time which incorporated aspirin exposure, BMI, and trimester revealed a significant interaction between exposure in the three groups, P=.02. However, excluding controls, a significant difference was not observed in UtA PI based on dose, P=0.416. In a post hoc analysis limited to the obese subpopulation, BMI ≥30, the UtA PI did not identify differences between the high-risk subgroups at 28-32 weeks, 1.0 ± 0.09 SE vs 1.14 ± .08 SE, P=.24; and at 18-22 weeks 1.16 ± .097 SE vs 1.13 ± 0.085, P=0.78. The aspirin-exposed high-risk groups had a cumulative non-significant increase in perinatal mortality, p=0.327, but a dose effect on mortality was not present.

CONCLUSION: A change in UtA PI over time was observed as expected; however, in a trial population enrolled by risk factors, dose of aspirin did not demonstrate a significant treatment effect on UtA PI in a phase II study.

Demographics and Safety Outcomes

	Control (n=65)	Aspirin 81mg (n=69)	Aspirin 162mg (n=75)	P value
Age	29.5 ± 6.3	29.6 ± 5.8	29.8 ± 6.1	0.962
Gravidity, Median [IQR]	2 [1-2.5]	2 [1-8]	2 [1-4]	0.13
Parity, Median [IQR]	0 [0-1]	1 [0-2]	1 [0-2]	0.12
Enrollment BMI	29.2 ± 7.9	35.7 ± 10	34.3 ± 9.4	<.0001*
Race (self-reported)				0.404
American Indian or Alaska Native	0	0	1	
Asian	1	2	2	
Black or African American	6	9	14	
Native Hawaiian or Pacific Islander	1	0	1	
White	49	53	45	
More than one race	0	2	3	
Not reported	8	3	9	
Ethnicity (self-reported)				0.982
Hispanic	8	9	9	
Non-hispanic	57	60	66	
Risk Factor for Inclusion (Multiple factors may be present)	N/A			
History of Preterm Pre-eclampsia		24	15	0.046*
Diabetes (Type 1 or 2)		17	15	0.504
Chronic Hypertension		31	41	0.243
Renal Disease		3	2	0.582
Autoimmune Disease		4	7	0.425
Tobacco use (%)	3 (4.6)	4 (5.8)	15 (20)	0.005*
Illicit Substance use (%)	2 (3.1)	4 (6.1)	8 (10.8)	0.188
Method of conception				0.931
Spontaneous (%)	60 (92)	65 (94)	71 (95)	
Medication-assisted	3	3	2	
In vitro fertilization	2	1	2	
Gestational age at delivery (wks)	38.8 ± 1.3	36.0 ± 4.3	36.2 ± 4.7	<.001*
SAFETY				
Fetal mortality (any cause)	0	1	1	0.637
Neonatal mortality (any cause)	0	2	1	0.287
Perinatal mortality (any cause)	0	3	2	0.520
Transfusion	1	2	4	0.646

42 Clinical Outcomes Following Remote Hypertension Monitoring Program for Postpartum Individuals with Hypertensive Disorders of Pregnancy

Lara S. Lemon[1], Beth Quinn[2], Anna Binstock[1], Jacob Larkin[2], Hyagriv Simhan[1], Alisse Hauspurg[3]
[1]University of Pittsburgh, Pittsburgh, PA, [2]Magee-Womens Hospital, University of Pittsburgh Medical Center, Pittsburgh, PA, [3]UPMC Magee-Womens Hospital, Pittsburgh, PA

OBJECTIVE: We sought to evaluate outcomes following implementation of a remote monitoring program for postpartum individuals with a hypertensive disorder of pregnancy (HDP).

STUDY DESIGN: We evaluated the impact of engagement in a remote hypertension management program in a cohort of postpartum individuals with a HDP delivering from 1/2018 - 6/2023 at a single institution. We compared postpartum readmission, office visit within 6 weeks, BP measurement within 10 days, and postpartum initiation of antihypertensive medication among those who participated to controls who did not participate. Program participation was at the discretion of the care provider and patient. We performed multivariate logistic regression and conditional regression in a propensity score matched cohort. Adjustment variables were included in propensity score modeling likelihood of program participation.

Propensity scores were assessed for even distribution by group and ensuring standardized bias < 10% after matching.

RESULTS: We included 14,382 eligible individuals (6501 participants, 7881 controls). Program participants were more likely to be white, commercially insured, reside in a more disadvantaged neighborhood, have a higher BMI, have preeclampsia, and have higher prenatal and inpatient postpartum BPs. These factors were well-balanced after implementation of propensity score. Program participants had lower 6-week postpartum readmission rates, demonstrating 16 fewer readmissions for every 1000 individuals in the program [adjRD=-1.6 (-2.5, -0.80); aRR 0.77 (0.68, 0.88)]. For every 100 individuals in the program, 85 more had a BP recorded within 10 days [adjRD=85.9 (85.1, 86.8)] and 7 more were adherent with 6-week postpartum office visit [adjRD=7.9 (6.4, 9.5)]. Participants were 3-4 times more likely to initiate an antihypertensive medication postpartum [ajdRR=3.79 (3.42, 4.19)].

CONCLUSION: Participation in a postpartum remote BP monitoring program was associated with fewer postpartum hospital readmissions, higher attendance at postpartum visits, improved guideline adherence, and higher rates of antihypertensive use after implementation.

Table 2. Risk-Adjusted frequency of outcomes.

Model	No.	Total Visits/Total, No. (%)		Risk-Adjusted [a] frequency per 100 deliveries (95%CI)		Risk Difference, per 100 deliveries (95% CI)	Risk Ratio (95% CI)
		RM	No RM	RM	No RM		
Readmission within 6 weeks							
Crude	14382	364/6501 (5.6)	494/7881 (6.3)	5.3 (4.7, 5.9)	6.5 (5.9, 7.1)	**-1.2 (-2.1, -0.36)**	**0.81 (0.70, 0.94)**
PS-matched [b]	12770	357/6385 (5.6)	462/6385 (7.2)	5.6 (5.0, 6.2)	7.2 (6.6, 7.9)	**-1.6 (-2.5, -0.80)**	**0.77 (0.68, 0.88)**
Office Visit within 6 weeks							
Crude	14382	4998/6501 (76.9)	4960/7881 (62.9)	73.4 (72.3, 74.5)	66.3 (65.3, 67.3)	**7.1 (5.6, 8.7)**	**1.11 (1.08, 1.13)**
PS-matched [b]	12770	4912/6385 (76.9)	4408/6385 (69.0)	76.9 (75.9, 78.0)	69.0 (67.9, 70.2)	**7.9 (6.4, 9.4)**	**1.11 (1.09, 1.14)**
BP Recorded within 10 days of delivery							
Crude	14382	6342/6501 (97.6)	1059/7881 (13.4)	97.7 (97.3, 98.0)	12.9 (12.1, 13.7)	**84.8 (83.9, 85.7)**	**7.57 (7.12, 8.05)**
PS-matched [b]	12770	6231/6385 (97.6)	745/6385 (11.7)	97.6 (97.2, 98.0)	11.7 (10.9, 12.5)	**85.9 (85.1, 86.8)**	**8.36 (7.82, 8.95)**
Initiation of HTN Medications							
Crude	14382	1624/6501 (25.0)	442/7881 (5.6)	24.3 (23.1, 25.4)	5.8 (5.2, 6.3)	**18.5 (17.2, 19.9)**	**4.22 (3.78, 4.71)**
PS-matched [b]	12770	1594/6385 (25.0)	421/6385 (5.6)	25.0 (23.9, 26.0)	6.6 (6.0, 7.2)	**18.4 (17.2, 19.6)**	**3.79 (3.42, 4.19)**

[a] Adjusted for delivery year month, maternal age, race, ethnicity, area deprivation index, parity, mode of delivery, commercial insurance, severe maternal morbidity, highest postpartum BP within 2 hours of delivery, BMI at time of delivery admission, and prenatal care within the health system.

[b] Matched on propensity score including: delivery year month, maternal age, race, ethnicity, area deprivation index, parity, mode of delivery, commercial insurance, severe maternal morbidity, highest postpartum BP within 2 hours of delivery, BMI at time of delivery admission, and prenatal care within the health system.

Abbreviations: RM- Remote Monitoring, PS - propensity score, BP- blood pressure

43 162 mg versus 81 mg Aspirin for High-risk Obese Individuals: An Open Label RCT (ASPREO)

Farah H. Amro[1], Michal Fishel Bartal[2], Claudia Pedroza[1], Sami Backley[1], Ghamar Bitar[1], Joseph Lucci IV[1], Nahla Daye[1], Sandra Sadek[1], Suneet P. Chauhan[3], Sean C. Blackwell[4], Baha M. Sibai[5]

[1]McGovern Medical School at The University of Texas Health Science Center at Houston (UTHealth), Houston, TX, [2]McGovern Medical School at UTHealth Houston, Sheba Medical Center, Tel Hashomer, Sackler School of Medicine, Tel Aviv University, Tel Aviv, Israel, Houston, TX, [3]University of Texas-Houston Medical School, Houston, TX, [4]Children's Memorial Hermann Hospital, Houston, TX, [5]Hermann Memorial Hospital, Houston, TX

OBJECTIVE: Low dose aspirin is recommended for preeclampsia prevention; however, the optimal dose is debated. We evaluated whether daily dose of aspirin (162 mg) compared to routine dose (81 mg) decreases the rate of preeclampsia (PE) with severe features in high-risk obese individuals.

STUDY DESIGN: Pregnant individuals 12-20 weeks with a BMI ≥ 30 kg/m^2 and at least one high-risk factor (history of PE, pregestational diabetes, gestational diabetes diagnosed < 20 weeks, or at least stage I hypertension [≥130/80]) were randomly allocated to aspirin dose of 81 mg or 162 mg (ClinicalTrials.gov: NCT03961360). Adherence to medications was assessed at 4 weeks after enrollment and at 32-36 weeks. Primary outcome was rate of PE with severe features based on physician diagnosis in those delivered ≥ 20 weeks. We used Bayesian methodology to determine a total sample size of 220 subjects needed to determine whether higher aspirin dosing would decrease the primary outcome, assuming 80% power, a neutral informative prior, and 75% certainty. An intention-to-treat analyses was used to calculate relative risk (RR), 95% credible intervals (CI).

RESULTS: Over the study period (05/2019 to 11/2022) 343 eligible women were approached and 220 (64%) agreed. High risk factors were similar between groups (history of prior PE: 34% vs 29%, diabetes mellitus: 42% vs 46%, Stage I HTN: 29% vs 32%). Primary outcome was unavailable for 7 (3%) participants,4 (1.8%) delivered prior to 20 weeks.Thus, we analyzed:107 on 162 mg and 102 on 81 mg.PE with severe features occurred in 35% in 162 mg compared to 40% in the 81 mg group(RR, 0.88, 95% credible interval, 0.64-1.22) with a posterior probability for treatment benefit of 78% (Table).The median gestational age at delivery was lower in 162 mg group (p=0.04), however there were no differences in other secondary outcomes or medication adverse events (Table).

CONCLUSION: Among high-risk obese individuals our trial suggests with 78% certainty that 162 mg aspirin compared to 81 mg, decreases PE with severe features.This trial supports doing a larger phase III multicenter trial.

Table. Maternal Characteristics and Outcomes

	ASA 162 mg N=107	ASA 81 mg N=102	RR (95% CI)	p-value	Bayesian (Prob RR<1)
Maternal Characteristics					
Age, yr	30.0 (26.0, 34.2)	29.0 (25.0, 33.0)			
Race/Ethnicity					
African American	50 (47%)	57 (55%)			
Hispanic/Latina	34 (32%)	25 (24%)			
White	8 (7.4%)	7 (6.8%)			
Unknown	15 (14%)	13 (13%)			
BMI (kg/m^2)	38 (34, 44)	37 (33, 43)			
Median GA at enrollment (weeks)	15 (13, 17)	15 (13, 17)			
Outcomes					
Bayesian Analysis of Primary Outcome*	37 (35%)	41 (40%)	0.88 (0.64, 1.22)		**0.78**
Total Preeclampsia**	41 (38%)	46 (45%)	1.17(0.85,1.62)	0.32	
Median Gestational Age at Delivery (weeks)	36 (34, 37)	37.20 (35, 38)		**0.04**	
Preterm Delivery	58 (54%)	45 (44%)	1.23 (0.93, 1.62)	0.14	
Delivery due to preeclampsia < 37 weeks	22 (21%)	21 (21%)	1.00 (0.59, 1.70)	>0.99	
Small for gestational age	7 (6.5%)	4 (3.9%)	1.71 (0.49, 6.04)	0.4	
Abruption	3 (2.8%)	3 (3.0%)	0.93 (0.19, 4.52)	0.9	
Postpartum Hemorrhage	11 (10%)	9 (8.8%)	1.17 (0.5, 2.69)	0.7	
Severe maternal morbidity***	9 (8.4%)	11 (11%)	0.78 (0.34, 1.80)	0.6	

*Preeclampsia with severe features= preeclampsia with severe features, or superimposed preeclampsia with severe features or HELLP Or eclampsia.

**Total preeclampsia= Preeclampsia with severe features and preeclampsia without severe features

***Severe Maternal Morbidity= Pulmonary Edema, HELLP, Eclampsia, Venous Thromboembolism, Blood Transfusion, ICU admission, Maternal Deat

44 Platelet Response to Aspirin Therapy in Pregnancy and Association with Pregnancy Outcome

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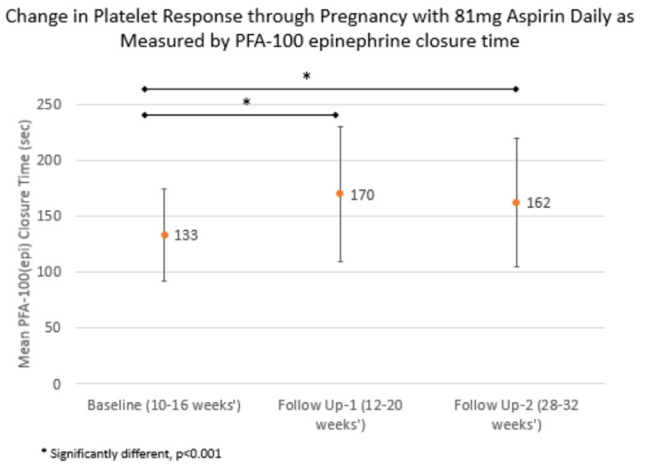
OBJECTIVE: Low dose aspirin is recommended for prevention of preeclampsia in high risk patients, but individual response to aspirin is highly variable and there is no marker established to measure aspirin response in pregnancy. A commercially available assay PFA-100 epinephrine closure time (PFA-100(epi)), is used to measure aspirin response in non-pregnant adults. Increased PFA-100(epi) result indicates increased platelet inhibition, and a threshold of 150 seconds has been described for aspirin response. We aimed to characterize the response to aspirin in pregnancy with use of PFA-100(epi) and identify whether it was associated with hypertensive disorders of pregnancy (HDP).

STUDY DESIGN: This is a prospective cohort study of singletons at high risk for preeclampsia taking 81mg aspirin daily. Blood was drawn at baseline prior to aspirin (10-16 weeks'), 2-4 weeks after aspirin initiation (follow-up 1), and at 28-32 weeks' (follow-up 2). We evaluated PFA-100(epi) across visits as well as rate of PFA-100(epi)< 150. Primary outcome was HDP. Secondary outcomes included preterm delivery for preeclampsia (preterm preE). Multivariable logistic regression was used to evaluate the relationship between PFA-100 (epi) and outcomes, adjusting for age, BMI, and preexisting hypertension or diabetes.

RESULTS: 103 participants had >75% adherence and completed all visits. 26% were Black, 30% had hypertension, and 10% had diabetes. PFA-100(epi) increased with aspirin through gestation (Figure). Predictors of aspirin response included diabetes; patients with diabetes had reduced PFA-100(epi) (log corrected adjusted MD -0.23 (- 0.46 to -0.01)) and higher rate of PFA-100(epi)< 150 seconds (adjusted OR 4.9 (1.1-34.3)) compared to non-diabetics. In multivariable logistic regression neither PFA-100(epi) at follow up-1 nor follow up-2 were associated with risk of HDP or preterm preE (p >0.10).

CONCLUSION: Low dose (81mg) aspirin therapy in pregnancy results in platelet inhibition through gestation as measured by PFA-100(epi), but PFA-100 response was not associated with the risk of hypertensive disorders of pregnancy



45 Optimal Gestational Age for Delivery of Pregnant Individuals with Mild Chronic Hypertension

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OBJECTIVE: ACOG recommends delivery as early as 37w0d gestation to as late as 39w6d for chronic hypertension (CHTN). Our aim was to investigate the optimal gestational age to deliver pregnant people with CHTN to improve perinatal outcomes.

STUDY DESIGN: Secondary analysis of a randomized controlled trial of CHTN treatment to different blood pressure goals. Participants with a term, singleton gestation were included. Pregnancies with fetal anomalies and those with a diagnosis of preeclampsia (preE) or gestational HTN < 37 weeks were excluded. The primary maternal composite outcome included death, serious morbidity (heart failure, stroke, encephalopathy, MI, pulmonary edema, ICU, intubation, renal failure), preE with severe features, hemorrhage requiring blood transfusion, or abruption. The primary neonatal outcome included fetal or neonatal death, respiratory support beyond oxygen mask, Apgar < 3 at 5 minutes, neonatal seizures, proven sepsis. Secondary outcomes included cesarean birth, length of stay, NICU admission, suspected sepsis, RDS, TTN, hypoglycemia. Those with a planned delivery were compared with those expectantly managed at each gestational week. Adjusted odds ratios with 95% CIs are reported.

RESULTS: 1,417 participants with mild CHTN were included; 305 (21.5%) with a new diagnosis in pregnancy and 1112 (78.5%) with known pre-existing HTN. Groups differed by BMI and pre-existing diabetes. In adjusted models, there was not an association between planned delivery and the maternal composite outcome in any gestational age week compared with expectant management (Table). Planned delivery in week 37 was associated with cesarean birth. Planned delivery in week 37 and 38 was associated with adverse neonatal outcomes (Table).

CONCLUSION: Planned delivery in the early term period compared with expectant management was not associated with a reduction in adverse maternal outcomes and increased the odds of cesarean delivery. Early term delivery was also associated with an increase in neonatal complications. Delivery timing should weigh maternal and neonatal outcomes in each gestational week.

Table. Maternal and neonatal outcomes of those with planned delivery versus expectant management

Outcome	37w0d-39w6d (n=1417)			38w0d-39w6d (n=961)			39w0d-39w6d (n=460)		
	Planned Delivery[c] (n=171)	Expectant Management (n=1246)	[b]aOR (95% CI)	Planned Delivery[c] (n=177)	Expectant Management (n=784)	[b]aOR (95% CI)	Planned Delivery[d] (n=306)	Expectant Management (n=154)	[b]aOR (95% CI)
Maternal primary composite outcome and components of the outcome, n(%)									
Primary composite maternal outcome	26 (15.2)	174 (14.0)	1.11 (0.71-1.75)	20 (11.3)	93 (11.9)	0.90 (0.53-1.52)	35 (11.4)	14 (9.1)	1.22 (0.63-2.35)
Serious maternal morbidity	0 (0)	14 (1.1)	N/A[e]	1 (<1)	9 (1.1)	N/A[e]	5 (1.6)	1 (<1)	N/A[e]
Preeclampsia with severe features	18 (10.5)	143 (11.5)	0.91 (0.54-1.53)	16 (9.0)	76 (9.7)	0.88 (0.50-1.57)	23 (7.5)	13 (8.4)	0.88 (0.43-1.80)
Hemorrhage requiring blood transfusion	8 (4.7)	43 (3.5)	1.38 (0.64-3.00)	6 (3.4)	27 (3.4)	0.87 (0.35-2.19)	17 (5.6)	2 (1.3)	N/A[e]
Placental abruption	1 (<1)	4 (<1)	N/A[e]	1 (<1)	2 (<1)	N/A[e]	0 (0)	1 (<1)	N/A[e]
Maternal secondary outcome, n(%)									
Cesarean delivery	108 (63.2)	554 (44.5)	**2.07 (1.48-2.91)**	88 (49.7)	331 (42.2)	1.25 (0.89-1.76)	149 (48.7)	59 (38.3)	1.37 (0.91-2.06)
Neonatal composite outcome	37 (21.6)	191 (15.3)	1.43 (0.96-2.14)	27 (15.3)	109 (13.9)	1.02 (0.64-1.63)	48 (15.7)	21 (13.6)	1.15 (0.66-2.01)
Secondary neonatal outcomes, n(%)									
Length of neonatal stay (Mean ± SD)	1.5 ± 4.2	1.0 ± 3.9	0.42 (-0.20, 1.05)	1.3 ± 4.5	0.7 ± 3.3	0.35 (-0.24, 0.93)	0.7 ± 2.1	0.4 ± 1.4	0.26 (-0.12, 0.64)
NICU admission, n(%)	37 (21.6)	196 (15.7)	1.42 (0.95-2.14)	32 (18.1)	95 (12.1)	1.37 (0.87-2.15)	45 (14.7)	15 (9.7)	1.55 (0.83-2.89)
Suspected sepsis, n(%)	9 (5.3)	67 (5.4)	0.96 (0.47-1.96	6 (3.4)	41 (5.2)	0.61 (0.25-1.47)	19 (6.2)	10 (6.5)	0.93 (0.42-2.07)
RDS, n(%)	13 (7.6)	37 (3.0)	**2.58 (1.34-4.98)**	6 (3.4)	12 (1.5)	2.35 (0.86-6.42)	7 (2.3)	1 (<1)	N/A[e]
TTN, n(%)	8 (4.7)	43 (3.5)	1.35 (0.62-2.93)	8 (4.5)	23 (2.9)	1.40 (0.61-3.22)	11 (3.6)	2 (1.3)	N/A[e]
Hypoglycemia, n(%)	32 (18.7)	134 (10.8)	**1.87 (1.20-2.91)**	25 (14.1)	60 (7.7)	**1.73 (1.02-2.92)**	16 (5.2)	11 (7.1)	0.44 (0.18-1.06)

[a] Planned delivery group included anyone with a scheduled induction of labor or cesarean without labor from 37w0d to 37w2d. Other participants who were still pregnant at or beyond 37w0d were considered expectantly managed.
[b] Adjusted odds ratio with 95% confidence interval was obtained by multivariable logistic regression models for binary outcomes. Covariates included maternal BMI and pre-existing diabetes which were different between groups at baseline. The difference for length of neonatal stay between planned delivery and expected management with 95% confidence interval was estimated by generalized linear mixed model.
[c] Planned delivery group included anyone with a scheduled induction of labor or cesarean without labor from 38w0d to 38w2d. Other participants who were still pregnant at that time were considered expectantly managed.
[d] Planned delivery group included anyone with a scheduled induction of labor or cesarean without labor from 39w0d to 39w2d. Other participants who were still pregnant at that time were considered expectantly managed.
[e] N/A: Multivariable modeling if count less than 5

46 Subtypes of hypertension years after a hypertensive disorder of pregnancy

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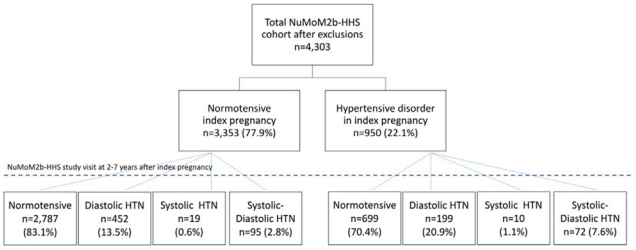
OBJECTIVE: Isolated diastolic hypertension (HTN) is prevalent in young adults and imparts increased cardiovascular risk. Our objective was to determine whether subtypes of HTN (isolated diastolic, isolated systolic, and combined systolic-diastolic) differ years after index pregnancy complicated by hypertensive disorder of pregnancy (HDP, including preeclampsia, eclampsia, gestational hypertension) compared with normotensive pregnancy.

STUDY DESIGN: This analysis utilized data from NuMoM2b-Heart Health Study (NuMoM2b-HHS), a multi-site cohort during which 4,312 individuals completed a follow-up visit at 2-7 years postpartum after index delivery (HHS visit). Individuals with preexisting chronic HTN or diabetes or on antihypertensive medications at HHS visit were excluded from this analysis. Combined HTN was defined as systolic blood pressure (SBP) $\geq$ 130 mmHg and diastolic BP (DBP) $\geq$ 80 mmHg; isolated systolic or diastolic HTN was either SBP $\geq$ 130 or DBP $\geq$ 80 mmHg, respectively. Multinomial logistic regression models adjusted for age, BMI at HHS visit, years from index delivery until HHS visit, and self-reported race and ethnicity (social constructs).

RESULTS: 4,303 individuals met inclusion criteria and had BP measurement at HHS visit with mean of 3.2 (SD 0.9) years since index pregnancy; 950 (22.1%) had history of HDP during that pregnancy. Among 847 (19.7%) with HTN at HHS visit and not on medications, isolated diastolic HTN was the predominant subtype (651 cases; 76.9%), followed by combined HTN (167; 19.7%) and isolated systolic HTN (29; 3.4%). When compared to those without HDP, those with history of HDP had an increased risk of isolated diastolic and combined HTN subtypes (isolated diastolic: aRR 1.58 [CI 1.30, 1.92]; isolated systolic: aRR 1.85 [0.85, 4.03]; systolic-diastolic: aRR 2.70 [1.95, 3.74]).

CONCLUSION: HDP are associated with both isolated diastolic HTN and combined systolic-diastolic HTN; further study in this population on the role of isolated diastolic HTN on future cardiovascular risk is warranted.

Figure 1. Subtypes of hypertension in NuMoM2b-HHS cohort at 2 to 7 years postpartum by hypertensive disorder of pregnancy



47 Subclinical Cardiovascular Alterations and Molecular Signatures in Women with History of Hypertensive Disorders in Pregnancy

Lee Reicher[1], Nastya Godneva[2], Adina Weinberger[2], Yariv Yogev[3], Eran Segal[2]

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OBJECTIVE: Hypertensive disorders of pregnancy (HDP) are associated with increased risk for long-term cardiovascular (CV) complications. During the postpartum years, these women experience subclinical CV changes with potential implications for CV diseases. Yet, the characterization of these changes remains limited. We investigated the long term molecular and physiological profiles of women with a history of HDP

STUDY DESIGN: Data collected as part of large-scale longitudinal study with over 10,000 healthy adults aged 40−70 years, between the years 2019 and 2022. The participants underwent physiological assessments through special tests and wearables, multi-omic profiling, and medical records were collected (**Figure**). Profiles of women with a history of HDP (hypertension occurring after 20 weeks of gestation, gestational hypertension and pre-eclampsia) were compared to a matched control subset (by number of pregnancies and the time elapsed since the HDP pregnancy)

RESULTS: Our study consisted of 200 women in the HDP group and 600 women in the control group (mean of 18 years post-pregnancy). Women with a history of HDP displayed notable findings compared to the control group (all *p< 0.001)

1. Higher sonographic liver viscosity and lower speed of sound index indicating liver fibrosis and steatosis, respectively.
2. Higher triglycerides (110±50 vs 99±50, mg/dl*)
3. Higher BMI (28±5 vs 25±5*) and systolic (122±17 vs 114±15*) and diastolic (89±11 vs 80±11*) blood pressure
4. Higher visceral fat percentage (822±550 vs 627±420 gr*)
5. Sleep monitoring indicated a higher rate of sleep apnea; higher Oxygen Desaturation (number of desaturation episodes per hour) (4.5±5 vs 3±4*) and Apnea-Hypopnea Index (18±14 vs 13±12*)
6. Retinal imaging: fractal artery dimension is reduced (associated with hypertension)
7. Lower levels of LysoPC, a vasoprotective metabolite

CONCLUSION: These findings offer valuable insights into long-term CV processes post pregnancy complicated with hypertensive dusease and can aid in personalized monitoring, guiding targeted interventions to proactively reduce the risk of CV complications

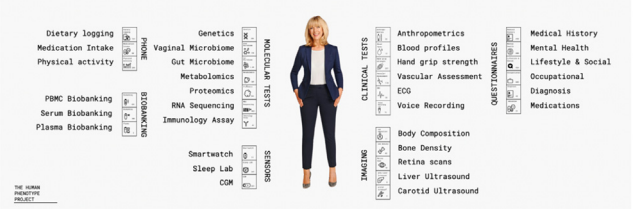

Figure | Data collected or analyzed in the Human Phenotype Project
The project combines innovative medical tests and wearables (such as CGM, and sleep monitoring). It profiles participants at unprecedented depth, including physiological assessment of their muscular, skeletal, liver, blood, heart, vascular, immune, gastrointestinal, and cognitive body systems. The multi-omics profiling of each participant includes genetics, microbiome, metabolomic, transcriptomic, proteomic, and immune system evaluation. A life-style questionnaire and medical records are obtained.

48 Lower thresholds for diagnosing hypertension in pregnancy and perinatal outcomes in large Tanzanian cohort

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OBJECTIVE: The American Heart Association now defines stage 1 hypertension (HTN) as a systolic blood pressure (BP) of 130-139 mmHg, a diastolic BP of 80-89 mmHg, or both, based on association with long-term cardiovascular risk. Whether lower thresholds should be adopted for diagnosing hypertensive disorders of pregnancy (HDPs) is not clear, particularly in low- and middle-income country settings where data are limited. We aimed to estimate perinatal risks associated with using stage 1 BP cutoffs after 20 weeks' gestation compared with traditionally defined cutoffs in a large Tanzanian cohort.

STUDY DESIGN: We performed a secondary analysis of a randomized noninferiority trial comparing 500 mg calcium vs 1500 mg daily for preeclampsia prevention among nulliparous women (n=11,000 pregnancies) in Dar es Salaam (2019-2023). After excluding 59 participants with BP $\geq$ 130/80 $<$ 20 weeks, we compared risks of perinatal outcomes associated with a lower cutoff (130/80) for gestational HTN >20 weeks versus traditional cutoffs. A normotensive group ($<$ 130/$<$ 80) throughout gestation served as the reference group in multivariable regression models.

RESULTS: A total of 10,941 pregnancies and 10,891 offspring with birth outcome data available were included analysis. 466 pregnancies (5.0%) were diagnosed with GHTN or PE using standard definitions while an additional 1,190 (10.9%) were categorized as reaching stage I thresholds at $\geq$20 weeks' gestation. There were no differences in birth weight, gestational age at birth, or other perinatal outcomes (perinatal mortality, PTB, SGA, LBW) for those reaching stage 1 HTN thresholds compared to normotensive women (TABLE). In contrast, higher risks of adverse outcomes were observed for those reaching the >140/ >90 threshold with or without proteinuria and with or without severe features.

CONCLUSION: Lowering blood pressure thresholds in pregnancy to define HDPs in Tanzania does not identify a population at higher risk for adverse perinatal outcomes. Limited resources in these settings may be better directed to management of women reaching traditional thresholds for HTN in pregnancy.

TABLE: Multivariable association of stage I GHTN, traditional GHTN, traditional PE w/o severe features and PE w/severe features with birth outcomes

	Normotensive (<130/<80 mmHg)	Stage I GHTN (130-139/80-89 mmHg w/ or w/o proteinuria)	Traditional GHTN (140-159/90-109 mmHg w/o proteinuria)	Traditional PE without severe features (140-159/90-109 mmHg w/ proteinuria)	PE with severe features (160+/110+ mmHg or other severe features)
	n= 9285 pregnancies	n=1190 pregnancies	n=161 pregnancies	n=119 pregnancies	n=186 pregnancies
OUTCOME					
Birth weight* (g)					
Mean (SD)	3088 (533)	3113 (537)	2953 (577)	2658 (736)	2754 (679)
Adj mean diff (95% CI)	Ref	7 (-24, 39)	-173 (-265, -80)	-391 (-525, -258)	-336 (-441, -232)
Gestational age at delivery* (wks)					
Mean (SD)	39.4 (2.1)	39.6 (2.1)	39.2 (2.0)	37.8 (3.0)	38.2 (2.6)
Adj mean diff (95% CI)	Ref.	0.1 (0.0, 0.23)	-0.2 (-0.5, 0.1)	-1.4 (-1.9, -0.8)	-1.2 (-1.6, -0.8)
Perinatal mortality*					
n/d (%)	350/9197 (3.8%)	57 / 1205 (4.7%)	15/165 (9.1%)	10/131 (7.6%)	32/193 (16.5%)
aRR (95% CI)	Ref.	1.28 (0.97, 1.69)	2.45 (1.49, 4.03)	2.29 (1.25, 4.18)	4.54 (3.25, 6.35
Preterm birth* (<37 wks)					
n/d (%)	812/8,579 (9.5%)	108 / 1,163 (9.3%)	20/153 (13.1%)	43/124 (34.7%)	41/171 (24.0%)
aRR (95% CI)	Ref.	1.01 (0.83, 1.23)	1.25 (0.79, 1.97)	3.06 (2.26, 4.14)	2.44 (1.80, 3.29)
SGA at delivery* (<10%)					
n/d (%)	1851 / 8509 (21.8%)	249 / 1163 (21.4%)	42 / 152 (27.6%)	43 / 124 (34.7%)	46 / 164 (28.1%)
aRR (95% CI)	Ref.	1.01 (0.90, 1.14)	1.40 (1.08, 1.82)	1.54 (1.18, 2.01)	1.33 (1.03, 1.71)
Low birthweight* (<2.5kg)					
n/d (%)	679 / 8509 (8.0%)	98 / 1163 (11.1%)	18 / 152 (11.8%)	45 / 124 (36.3%)	42 / 164 (25.6%)
aRR (95% CI)	Ref.	1.11 (0.90, 1.37)	1.57 (0.99, 2.49)	4.45 (3.35, 5.91)	3.35 (2.51, 4.47)

*Multivariable model includes covariates for age, education, wealth quintile, BMI, anemia, HIV status, FH HTN, and randomized regimen. Birth outcomes are reported per infant rather than per pregnancy; the denominator for perinatal mortality includes both live births and stillbirths whereas the denominator for other perinatal outcomes is restricted to live births.

Oral Concurrent Session 5

Medical & Surgical Complications

Abstracts 49–56

WEDNESDAY
February 14, 2024
10:00 am – 12:00 pm

MODERATOR(S)

Juan Gonzalez Velez, MD, PhD

Jeanne Sheffield, MD

MEDICAL & SURGICAL COMPLICATIONS

Abstracts 49-56

49 Early pregnancy reticulocyte hemoglobin content as a marker for iron deficiency by BMI category

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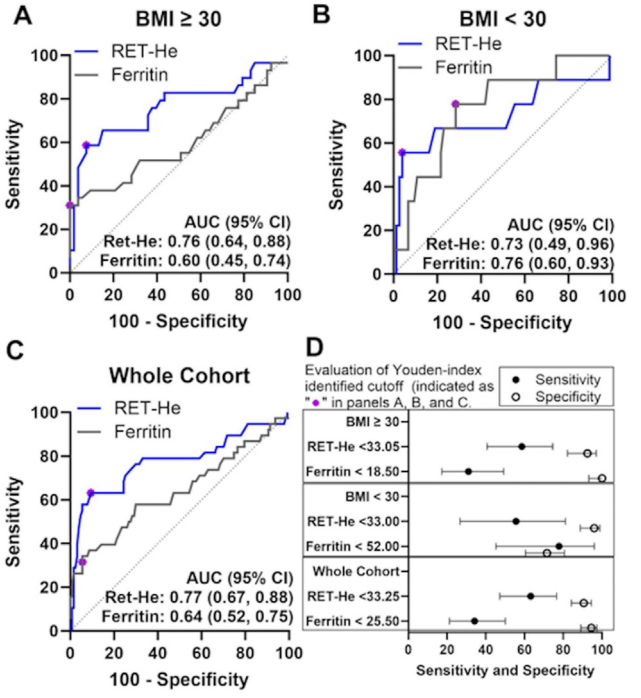
OBJECTIVE: Iron deficiency (ID) in pregnancy is common, affecting up to 45% of individuals. ACOG recommends ferritin to screen for ID; however, ferritin may be elevated in inflammatory conditions, such as obesity, obscuring the diagnosis of ID. Reticulocyte hemoglobin concentration (RET-He), a readily available assay, is not affected by inflammation and may be an alternative measure of iron status. We describe the diagnostic properties of early pregnancy ferritin and RET-He in identifying ID for all-comers and by BMI category.

STUDY DESIGN: Prospective cohort of pregnant individuals enrolled at $\leq$ 14 weeks' GA, stratified 1:1 by obesity . Serum transferrin saturation (Tsat), ferritin, and RET-He were measured at enrollment. ID was defined as Tsat $\leq$ 20%. ROC analysis assessed the diagnostic properties of ferritin and RET-He for ID within the cohort as well as by BMI category. The ferritin and Ret-He value with maximum potential effectiveness was identified using Youden index.

RESULTS: A total of 165 individuals were included, 83 with BMI $<$ 30 and 82 with BMI $\geq$ 30. Diagnostic properties of RET-He for ID by ROC analyses were consistently reasonable overall and in both obesity groups, whereas ferritin was less discriminatory among people with obesity (Figure 1). For RET-He, cut points were: 33.0, 32.8 and 33.2 for BMI $\geq$ 30, BMI $<$ 30, and the whole cohort respectively. The optimal cut points of ferritin for identification of ID were 18, 51 and 25 ng/mL. Sensitivity of these values for RET-He and ferritin for ID for those with BMI $\geq$ 30 were 59 and 31, and specificity 92 and 100. For those with BMI $<$ 30: sensitivity was 56 and 78, and specificity 96 and 72. For the whole cohort: sensitivity was 63 and 34, specificity 91 and 94.

CONCLUSION: Early pregnancy RET-He performs better than ferritin in identification of ID in pregnancy. This difference is greater in those with BMI $\geq$ 30. The optimal ferritin value for identifying ID varied significantly by BMI, whereas RET-He did not.

Figure 1. ROC analysis of the diagnostic properties of ferritin and reticulocyte hemoglobin for iron deficiency



AUC- area under the curve; BMI- body mass index; CI- confidence interval
RET-He- reticulocyte hemoglobin

50 Frequency of cytomegalovirus reinfection during pregnancy: a prospective cohort study

Juliette St-Georges[1], Safari Joseph Balegamire[1], Suresh Boppana[2], Mi-Suk Kang Dufour[3], Ariane Larouche[3], Barbora Knoppova[2], Misty Latting[2], Christian Renaud[3], Benoit Masse[4], Yves Giguère[5], Jean-Claude Forest[6], Soren Gantt[3], Isabelle Boucoiran[7]
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OBJECTIVE: To identify reinfection with cytomegalovirus (CMV) during pregnancy and determine the proportion of congenital CMV infections (cCMV) associated with these reinfections.

STUDY DESIGN: We used the biobank of the prospective cohort Grossesse en santé, collected between 2005 and 2010 in Quebec City, Canada and selected cases with positive CMV IgG serology (Abbott Architect platform) in the first trimester. CVM primary infections were excluded based on IgG avidity less than 60%. Antibody response to CMV strain-specific epitopes on glycoproteins B and H (gB and gH) from laboratory strains (AD169 and Towne) were measured by enzyme-linked immunosorbent assay using serum samples collected in the first and third

trimester. CMV reinfection was defined as the appearance of an antibody response targeting a new CMV epitope in the third trimester. cCMV infections were identified by CMV polymerase chain reaction (PCR) on cord blood using the AltoStar CMV PCR Kit 1.5 (Altona) platform.

RESULTS: Among 7855 participants, 4111 had first and third trimester sera available, from which 965 were seropositive for CMV (+IgG) in the first trimester (23%) and 9 were excluded because of first trimester primary infection. Among the remaining 956 participants, 16 reinfections were identified (1.7%), and 21 cases of cCMV were identified (2.2%). Of cCMV cases, 3 (14.3%) and 18 (85.7%) occurred among participants with and without evidence of reinfection during pregnancy, respectively. This corresponds to a 18.7% risk of transmission with reinfection during pregnancy, compared to 1.9% in the absence of reinfection.

CONCLUSION: CMV reinfection in pregnancy is rare but is associated with 18.7% risk of vertical transmission. The number of reinfections during pregnancy may have been underestimated because CMV is extremely variable, and the assay used in our study only identifies antibody response against 4 antigenically distinct epitopes from 2 viral strains highlighting the critical need for the development of an assay to accurately estimate the rate of CMV reinfection in pregnancy.

51 Association of SARS CoV-2 infection in pregnancy and placental gene expression at delivery

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OBJECTIVE: SARS CoV-2 infection during pregnancy has been associated with varying degrees of placental inflammation, with an unknown underlying mechanism. We utilized the novel approach of placental gene expression analysis to examine possible mechanistic differences induced by SARS CoV-2 infection during pregnancy by trimester.

STUDY DESIGN: In this prospective dual site cohort study, placentas were biopsied at delivery in patients infected with SARS CoV-2 during pregnancy. Placental biopsies collected prior to the SARS CoV-2 pandemic were controls. Placental biopsies underwent novel genome-wide mRNA profiling and bioinformatics were used to assess transcription factor activity and immune cell activation, controlling for study site, age, parity, BMI, race/ethnicity, and insurance status. Transcripts with >2-fold differential expression between infected and uninfected placentas were considered significant.

RESULTS: 886 uninfected and 68 infected placentas were analyzed. Of the affected samples, 8 were infected in the 1st, 24 in 2nd and 36 in 3rd trimester. Marked transcriptional alterations were identified in 3rd trimester infections, including upregulation of mesenchymal transcripts, elevated expression of Type I interferon/innate antiviral signaling (IRF, STAT family transcription factors), glucocorticoid receptor activity, macrophage activation, and downregulation of epithelial gene transcripts (Figure 1). Classical and non-classical monocytes were both upregulated. 2nd trimester infection demonstrated less significant interferon signaling, but additional inflammatory activation (NF-kB). These effects were not seen in 1st trimester SARS CoV-2 infection apart from macrophage activation, although sample size limits results.

CONCLUSION: SARS CoV-2 infection was associated with multiple alterations in placental gene regulation with differential activity by trimester of infection. These differences could be related to the severity and timing of infection, and future research should clarify the impact of these factors.

52 Short term risk of cardiovascular disease complications differs depending on the mode of delivery

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OBJECTIVE: Cardiovascular disease (CVD) is an increasingly prevalent problem in females of reproductive age, affecting up to 4% of pregnancies in previously healthy persons. While the physiologic relationship remains unclear, increased fluid shifts, prolonged hypomobility, higher blood loss, hypothermia, and overall stress state triggered by cesarean surgery may affect CVD risk in the postpartum period. The objective of this study is to determine if the mode of delivery affects CVD-related morbidity in a person without prior CVD. We hypothesized that patients that undergo a cesarean delivery (CD) will be at increased risk of non-fatal CVD readmissions one year following delivery.

STUDY DESIGN: We designed a retrospective cohort study utilizing the Nationwide Readmissions Database (2010-2018) to identify singleton delivery hospitalizations. ICD-9 and ICD-10 codes were used to identify patients with readmission for CVD within the calendar year of index delivery. Patients with preexisting CVD hospitalization prior to or during delivery were excluded. Associations between mode of delivery and CVD complications were determined from Cox proportional hazards regression models before and after adjusting for potential confounders.

RESULTS: Of the 30,039,844 deliveries, 32% (n = 9,613,039) underwent a cesarean. CVD readmissions occurred in 255.2 per 100,000 cesarean deliveries compared with 133.9 per 100,000 vaginal deliveries. After controlling for patient and hospital characteristics, as well as hypertensive and diabetic disorders, there remained an increase in readmission for CVD (adjusted hazard ratio [HR] 1.42, 95% confidence interval [CI] 1.35, 1.50), coronary heart disease (adjusted HR 1.46, 95% CI 1.38, 1.50), and stroke (adjusted HR 1.17, 95% CI 1.05, 1.31). The risk of CVD in relation to CD was strongest for heart failure (HR 1.50, 95% CI 1.36, 1.65). The risk of readmission for CVD persisted for one year after delivery (figure 1).

CONCLUSION: Despite the low rates of CVD readmissions overall, cesarean is associated with an increase in cardiovascular morbidity in previously healthy patients.

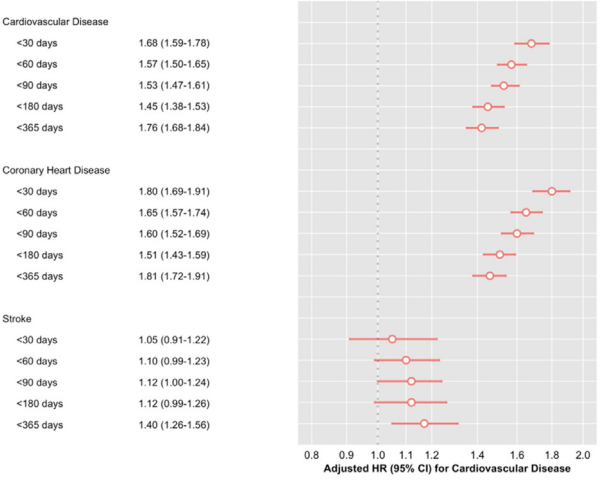

Fig 1: Cumulative Risk of Rehospitalization for Cardiovascular Complications in the Postpartum Period in Relation to Cesarean Delivery

53 Systematic review of recipient alloimmunization using standard ABO+D versus an extended donor match protocol

Ronan P. Sugrue[1], Marie Elise Abi Antoun[2], Jaxon Olsen[3], Alexandra Stonehill[4], Jennifer J. Cate[1], Virginia Y. Watkins[5], Lesley Skalla[4], Marilyn Telen[4], Andra H. James[6], Jerome J. Federspiel[5]

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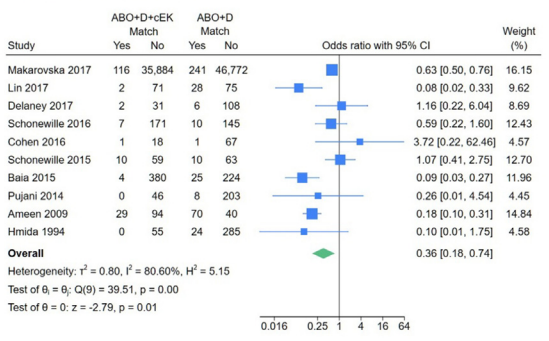
OBJECTIVE: Red blood cell alloimmunization (AI) limits transfusion options and confers risk of hemolytic disease of the fetus and newborn (HDFN). Antigens D, c, E and Kell are particularly pathogenic. Few institutions in the United States routinely match donors for more than ABO and D antigen (ABO+D) when alloantibodies are absent. Several studies have compared new AI among recipients of blood matched for ABO+D to blood additionally matched for c, E and Kell (ABO+D+cEK). The aim of this study was to systematically review and meta-analyze their outcomes.

STUDY DESIGN: Three online databases (Medline via PubMed, Scopus, Embase) were searched for prospective and retrospective cohort studies comparing ABO+D and ABO+D+cEK donor match protocols where new AI was a primary outcome. Case reports, literature reviews and studies of non-human subjects were excluded. The search protocolwas peer-reviewed and published on the PROSPERO international database of meta-analyses (CRD42023411620). Two teams of two reviewers independently screened studies; conflicts resolved by a fifth reviewer. Data were extracted according to Cochrane guidelines; risk of bias measured using ROBINS-I and RoB-2 tools. Random effects meta-analysis was used to combine effect estimates.

RESULTS: In total, 3,533 studies were reviewed. Among 10 that met inclusion criteria, 85,385 patients were transfused, of whom 43.3% (36,980) received only ABO+D+cEKmatched blood. ABO+D+cEK was associated with significantly lower rate of new AI compared with ABO+D (OR: 0.36, 95% CI: 0.18-0.74). Secondary analyses showed similar reductions when excluding studies of intrauterine fetal transfusions (OR 0.27, 95% CI: 0.13-0.58) and when only examining c, E or Kell antigen AI (OR 0.26, 95% CI: 0.13-0.53). As expected, no reduction in D antigen AI was noted (OR 0.77, 95% CI: 0.24-2.52).

CONCLUSION: New alloimmunization is significantly reduced when using an ABO+D+cEK match protocol. Given sequelae of alloimmunization in pregnancy and thereafter, establishing routine use of ABO+D+cEKdonor match in adults of pregnancy potential merits consideration.

Figure 1: Forest plot of effect sizes of extended ABO+D+cEK match versus standard ABO+D match on recipient alloimmunization



54 Azithromycin to Reduce Maternal Infections in Planned Vaginal Birth: Secondary Analysis of the A-PLUS Trial

Waldemar Carlo[1], Alan T. Tita[2], Elizabeth M. McClure[3]

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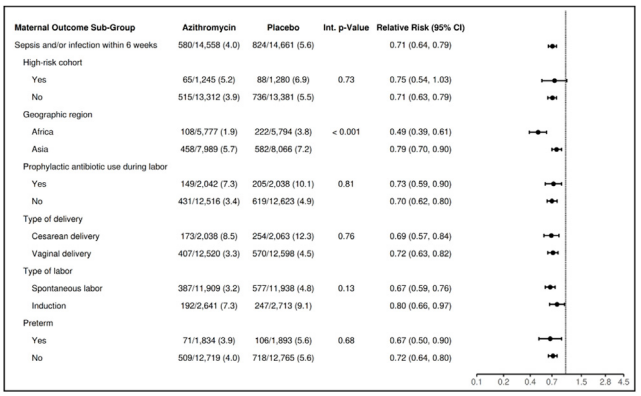
OBJECTIVE: The intrapartum azithromycin trial (A-PLUS Trial) showed a reduction in maternal sepsis or death mainly driven by sepsis. To test the hypothesis that a single oral dose of intrapartum 2g azithromycin (AZI) in women in labor planning a vaginal delivery reduces the incidence of any maternal infection

STUDY DESIGN: This is a secondary analysis of the A-PLUS Trial involving 29,278 women in seven countries who were randomized to a single oral dose of 2g of AZI vs. placebo. The primary outcome was any maternal infection defined as one or more of any of the following infections after randomization: sepsis (by WHO clinical criteria), chorioamnionitis, endometritis, perineal or cesarean wound infection, abdominopelvic abscess, mastitis/breast abscess, pyelonephritis, pneumonia, and other bacterial infections (meningitis, etc). The relative risk (RR) and 95% confidence interval (CI) of each outcome comparing the azithromycin arm to the placebo arm was estimated using a Poisson model adjusted for treatment arm and site. Subgroup analyses were conducted by: high- and low-risk delivery (high-risk if membrane ruptured ≥8 hours and/or in labor ≥18 hours prior to randomization), region (Africa or Asia), prophylactic antibiotic, delivery mode, type of labor, and preterm/term status. Subgroup analyses included a two-way interaction test between intervention arm and subgroup.

RESULTS: Maternal sepsis or death occurred less often in the azithromycin arm (580/14,558, 4.0%) compared to the placebo arm to 824/14,661, 5.6% in the placebo arm (RR=0.71; 95% CI: [0.64, 0.79], Figure 1). The number needed to treat was 62.

CONCLUSION: In women in labor in low-resource settings planning a vaginal delivery, intrapartum azithromycin was associated with a lower rate of any maternal infection compared to the placebo group and the NNT was 62 or half of the NNT for maternal death and/or sepsis (NNT 125) in the A-PLUS Trial.



55 Infant developmental delays at well visit encounters in infants exposed to MOUD: buprenorphine or methadone

Chaitali Korgaonkar-Cherala[1], Emily H. Stetler[2], Lauren Stewart[2], Oladunni Ogundipe[2], Julia Kim[2], Rakasa Pattanaik[2], David Garry[3], Kimberly Herrera[2], Diana Garretto[4], Cassandra Heiselman[3]
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OBJECTIVE: Infant outcomes as they relate to type of maternal medication for OUD (MOUD) are not well-studied. This study examines differences in social/emotional, language/communication, cognitive, and movement/physical delays in infants exposed to buprenorphine (Bup) versus methadone (Meth) at sequential infant wellness visits.

STUDY DESIGN: This is a retrospective study of patients (N=302) on MOUD who delivered at a single institution between Jan 2017 and Dec 2022. Patients were divided based on MOUD, Bup or Meth. Data was collected including medical comorbidities, parity, psychiatric diagnoses, race, ethnicity, BMI, age, gestational age at birth, and mode of delivery. Infant data included NOWS, NICU admission, and developmental delays noted at infant well visits (2-mo, 4-mo, 6-mo, 9-mo, 12-mo, and 18-mo).

RESULTS: There were 220 (72.8%) patients taking Bup and 82 (27.1%) patients taking Meth. Groups were similar in maternal/neonatal characteristics. NOWS requiring morphine was more likely with Meth than Bup (41.5% v 19.5%, p< 0.01). Compliance with the 12-mo wellness visit was higher in the Bup group than the Meth group (38.4% v 27%, p=0.04); however, there was no difference in compliance between groups at the 18-mo visit (p=0.11). Groups were similar in identification of any delay at visits through 12-mo and 18-mo (p=0.10 and 0.75). A composite infant delay through the 12-mo and 18-mo visit (p=0.22 and 0.74) were also similar. (Table 1) When individualizing specific delays, cognitive delay at the 18-mo visit was significantly higher in the Meth group than the Bup group (17.4% v 2.6%, p=0.02).

CONCLUSION: Infant composite delays were similar based on MOUD, Bup or Meth. When individualizing delays, MOUD with Bup had a lower incidence of cognitive delays at 18-mo compared with Meth. Infant well visit compliance was similar in both groups. Early psychomotor evaluation is important in these MOUD exposed infants.

Table 1: Infant Well Visit Compliance and Developmental Delays at 12-month and 18-month visits with divided based on maternal MOUD: Buprenorphine and Methadone

	Buprenorphine (n=220)	Methadone (n=82)	p-value
12 month wellness visit (n=120)			
Visit compliance	94 (38.4)	27 (27)	0.04
Infant with any delay at visit	9 (9.6)	6 (22.2)	0.10
Social/emotional delay	3 (3.2)	0 (0)	0.81
Language/communication delay	5 (5.3)	4 (14.8)	0.11
Cognitive delay	5 (5.3)	3 (11.1)	0.38
Movement/physical	5 (5.3)	3 (11.1)	0.38
Compliance for all wellness visits through 12 months (n=120)	55 (59.1)	17 (63)	0.72
Any delay at any wellness visit up to 12 months	24 (17.4)	12 (25.5)	0.22
18 month wellness visit (n=140)			
Visit compliance	78 (31.7)	23 (23)	0.11
Infant with any delay at visit	23 (29.5)	6 (26.1)	0.75
Social/emotional delay	3 (3.8)	3 (13)	0.13
Language/communication delay	21 (26.9)	6 (26.1)	0.94
Cognitive delay	2 (2.6)	4 (17.4)	0.02
Movement/physical	3 (3.8)	3 (13)	0.13
Compliance for all wellness visits through 18 months	49 (46.2)	10 (29.4)	0.08
Any delay at any wellness visit up to 18 months	41 (28.9)	16 (31.4)	0.74

56 Transperineal ultrasound-based algorithm advising women after obstetric anal sphincter injury regarding their subsequent delivery mode

Tamar Katzir, Gil Friedman, Edi Vaisbuch, Moshe Gillor
Kaplan Medical Center, Rehovot, HaMerkaz

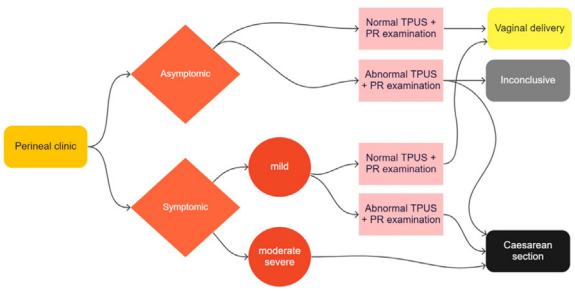
OBJECTIVE: Obstetric anal sphincter injury (OASI) is a severe complication of vaginal delivery (VD) that increases the risk of anal incontinence. Limited validated data is available on the optimal mode of subsequent delivery following OASI, leading to the potential overuse of elective cesarean deliveries (CD). Since 2020, within a dedicated "Perineal trauma" clinic, we have developed and implemented an algorithm utilizing transperineal ultrasound (TPUS), rather than the conventional and commonly used transrectal ultrasound, for consulting women with a history of OASI on the preferred mode of delivery (Figure 1). This study aimed to assess our algorithm's impact on subsequent OASI and elective CD rates.

STUDY DESIGN: This retrospective cohort study included women diagnosed with OASI between 5/2015 and 4/2022 in our hospital. Demographic and delivery data were collected from the electronic medical charts. The study group included women who delivered after 2019 and underwent an assessment according to the TPUS algorithm in our dedicated perineal trauma clinic. The control group included women who delivered before the clinic's establishment and consulted regarding the preferred future delivery mode based on the attending physician's subjective impression. Recommendations for future delivery mode, actual subsequent delivery mode, and recurrent OASI rates were compared between the groups.

RESULTS: Demographic characteristics were comparable between the study (n=57) and control (n=73) groups. The rate of 3a-degree perineal tear was higher, and unclassified 3rd-degree perineal tear was lower in the study group (52% vs. 7%, p=0.001 and 7% vs. 18%, p=0.07). Women in the study group were more reassured to deliver vaginally (66% vs. 10%, p< 0.001). Indeed, their subsequent VD rate was higher (53% vs. 21%, p< 0.001) without an increase in the recurrent OASI rate (0% vs. 9%, p=0.24).

CONCLUSION: Consulting women after OASI regarding their preferred mode of subsequent delivery in a dedicated perineal trauma clinic, using a TPUS-based algorithm, reduced elective CD rates without increasing the rate of recurrent OASI.

Figure 1: Algorithm advising women after vaginal delivery with OASI on the subsequent mode of delivery



TPUS, Trans Perineal ultrasound; PR, per rectum; SMIS, St Mark's score of anal incontinence; EAS, external anal sphincter

Mild symptoms were defined as SMIS≤2 with a visual analog scale (VAS) of anal incontinence ≤3. Abnormal TPUS was defined as a defect of ≥30° in the EAS in ≥4/6 slices. Abnormal PR was defined as a weak anal sphincter contraction during rectal examination (3 or less on a scale of 0-5).

Oral Concurrent Session 6

Quality, Equity & Public Health

Abstracts 57–64

WEDNESDAY
February 14, 2024
10:00 am – 12:00 pm

MODERATOR(S)

Emily Miller, MD, MPH

Niraj Chavan, MD, MPH

QUALITY, EQUITY & PUBLIC HEALTH

Abstracts 57-64

57 Inter-pregnancy interval and uterine rupture among more than 500,000 Trials of Labor after Cesarean (TOLAC)

Bradley de Vries[1], Pejman Adily[2], Travis Bettison[3], Vincenzo Berghella[4], Adam Mackie[3], Rajit Narayan[3], George Johnson[1], Marjan Mosalman Haghighi[1]

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OBJECTIVE: To describe the association between inter-pregnancy interval (IPI) and uterine rupture among individuals attempting TOLAC.

STUDY DESIGN: This retrospective cohort study used US CDC data including birth and fetal death data files (2011-2021) and Period/Cohort Linked Birth-Infant Death Data Files (2014-2019). Participants had one previous livebirth by cesarean delivery (CD), no previous vaginal births and an immediately subsequent TOLAC. Rates of uterine rupture were described by IPI group and univariable logistic regression with first-order splines with one knot. Multiple imputation and multivariable logistic regression were used.

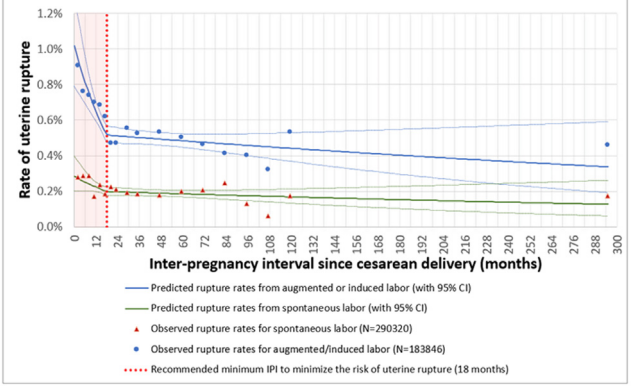
RESULTS: Among 42.5 million births, 506 666 TOLACs immediately after a CD were included in the multivariable logistic regression.

The raw rate of uterine rupture was 0.40% for IPIs < 18 months (95%CI 0.37-0.44%) and 0.30% for IPIs ≥18 months (95%CI 0.28-0.32%). The Figure shows rates of uterine rupture by IPI and the predicted probabilities of rupture in the univariable spline regression for induced/augmented and spontaneous labors. There was a linear decrease with increasing IPI until 18 months and subsequent relatively constant rates.

The odds ratio was 1.94 for an IPI < 3 months (95%CI 1.73 to 2.06), progressively decreasing to 1.15 for an IPI from 15 to < 18 months (95%CI 1.10 to 1.21) compared with IPI 4-5 years after adjusting for confounders. Uterine rupture was associated with increasing age, decreasing height, higher gestation, higher birthweight, and induced/augmented labors. It was not associated with hypertension, gestational diabetes or smoking. The rate of uterine rupture with stillbirth or neonatal death was 0.012% (1:8413) for IPI < 18 months (95%CI 0.00-0.02%) and 0.018% (1:5614) for IPI ≥18 months (95%CI 0.01-0.02%).

CONCLUSION: Shorter IPI is strongly associated with an increase in uterine rupture in TOLAC with the odds ratio falling sharply between 0 and 18 months. An IPI of at least 18 months should be recommended to achieve the lowest incidence of uterine rupture during TOLAC.

Figure: Predicted (solid curve) and observed (point estimates) uterine rupture rates versus inter-pregnancy interval by onset of labour type among 506,666 trials of labor for parturients with one previous cesarean delivery and no previous vaginal births



58 Prenatal herbicide exposure and newborn size in a Ghanaian cohort

Kwaku Poku asante[1], Kaali Seyram[1], Mohammed Mujtaba Nuhu[2], Elizabeth Gibson[3], Alison Lee[4], Kennetha A. Ae-Ngibise[2], Anna M. Modest[5], Ellen Boamah[1], Jones Opoku-Mensah[2], Austin M. Oberlin[6], Oscar Agyei[2], Russ Hauser[3], Abena Konadu Yawson[2], Darby Jack[7], Brent Coull[3], Blair Wylie[8]

[1]Kintampo Health Research Centre, Brong Ahafo, Ghana, [2]Kintampo Health Research Centre, Kintampo, Brong-Ahafo, [3]Harvard T.H. Chan School of Public Health, Boston, MA, [4]Mount Sinai Hospital, New York, NY, [5]Beth Israel Deaconess Medical Center, Boston, MA, [6]Columbia University Irving Medical Center, New York, NY, [7]Mailman School of Public Health, New York, NY, [8]Columbia University, New York, NY

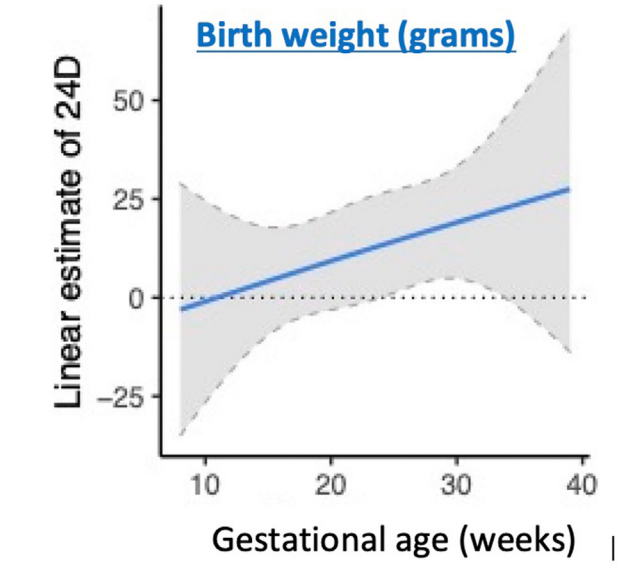
OBJECTIVE: Widely used herbicides may act as endocrine disruptors. Herbicide biomarkers are routinely detected, and levels are increasing, among pregnant people around the globe. Epidemiologic studies evaluating the impacts of herbicides during pregnancy are limited. We aimed to determine associations between urinary prenatal herbicide concentrations and newborn size, an important marker of future infant health, and to identify critical windows of vulnerability.

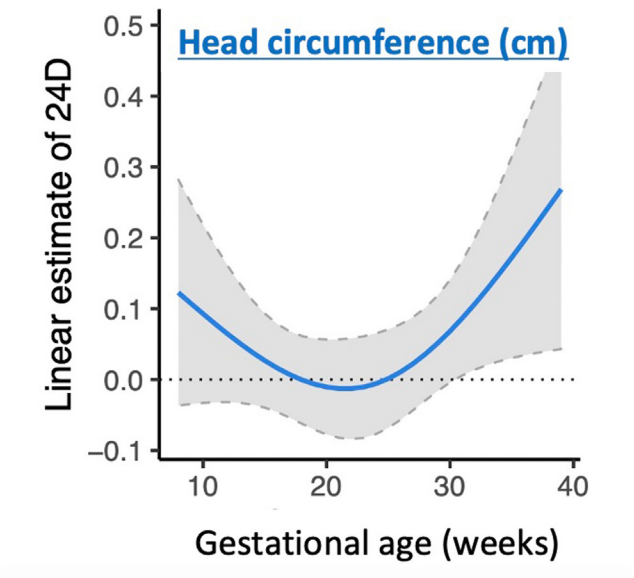
STUDY DESIGN: In a prospective Ghanaian prenatal cohort using repeated urine samples across pregnancy, we measured 2,4-dichlorophenoxyacetic acid (2,4D), a widely used weed killer. We extended multiple informant models with time-varying coefficients to account for the short $^1/_2$ -life of 2,4D and examined variable associations of creatinine-corrected 2,4D concentrations across pregnancy with newborn weight, length, and head circumference. We adjusted for key environmental co-exposures (air pollution, pesticides) and confounders (parity, BMI, wealth, malaria) and examined effect modification by infant sex.

RESULTS: Among samples from 1,152 pregnant participants, 58% had detectable 2,4D with median prenatal exposure of 0.19 μcg/mL (IQR 0.11-0.49). Prenatal 2,4D exposure was associated with significant increases in birth weight during weeks 24-33 and head

circumference during weeks 31-39 (Figure). Averaged across pregnancy, a doubling of exposure in any given week increased birth weight by 11.5 grams (95%CI 1.5, 21.5) with a stronger association among males (16.8; 95%CI 2.2, 31.4). The average association between 2,4D and head circumference was not statistically significant. We found no evidence of a relationship with birth length.

CONCLUSION: Prenatal exposure to 2,4D, a widely used herbicide, was associated with increased birth weight and head circumference in this Ghanaian cohort. While the increase is modest for a given week, repeated exposures may result in larger cumulative effects. Follow up during childhood is ongoing to determine whether this chemical is acting as an *in utero* obesogen.





59 Assessment of Labor Unit Culture as a Factor in Safely Reducing Cesarean Births

Althea Bourdeau[1], Emily White VanGompel[2], Elizabeth S. Langen[1], Lisa Kane Low[1]

[1]University of Michigan, Ann Arbor, MI, [2]NorthShore University HealthSystem, Chicago, IL

OBJECTIVE: To assess the association between maternity unit culture and the rate of nulliparous, term, singleton, vertex cesarean births (NTSV CB) at the hospital level.

STUDY DESIGN: Clinicians at Michigan birthing hospitals participating in the Obstetrics Initiative perinatal quality collaborative funded by Blue Cross Blue Shield of Michigan, were invited to complete the Labor Culture Survey (LCS). The LCS includes 28 Likert-style items covering 7 subscales measuring individual attitudes, beliefs and perceptions of unit practices. Descriptive statistics and multivariate Poisson regression (controlling for hospital birth volume, location, nursery acuity level, BMI $>$ 30, age $>$ 35 years, and Medicaid as primary insurance) were conducted to measure association between hospital-level means on each subscale and hospital-level NTSV CB rates. Sites with abstracted data in 2020 and 2021 (n = 67) were included in descriptive analyses, and sites that had $\geq$ a 30% response rate and one OBGYN responder ("responder sites"; n = 53) were included in Poisson modeling.

RESULTS: The LCS was completed by 3,222 clinicians.The Fear, Unit Microculture, and Cesarean Safety subscales were associated with hospital NTSV CB rates (Table 1). A one point increase in the Fear subscale (personal concerns) was associated with a relative 51.3% increase ($p< 0.001$) and a one-point increase in the Cesarean safety (estimation of birth risk) subscale was associated with a relative 44.5% increase in the NTSV CB rate ($p< 0.001$); conversely, a one-point increase in the Unit Microculture subscale (assessment of unit practices that support vaginal birth) was associated with a relative 29.6% decrease in the NTSV CB rate (p=0.049).

CONCLUSION: Understanding unit culture is an important step in addressing NTSV CB rates. While individual attitudes such as fear of vaginal birth and perception of Cesarean safety may be deeply entrenched, improving unit microculture (e.g. use of evidence based practices/policies, nurses providing labor support) may represent a key focus area for quality improvement champions.

Relationship between Labor Culture Survey subscale score and NTSV CB rate

LCS subscale	Estimate (95% CI)	Relative risk
Best Practices	-0.29 (-0.65, 0.08)	0.748
Fear`	-0.67 (-1.01 ,- 0.33)	0.513**
Unit Microculture	-0.35 (-0.70 , 0.00)	0.704*
Physician Oversight	-0.08 (-0.43, 0.27)	0.923
Maternal Agency	-0.34 (-0.67, 0.00)	0.712
Cesarean Safety`	-0.81 (-1.23, -0.39)	0.445**
Unit Norms	-0.11 (-0.36, 0.14)	0.896
Vaginal Birth Microculture	-0.13 (-0.39, 0.13)	0.878
Patient Safety Culture	-0.06 (-0.29, 0.16)	0.942

`Subscale is reverse-coded

*P < 0.05; **P < 0.001

Includes hospitals with at least one OBGYN survey respondent and a response rate >= 30%. Adjusted for hospital annual birth volume, geographic location, nursing acuity level, birthing person % BMI > 30, birthing person % age > 35y, and birthing person % Medicaid as primary insurance.

60 Predicting chorioamnionitis using AI-based methods: a retrospective cohort study

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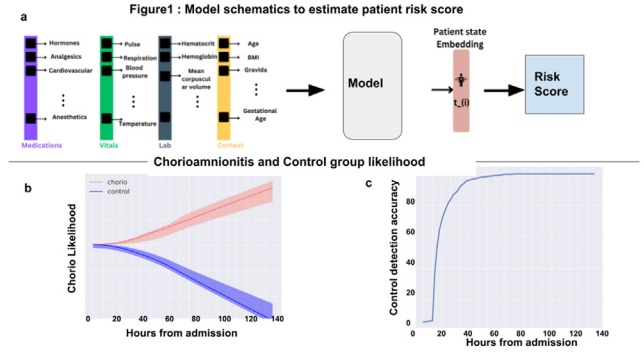
OBJECTIVE: Diagnosing chorioamnionitis remains challenging due to its non-specific clinical manifestations and the reliance on invasive testing. This study introduces a state-of-the-art machine learning model designed to diagnose chorioamnionitis early and accurately by harnessing the power of routinely collected Electronic Health Record (EHR) data.

STUDY DESIGN: EHR data collected from inpatient delivery admission from 2012-2018 at Stanford Hospital were utilized to devise a mathematical model representing patient health.The timing of clinical chorioamnionitis diagnosis was determined by the initiation of chorioamnionitis specific antibiotics. Utilizing over 75 variables including birthing parent demographics, inpatient vital signs, labor interventions, administered medications, and laboratory test results from the delivery admission, we created birthing parent representations through a transformer encoder-based neural network (Figure 1. a). This model was combined with a Hidden Markov Model for real-time chorioamnionitis risk assessment during a patient's stay (Fig 1.a).

RESULTS: Our analysis included 25,723 pregnant persons, of which 12% were diagnosed with chorioamnionitis during their delivery admission. Our model demonstrated an 80% success rate in pre-empting the conventional, clinical diagnosis of chorioamnionitis (Fig 1. b). On average, our model diagnosed chorioamnionitis 4.5 hours earlier than the clinical diagnoses. Moreover, 90% of unaffected patients were correctly identified within their initial 24 hours of hospital admission (Fig 1.c).

CONCLUSION: This study serves as a proof-of-concept that the application of artificial intelligence with delivery admission EHR data may aid in the accurate and more timely diagnosis of chorioamnionitis. By transcending the limitations of traditional diagnostic methods, our approach offers a data-driven tool capable of generating individualized risk profiles. Pending external validation, this methodology could usher in more personalized, timely interventions, with the potential to enhance both maternal and neonatal outcomes.



61 A Pilot Study for Implementation of a Virtual Group Prenatal Genetics Counseling Program

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OBJECTIVE: ACOG endorses nondirective pretest counseling regarding prenatal genetic testing options. Pretest counseling is often performed by the obstetrician at the first prenatal visit. To provide more standardized and available genetic counseling, we initiated free monthly group genetics virtual sessions. Using survey data, we aimed to determine whether the sessions improved patients' knowledge and comfort levels surrounding prenatal testing.

STUDY DESIGN: All English-speaking obstetric patients were encouraged to enroll in a virtual 60-minute webinar, led by a certified genetic counselor and an MFM. Pre- and post-session surveys were provided to all attendees, which included sociodemographics and a questionnaire modified from validated scales. Survey data were collected from March to June 2023. Patients were divided into two groups for score comparison, depending on whether they had prior pretest counseling as part of standard prenatal care. Statistical analyses included Mann-Whitney U, Chi-square, and ANOVA modeling for comparison of score changes.

RESULTS: Of the 231 patients who attended a webinar, 40% completed the surveys (Table 1). Prior to the sessions, 59% of patients reported feeling comfortable understanding their prenatal testing options compared to 99% after the sessions ($p< 0.001$). There was an increase in those reporting having the tools to make decisions about genetic testing (54% pre- vs 99% post-session, $p< 0.001$) and reporting that their decisions reflect what is important to them (64% pre- vs 81% post-session, $p=0.009$). The session was valuable to 96% of participants. There were no differences in pre- vs post-session scores related to anxiety. When comparing survey data among those who had prior standard counseling to those who had not, the improvement in scores remained present after adjusting for covariates (Table 1).

CONCLUSION: Standardized group genetic counseling appears beneficial to patients, even among those with prior counseling by their obstetric providers. Future directions include assessment of a larger, more diverse patient population to support broader implementation.

Table 1: Demographics and survey data among patients participating in virtual group genetics counseling

	Patients with prior counseling (n = 34)	Patients without prior counseling (n = 53)	p-value
Maternal age, years	35	34	0.74
Gestational age at virtual session	10w2d	6w6d	< 0.001
Nulliparity	25 (73.5)	43 (81)	0.70
IVF pregnancy	9 (26)	10 (19)	0.40
Low risk OB practice	31 (91)	44 (83)	0.51
Race/Ethnicity			0.22
-White	25 (73.5)	35 (66)	
-Asian	6 (17.6)	10 (19)	
-Hispanic	2 (5.9)	4 (7.5)	
Education level beyond college	24 (70.5)	33 (62.2)	0.37
Session reported as "valuable" to participants	34 (100)	49 (92.4)	0.15
Adjusted mean changes in pre- vs post-session scores*			
Pre- vs post-session change in comfort with knowledge of testing options[a]	0.74	0.50	0.03
Pre- vs post-session change in perceived personal control[b]	0.96	0.87	0.32
Pre- vs post-session change in comfort with decision-making[c]	0.26	0.39	0.28
Pre- vs post-session change in anxiety about testing[d]	-1.1	- 0.97	0.63
Pre- vs post-session change in anxiety about results[e]	- 1.1	- 0.9	0.24

Data are median, n (%)
*Mean Δ pre- vs post-session scores, adjusting for parity, type of OB practice, ethnicity, and education.
[a]When asked, "Using a scale of 1-5, I feel comfortable understanding the prenatal testing options available to me" (1=extremely uncomfortable, 5=extremely comfortable).
[b]When asked, "Using a scale of 1-5, I feel I have the tools to make decisions around genetic testing that will influence my family's future." (1=strongly disagree, 5=strongly agree).
[c]When asked, "Using a scale of 1-5, My decisions around genetic testing reflect what is important to me." (1=strongly disagree, 5=strongly agree).
[d]When asked, "Using a scale of 1-5, I am worried about making decisions regarding genetic testing." (1=not worried, 5=very worried).
[e]When asked, "Using a scale of 1-5, I am worried about what I will do if a genetic test shows an abnormality." (1=not worried, 5=very worried).

62 Genetic Health Literacy in an Urban Southeastern Population

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OBJECTIVE: As prenatal genetic screening and diagnostic testing is recommended for all pregnant persons, we sought to evaluate genetic literacy in an urban population in the Southeast.

STUDY DESIGN: Prospective study of all individuals seeking prenatal care at the University of Alabama at Birmingham from 3/2020-8/2022. Consenting individuals were administered a computer-based survey which included an introduction to genetic screening/diagnostic testing and assessed patient attitudes towards genetic testing. Genetic literacy was assessed using two validated measures: the Genetic Literacy and Comprehension (GLAC), which assesses a patient's self-reported familiarity with 8 genetics terms, and the Genetic Knowledge Survey (GKS) which assesses correctness on 16 genetics questions. Mean scores for both instruments as well as GKS score ranges (Table) were computed for the overall population. Scores were compared between private vs. public insured groups and low-risk vs. high-risk populations (referred for potential genetic abnormalities e.g., abnormal genetic screening, fetal anomalies) using appropriate tests.

RESULTS: A total of 1596 people were approached for this study, of whom 895 enrolled. Of these, 776 were low-risk (53.6% publicly insured) and 119 high-risk (54.5% publicly insured). Our cohort was on average 27±6 yrs old, primarily Black (55%), with at least a high school education (92%). The overall mean GLAC score was 5.2±2.3 and was significantly higher in privately insured patients and those with high genetic risk (Table). GKS scores were overall low in our cohort (6.9 ± 4.7), with lower scores among publicly insured participants (Table). GKS scores were similar among low and high-risk groups (p=0.095). While rates of high knowledge were greatest in those with private insurance (13.9%), high GKS scores were infrequent (Table).

CONCLUSION: While pregnant individuals report familiarity with genetic terms, they do not have high genetic knowledge. Efforts to improve genetic knowledge are urgently needed, so that pregnant patients can make informed decisions about prenatal genetic screening and diagnosis.

	Overall Cohort (n=895)	Low-Risk (n=776)	High-Risk (n=119)	p-value*	Low-Risk Public Insurance (n=416)	Low-Risk Private Insurance (n=360)	p-value**
GLAC Score (mean ± SD)	5.2 ± 2.3	5.2 ± 2.3	5.7 ± 2.1	0.031	4.2 ±2.4	6.2 ± 1.7	<0.0001
GKS Score (mean ± SD)	6.9 ± 4.7	6.8 ± 4.7	7.5 ± 4.5	0.095	5.0 ± 3.9	8.8 ± 5.0	<0.0001
GKS Score Range				0.018			<0.0001
<7 (low)	42.3%	43.9%	31.9%		58.2%	27.5%	
7-13 (medium)	51%	49.1%	63.0%		40.8%	58.6%	
>13 (high)	6.7%	7.0%	5.1%		1.0%	13.9%	

* p-value comparing low-risk vs. high-risk; **p-value comparing low-risk public vs. private insurance

63 A Novel Index to Assess Association Between Structural Racism and Black/White Stillbirth Rate Disparities

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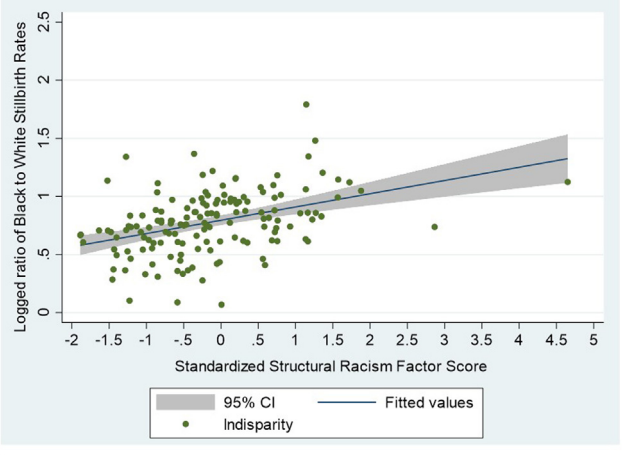
OBJECTIVE: Racial disparities in stillbirth rates are well-documented but the association with structural racism has not been adequately studied. Using the Structural Racism Index, a novel index that assesses Black/White disparities in multiple socioeconomic indicators and quantifies exposure to systemic inequalities, this study investigates the relationship between structural racism and Black/White stillbirth rate disparities across US counties.

STUDY DESIGN: Using CDC Vital Statistics data from 2016 - 2019, stillbirth rates were calculated for non-Hispanic Black (NHB) compared to non-Hispanic White (NHW) populations at the county level. The Structural Racism Index (SRI) and its relationship to differences in stillbirth rates by race was studied. Analyses were restricted to counties with more than 50,000 Black residents and at least 10 stillbirths to assure model stability. Linear regression of the stillbirth rate were performed and adjusted for county level access to resources using the CDC's Social Vulnerability Index (SVI) and other county level socioeconomic factors.

RESULTS: A total of 149 counties, representing 1.5 million residents and 70% of the US Black population, met inclusion criteria. The average stillbirth rate was 10.4 in the NHB population versus 5.3 per 1000 in the NHW population. After adjusting for SVI, each standard deviation increase in the SRI score still resulted in a 12% increase in the rate of stillbirth disparity (aOR 1.12, 95% CI 1.07-1.17). The disparity in rates was not explained by county level differences in social vulnerability as measured by the SVI or county level factors like education, unemployment, or poverty.

CONCLUSION: There are significant racial disparities in rates of stillbirth between NHB and NHW populations at the US county level and structural racism as measured by the Structural Racism Index is strongly associated with these differences. Measures such as the CDC's SVI do not adequately account for the differences observed thus other measures such as the SRI should be considered to better understand how exposure to structural racism leads to worse health outcomes.

Figure 1: Correlation between county structural racism factor scores and the logged ratio of county-level Non-Hispanic Black to Non-Hispanic White stillbirth rates in US counties[1], 2016-2019 (N=149)



[1]Counties with > 50,000 Black residents and more than 10 stillbirths

64 Exploring Black birthing people's perspectives on racial concordance with obstetric care providers

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OBJECTIVE: The qualitative aim of this multi-method study was to explore Black birthing people's lived experiences within obstetric care and their perspectives on racial concordance with obstetric providers.

STUDY DESIGN: In this study, we used a qualitative descriptive approach to conduct 1-on-1 semi-structured interviews (n=16) and 5 focus groups (FGs; n=16) in a sample of individuals who self-identified as Black or African American, were $\geq$ 18 years of age, delivered a baby with the university health system between 2019-2021, and were English-speaking. Potentially eligible individuals were identified via electronic health record data then recruited and consented electronically. Interview and FG guides were co-created by the research team and were utilized to elicit discussion regarding lifetime experiences with racism and discrimination, experiences with the healthcare system during pregnancy, and perspectives on racial concordance with obstetric providers. Interviews and FGs were conducted by experienced researchers who identify as Black women. They were audio-recorded, transcribed, and data was de-identified for analysis. Thematic analysis was used to group codes into larger themes.

RESULTS: All 32 participants included in the analysis identified as non-Hispanic Black women. Their mean age was 34 years, nearly 63% were married, and 72% had a bachelor's degree or higher. Themes that emerged were: (1) desire for racially concordant providers, (2) difficulty finding racially concordant providers, (3) experience of stereotyping during obstetric care, (4) not being heard by obstetric providers and staff, and (5) fear of dying in pregnancy/childbirth. Representative quotes for each theme are presented in Table 1.

CONCLUSION: Black birthing people in this study shared a clear preference for racially concordant obstetric providers, citing experiences of discrimination and racism in their lifetimes and during obstetric care as driving factors, and lamented how difficult it is to find this. Increasing opportunities for racially concordant obstetric care may be one strategy for improving care for Black birthing people.

Table 1. Themes and representative quotes

	Themes	Quotes
1	Desire for racially concordant providers	"I really would have loved to have a couple of Black midwives... I would have loved to have had **somebody that looked like me.**" (P241) "**I was actually a little hesitant to see the providers who were White in the office**, just because of the... discrimination that I have experienced throughout my lifetime and the discrimination that I see my friends and my family experience and also the discrimination that you witness on the news and see on TV." (P126) "There's just an innate knowledge and understanding that you would have for someone [of the same race]." (P376) "So because I was terrified, and this was my fourth C-section, I told my doctors because my doctor is a White woman and I told her **I really would like a Black woman in there.** Because you know, I'm just afraid." (FG5E) "Then this last labor was a rainbow coalition of people and **I had more Black women involved in the pregnancy and delivery process and it made so much of a difference** that I would say it was definitely mandatory." (FG5E)
2	Difficulty finding racially concordant providers	"I was actually trying to find African American or Black physician doctor [that was] female, preferably for high risk. **That was so hard. Oh, so hard.**" (P376) "**I didn't have anybody that actually looked like me.**" (P405)
3	Not being heard	"**I did not feel heard**. I didn't feel like they were taking me seriously." (P165) "I was talking to a White provider. And I felt like I was I was trying to express my concerns, but I felt like she wasn't listening to them, and she was just kind of brushing them off as in **not taking me seriously.**" (P126) "I've run into a lot of White male doctors that clearly were **not listening and did not take me seriously.** I've also run into a lot of female, White female nurses that **clearly did not care.**" (P165)
4	Stereotyping	"She's like, you know, well, abortion is an option especially if you don't know the dad. I'm just like, wait a minute, I do know who my child's dad is... 'Oh, so y'all actually managed to stay together?' Just like why is it so much of a surprise? **I'm sorry, am I meant to be a single mother?**" (P220) "This one nurse... kept asking me do I need a social worker? Do I need WIC? Did I need all these things? And I'm like, what, what in my profile is making you ask these questions, are these normal questions? **Or are you asking me this because I'm Black?**" (P241)
5	Fear of dying	"I was so scared because I'm like, **I might die with this pregnancy**. Like that was the first thought in my head. I could very well die just from simply getting pregnant and because I decided to have a child." (FG2A) "**I was definitely concerned about dying in childbirth or afterwards.**" (P165)

Participant identification number in parentheses following quote.

Oral Concurrent Session 7

Clinical Obstetrics & Postpartum

Abstracts 65–74

WEDNESDAY
February 14, 2024
3:00 pm – 5:30 pm

MODERATOR(S)

Corrina Oxford-Horrey, MD

Todd Rosen, MD

CLINICAL OBSTETRICS & POSTPARTUM

Abstracts 65-74

65 Prophylactic Antibiotics after Cesarean Trial (PACT): A Randomized Control Trial

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[1]University of Texas Medical Branch, Dickinson, TX, [2]University of Texas Medical Branch, Galveston, TX, [3]University of Nebraska Medical Center, Omaha, NE, [4]St. David's Women's Center of Texas, Austin, TX, [5]Eastern Virginia Medical School, Norfolk, VA

OBJECTIVE: A trial of postoperative antibiotics as prophylaxis for post-cesarean surgical site infections (SSI) noted a benefit in obese patients with ruptured membranes. However, this was before pre-incision extended antibiotic prophylaxis with adjunctive azithromycin. We sought to assess if 48-hour post-cesarean antibiotics reduce infectious morbidity in the era of extended pre-operative prophylaxis.

STUDY DESIGN: Between 8/2017 to 3/2023, we conducted a double-blinded randomized clinical trial that included obese patients undergoing cesarean with > 4 hours of ruptured membranes. section following the administration of extended-spectrum pre-operative prophylaxis. Participants with chorioamnionitis, immunosuppression, antibiotic contraindications, or planned post-operative antibiotics were excluded. Subjects were assigned randomly to cephalexin 500mg and metronidazole 500mg PO q8hrs for 48 hours post-operatively (cefalexin-metronidazole) vs. placebo (control). Per clinical practice, both groups received extended-spectrum pre-skin incision prophylaxis with cephazolin and azithromycin. The primary outcome was a composite of endometritis, SSI, or other post-cesarean infections within 30 days of delivery. Secondary outcomes included incisional morbidity, fevers, and other surgical wound complications. Analysis was performed by intention-to-treat as well as per protocol.

RESULTS: Among 321 randomized participants, 284 (88.4%) completed the 30-day follow-up. The median age was 27.8 years, and BMI was 38 kg/m2. Baseline characteristics were balanced between the 2 groups. There was no difference in the primary outcome between the active and placebo groups (5.0% vs 6.9%, RR 0.71, 95% CI, 0.26-1.91]. No significant differences were found between groups for other prespecified secondary outcomes, including rates of incisional morbidity, fever, wound separation, or endometritis (Table).

CONCLUSION: The previously noted benefit of postoperative antibiotics for post-cesarean prophylaxis in obese patients was not seen in the pre-incision extended antibiotic regimen era. A larger trial is unlikely to find differences.

Study Outcomes				
Intention to Treat	Cephalexin-Metronidazole (n=160)	Placebo (n= 161)	Relative Risk (95% CI)	P Value
Primary Outcomes	n (%)	n (%)		
Surgical site infection composite	9 (5.6)	11 (6.8)	0.81 (0.33-2.02)	0.65
Secondary Outcomes				
Fever	11 (7.4)	9 (5.7)	1.31 (0.53-3.26)	0.56
Endometritis	3 (2.0)	3 (1.9)	1.05 (0.21-5.31)	0.95
Wound separation	6 (4.0)	8 (5.1)	0.78 (0.26-2.31)	0.62
Wound seroma	4 (2.7)	2 (1.3)	2.14 (0.39-11.85)	0.37
Wound cellulitis	4 (2.7)	4 (2.6)	1.06 (0.26-4.30)	0.94
ER wound evaluation	3 (2.0)	5 (3.2)	0.62 (0.15-2.66)	0.52
OB triage wound evaluation	6 (4.0)	9 (5.8)	0.69 (0.24-1.99)	0.49
Post-partum wound re-admission	2 (1.4)	3 (1.9)	0.70 (0.12-2.24)	0.7
Per Protocol	Cephalexin-Metronidazole (n=140)	Placebo (n= 144)	Relative Risk (95% CI)	P Value
Primary Outcomes	n (%)	n (%)		
Surgical site infection composite	7 (5.0)	10 (6.9)	0.71 (0.26-1.91)	0.49
Secondary Outcomes				
Fever	9 (6.9)	8 (5.1)	1.23 (0.46-3.28)	0.68
Endometritis	2 (1.5)	3 (2.1)	0.71 (0.12-4.34)	0.71
Wound separation	5 (3.9)	7 (5.0)	0.76 (0.24-2.46)	0.64
Wound seroma	4 (3.1)	2 (1.4)	2.19 (0.39-12.17)	0.36
Wound cellulitis	4 (3.1)	4 (2.9)	1.08 (0.26-4.41)	0.92
ER wound evaluation	2 (1.6)	5 (3.6)	0.42 (0.08-2.21)	0.29
OB triage wound evaluation	6 (4.6)	8 (5.8)	0.80 (0.27-2.37)	0.68
Post-partum wound re-admission	1 (0.8)	2 (1.4)	0.54 (0.48-5.97)	0.61

66 Oral Analgesia in Fixed-Time Interval vs. On-Demand following Vaginal Delivery: A Randomized Controlled Trial

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OBJECTIVE: To compare the efficacy of a fixed-time-interval oral analgesia compared to on-demand protocols for the management of post-vaginal delivery pain in the first 24 hours postpartum.

STUDY DESIGN: We performed a randomized, prospective, controlled trial, at a single tertiary medical center, between June 2020 to June 2022. Vaginally delivered women were randomly assigned to one of two groups: group 1: oral analgesics of Paracetamol 1 g + Ibuprofen 400 mg every 6 h for the first 24 hours postpartum (per-protocol analgesia group); group 2: same oral analgesics according to maternal request (on-demand group). The primary outcome was pain level during the 1st 24 hours post-delivery, measured on a 10-point visual analog scale (VAS). We estimated that 100 women per group would provide 80% power to identify a 20% difference in the primary outcome.

RESULTS: From 2020-2022, 200 women were enrolled and included in the analysis: 100 (50%) in study group (per-protocol analgesia) and 100 (50%) in control group (on-demand analgesia). Baseline and delivery characteristics were comparable for all relevant variables, including oxytocin augmentation, epidural anesthesia, episiotomy rate and neonatal weight. VAS score was comparable between study groups (5.31±1.92 vs. 5.29±1.67, p=0.626), even following sub-analysis for nulliparity, episiotomy, and vacuum assisted delivery. However, breastfeeding rates were higher in the per-protocol analgesia group (98% vs. 88%, p=0.006). Additionally, higher satisfaction rates were found among the per-protocol analgesia

group (p< 0.05). Women in the per-protocol group received more analgesic treatment with no reported side effects.

CONCLUSION: A fixed analgesic protocol for postpartum pain management, compared with an on-demand protocol, following vaginal delivery, is associated with higher breastfeeding rates and better maternal satisfaction though similar VAS scores.

Table 1. Pain management characteristics and outcomes.

Variable	Per-protocol analgesia n=100	As-needed analgesia n=100	P-value
Analgesics ≤ 24h, mean ± SD			
Paracetamol	2.9 ± 1.3	0.8 ± 1.1	< 0.001
Ibuprofen	2.9 ± 1.2	0.7 ± 1.1	
Analgesics > 24h, mean ± SD			
Paracetamol	2.9 ± 2.3	0.9 ± 1.3	< 0.001
Ibuprofen	5.9 ± 4.5	0.5 ± 1.1	
Average VAS, 24 h, mean ± SD			
All patients	5.31 ± 1.92	5.29 ± 1.67	0.626
Episiotomy	5.38 ± 1.91	5.17 ± 1.84	0.326
Nulliparous	5.53 ± 1.71	5.39 ± 1.78	0.878
Vacuum assisted delivery	4.28 ± 1.89	6.27 ± 1.79	0.126
Infant Feeding status, n (%)			
Breastfeeding	88 (88)	98 (98)	0.006
Formula only	12 (12)	2 (2)	
BSS-30+, mean ± SD			
QC	37.9 ± 4.7	31.1 ± 5.2	0.0324
WA	35 ± 5.1	30.3 ± 6.3	0.0453
SE	58.1 ± 8.5	50.1 ± 8.3	0.0398
Duration of hospital stay, days, mean ± SD	2.9 ± 0.7	2.9 ± 1	0.7219

VAS, visual analog scale.

+BSS-30 (Birth Satisfaction Scale) is a valid and reliable scale designed to assess women's experiences of labor and childbirth. The questionnaire has 3 components: quality control (QC), women's attributes (WA) and stress experienced (SE).

P < 0.05 is considered significant.

67 Association of body mass index with pain and opioid use after cesarean delivery

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OBJECTIVE: To ascertain whether the amount of opioid analgesia used after cesarean delivery (CD) differed among those with body mass index (BMI) < 30 vs. ≥ 30 m/kg2

STUDY DESIGN: Secondary analysis of a multicenter randomized trial of individuals who had undergone CD and were randomly assigned, within 1 day prior to planned discharge to an individualized opioid prescribing plan (IOPP) or a fixed quantity of opioids upon discharge at 31 U.S. hospitals (2020-22). The primary exposure was delivery BMI. The primary outcome was inpatient oral opioid use in morphine milligram equivalents (MME) in the 24 hours prior to randomization. Secondary outcomes included outpatient opioid use calculated as number of tablets taken through 6 weeks postpartum and moderate-severe (score ≥4) perceived pain and interference in daily activities on the Brief Pain Inventory (BPI, 1-10) at 1-week postpartum. Multivariable modeling evaluated the association between BMI (with BMI < 30 kg/m2 as referent group) and opioid use and pain scores.

RESULTS: Of 4,768 included individuals, 3,556 (74.6%) had BMI ≥ 30 m/kg2. Those with BMI ≥ 30 m/kg2 were more likely to have government assisted insurance, diabetes, and hypertension/pre-eclampsia, and less likely to be £ 19 years old or nulliparous. Individuals with BMI ≥ 30 m/kg2 used more opioids in the 24h prior to discharge and requested more oxycodone tablets at discharge. They used more oxycodone tablets at 1, 2 and 6 weeks post discharge, and reported a higher frequency of moderate to severe pain at baseline and at all time points assessed through 6-weeks. (Table). The association between obesity and the magnitude of pain relief did not differ by opioid use prior to discharge (p=0.56) or at the 1-week visit (p=0.45).

CONCLUSION: Individuals with BMI ≥ 30 m/kg2 use more opioids post-cesarean and after hospital discharge than individuals with BMI < 30 kg/m2. Despite this greater use, they demonstrate slightly poorer pain relief than subjects with BMI < 30 kg/m2.

Body Mass Index Category, opioid use and pain

	Body mass index ≥ 30 kg/m² (N=3,556)	Body mass index < 30 kg/m² (N=1,212)	p	Adjusted median difference & 95% CI
MMEs consumed in 24 hours prior to randomization	15 (0, 37.5)	10 (0, 30)	< 0.001	5 (2.8, 7.2)
Number of Oxycodone 5 mg tablets requested at discharge (IOPP group only)	15 (8, 20)	10 (5, 20)	< 0.001	3.5 (2.1, 4.9)
Number Oxycodone 5 mg tablets used at 1-week, N=4,273	5 (0, 10)	3 (0, 10)	< 0.001	1 (0.4, 1.6)
Number Oxycodone 5 mg tablets used at 2-weeks, N=4,373	5 (0, 14)	3 (0, 12)	< 0.001	1.7 (0.9, 2.4)
Number Oxycodone 5 mg tablets used at 6-weeks, N=3,862	6 (0, 15)	3 (0, 12)	< 0.001	2 (1.3, 2.7)
	Body mass index ≥ 30 kg/m² (N=3,556)	Body mass index < 30 kg/m² (N=1,212)	p	Adjusted odds ratio & 95% CI
BPI Moderate to severe pain at baseline, N=4,764	3,221 (90.7)	1,052 (86.9)	0.002	1.38 (1.12, 1.71)
BPI Moderate to severe pain 1-week, N=4,396	1,996 (60.8)	624 (56.0)	0.005	1.11 (0.96, 1.28)
BPI Moderate to severe pain 2-weeks, N=4,333	1,076 (33.1)	279 (25.8)	< 0.001	1.22 (1.04, 1.44)
BPI Moderate to severe pain 6-weeks, N=4,328	390 (12.0)	100 (9.2)	0.01	1.08 (0.84, 1.37)
BPI Moderate to severe pain 90-days, N=4,148	170 (5.5)	55 (5.2)	0.75	0.88 (0.63, 1.22)

Data are n (%) or median (IQR). IOPP = individualized opioid prescribing plan. Multivariate analyses are adjusted for advanced maternal age, parity, diabetes, hypertension, private insurance, and primary indication for cesarean delivery.

68 Prospective multicenter trial comparing balloon versus suction hemorrhage control devices for postpartum hemorrhage

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OBJECTIVE: Postpartum hemorrhage (PPH) is the leading cause of severe maternal morbidity. Two devices, balloon (Bakri) and suction (Jada), are available for treatment of PPH, but there is limited data directly comparing their efficacy against each other. The purpose of this study was to prospectively compare these two devices within a large multi-center hospital system using a standardized 3 stage PPH response algorithm.

STUDY DESIGN: PPH and use of hemorrhage control devices was assessed at 65 facilities through detailed case audits. Use of PPH control devices is recommended for stages 2 and 3 of the algorithm. Case audits included all cases of stage 3 PPH, if a PPH device was used, or there was transfusion. The primary outcomes were: 1) need for any transfusion; 2) use of ^{3} 3 units of red blood cells (pRBC); and 3) quantitative blood loss (QBL) after device placement. Other variables assessed were length of stay (LOS), mode of delivery, admission Hct, abnormal DIC labs (INR, platelets, and fibrinogen), use of tranexamic acid (TXA), and discharge Hct. Data was analyzed using t-test and z-ratios.

RESULTS: During the 11-month observation period there was 80,049 deliveries and PHH occurred in 3,894 (4.9%). PPH control devices (Bakri, n=183 and Jada, n=195) were used in 378 cases (10.3%). The Bakri group had a higher rate of cesarean delivery (36.1% v. 25.1%, p=0.02), rate of abnormal DIC panel (29.2% v. 16.8%, p<

0.01), and a higher QBL at time of device placement (1729 v 1538 ml, p=0.01). There was no difference between devices for Hct at admission, use of TXA, QBL after device placement, rate of transfusion, the number requiring ³ 3 units of pRBC, or discharge Hct, Table 1.

CONCLUSION: Despite higher QBL at placement, abnormal DIC labs, and the rate of cesarean section in the Bakri group both devices were equally effective with regards to mitigating transfusion requirements and blood loss after device placement. With similar efficacy when used as part of a standardized PPH response other factors, such as cost of the device, availability and ease of use, will need to be considered.

	Bakri	Jada	p-value
Length of stay (days)	3.3	3.2	0.56
Admission Hct	34.1	34.9	0.18
Cesarean Delivery	36.1%	25.1%	0.02
Abnormal DIC labs	28.4%	16.4%	0.005
TXA use	83.1%	86.2%	0.4
QBL at device placement (ml)	1729	1537	0.01
QBL after device placement (ml)	418	435	0.82
Received transfusion	56.3%	51.3%	0.33
Received ≥ 3pRBC	27.3%	25.6%	0.71
Discharge Hct	27.0	27.3	0.84

69 Derivation and validation of an intrapartum algorithm to predict postpartum hemorrhage risk using photoplethysmography data

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OBJECTIVE: Postpartum hemorrhage (PPH) is the leading cause of maternal mortality. Uterine atony accounts for most PPH, where myometrial fatigue is a significant and unobservable indictor.

OBJECTIVE: The primary aim was to develop an algorithm using non-invasive photoplethysmography (PPG) data to provide intrapartum decision support indicating subjects at high-risk of requiring postpartum nonprophylactic intervention for hemorrhage. The algorithm was designed using machine learning, with the goal to constrain the learning process such that the resulting model targets myometrial fatigue for predicting need for PPH intervention.

STUDY DESIGN: This study was a primary, prospective, observational study at a single academic hospital. Patients with a live, term singleton pregnancy were eligible upon admission for a non-planned cesarean. A wearable PPG device was placed on the participant's wrist from active labor through 24 hours postpartum and collected data at 5Hz.The algorithm was designed to recognize PPG waveform signatures that corresponded to specific variations in heart rate timing modeled to correlate with myometrium fatigue. Since myometrial fatigue was not observable, administration ofnonprophylactic uterotonic was recorded as a reference standard. Admission PPH risk score was recorded for each subject as a baseline.

RESULTS: PPG data was obtained from 403 participants. Subjects receiving nonprophylactic postpartum uterotonics were labeled as case subjects (190). Subjects were randomly divided into 202 training subjects (87 cases) for designing the algorithm and 201 test subjects (103 cases). Test subject evaluations demonstrated the system could predict PPH intervention 1-6 hours before delivery with a >2.5x improvement in sensitivity (40% vs. 15%) compared to PPH risk score, with no decrease in positive predictive value.

CONCLUSION: Elevated risk for PPH intervention was identified 1 to 6 hours ahead of delivery with significantly higher sensitivity than admission PPH risk scores. Advanced warning for PPH would allow time to mobilize resources for appropriate and timely treatment.

70 Management Approaches for Placenta Accreta Spectrum – Not a one size fits all approach

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OBJECTIVE: The incidence of placenta accreta spectrum (PAS) has increased, and it causes substantial morbidity and mortality. Cesarean hysterectomy is the standard treatment for PAS in the United States, however it frequently leads to major morbidity. At our center we offer three approaches to manage PAS, and the objective of this study was to compare maternal outcomes as a result of these different management strategies.

STUDY DESIGN: Prospective cohort study at a Level IV academic center (January 2020 to July 2023) of individuals with ultrasound suspected PAS that had three different planned PAS management approaches:1. Cesarean hysterectomy (CH), 2. Delayed Interval hysterectomy (hysterectomy performed 4-5 weeks after delivery) (DH) 3. Conservative Management (no planned hysterectomy) (CM). The data was analyzed according to planned management protocol. As an alternative option to CH, CM was offered starting in 2020 and DH as of 2022. The primary outcome was composite acute morbidity (within 24 hours from cesarean delivery or hysterectomy) and composite delayed morbidity (>24 hours postoperative).

RESULTS: A total of 60 individuals had ultrasound suspected PAS, management planned was: CH for 29 (48%), DH for 16 (27%), CM for 15 (25%). There were no differences in baseline maternal characteristics between the groups (age, race, BMI, chronic hypertension, diabetes mellitus). The type of PAS by ultrasound and placental pathology was similar between all groups, although there was a trend towards more placenta increta and percreta in the DH and CM groups (Table).The planned procedure was performed in 26/29 (90%) CH group, 13/16 (81%) DH group, 4/15 (27%) CM group (3/15 in CM group had a delayed hysterectomy due to patient request). DH and CM groups were less likely to require a blood transfusion, and had significantly less composite acute morbidity. The composite postoperative morbidity was similar between the three groups (Table).

CONCLUSION: Our results suggest that delayed hysterectomy and conservative management can be considered as viable approaches for management of PAS.

Table. Baseline Characteristics and Maternal Outcomes stratified by PAS management strategy

	Planned Cesarean Hysterectomy N=29[1]	Planned Interval Hysterectomy N=16[1]	Planned Conservative Management N=15[1]	p-value
Type of MAP by Ultrasound				
Accreta	27 (93%)	11 (69%)	12 (80%)	
Increta	1 (3%)	3 (19%)	1 (7%)	0.25
Percreta	1 (3%)	2 (13%)	2 (13%)	
Pathology Diagnosis				
No MAP	5 (17%)	0 (0%)	1 (7%)	
Accreta	14 (48%)	8 (50%)	3 (23%)	0.37
Increta	8 (28%)	5 (31%)	5 (38%)	
Percreta	2 (7%)	3 (19%)	2 (15%)	
No pathology specimen	N/A	N/A	4 (27%)	
Gestational age at delivery	33.2 (2.3)	32.8 (2.4)	33.7 (1.9)	0.55
Indication for delivery				
Planned	20 (69%)	14 (88%)	9 (60%)	
Bleeding	5 (17%)	1 (6%)	1 (7%)	0.45
Labor	1 (3%)	1 (6%)	3 (20%)	
Maternal	2 (7%)	0 (0%)	1 (7%)	
Fetal	1 (3%)	0 (0%)	1 (7%)	
Procedure performed				
Cesarean Hysterectomy	26 (90%)	3 (18%)	1 (7%)	
Interval Hysterectomy	0 (0%)	13 (81%)	8 (53%)	<0.001
Conservative Management	0 (0%)	0 (0%)	4 (27%)	
Placenta spontaneously delivered at Cesarean Delivery	3 (10%)	0 (0%)	2 (13%)	
Blood transfusion	25 (86%)	12 (75%)	7 (50%)	**0.04**
Received ≥ 4 Units PRBC	16 (55%)	9 (56%)	4 (27%)	0.15
Estimated Total Blood loss (Cesarean section and hysterectomy)	2648 (1170)	2540 (1451)	2597 (3152)	0.98
Need for unplanned readmission	2 (7%)	4 (25%)	4 (27%)	0.16
Latency from delivery discharge to hysterectomy (days)	N/A	28.2 (4.5)	62.0 (59.7)	0.07
Composite Acute Morbidity*	25 (86%)	8 (50%)	8 (53%)	**0.02**
Composite Delayed Morbidity**	2 (7%)	4 (25%)	1 (7%)	0.15
	[1]n (%); Median (IQR)			

*Composite Acute Morbidity: lower genitourinary injury, large bowel injury, cardiac arrest, transfusion, ICU admission
**Composite Delayed Morbidity: bleeding, UTI, pneumonia, ileus, wound infection, operating room take back, venous thromboembolism

71 Reoperation following cesarean delivery: an analysis of incidence, indications, and procedures using a national database

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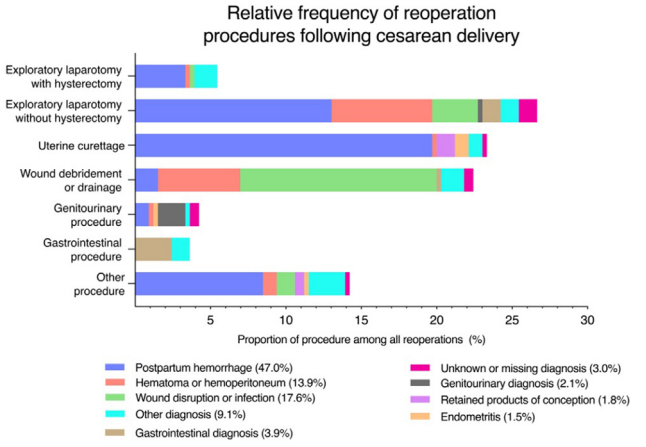
OBJECTIVE: Prior studies have described reoperation rates after cesarean birth (CB) but primarily focus on relaparotomy and were conducted at single centers. The types of procedures and indications for reoperation in a more generalizable population remains unclear. Our objective was to determine the incidence of reoperation after uncomplicated CB, describe the types of procedures and indications for reoperation, and identify risk factors associated with reoperation using the National Surgical Quality Improvement Program (NSQIP) database.

STUDY DESIGN: The NSQIP database was queried to identify patients who underwent CB between 2019-2021, based on International Classification of Diseases 10th Revision (ICD-10) codes. Cases involving non-gynecologic concurrent procedures or hysterectomy were excluded. Reoperations within 30 days of the CB were identified using Current Procedural Terminology (CPT) codes for the reoperation procedure and ICD-10 codes for the associated diagnosis. Patient characteristics were analyzed, and multivariable logistic regression models were used to identify risk factors associated with reoperation.

RESULTS: A total of 43,113 CB were analyzed, among which 397 (0.88%) required reoperation. Out of these, 330 (87%) reoperations were performed for indications associated with the CB. Postpartum hemorrhage was the most common diagnosis for reoperation (47%), followed by wound disruption or infection (18%), and hematoma or hemoperitoneum (14%). The main types of reoperation included exploratory laparotomy without hysterectomy (27%), uterine curettage (23%), and wound debridement and drainage (22%). In the final multivariable model, several risk factors were independently associated with a higher likelihood of reoperation: smoking (aOR 1.96, 95% CI 1.49-1.56), hypertension (aOR 1.83, 95% CI 1.27-2.62), bleeding disorders (aOR 2.11, 95% CI 1.15-3.89), ASA) class >3 (aOR 2.23, 95% CI 1.29-3.84), and concurrent myomectomy (aOR 4.39, 95% CI 1.06-18.2).

CONCLUSION: Reoperation after cesarean birth is uncommon but associated with identifiable perioperative risk factors.



72 Increased risk of postpartum hemorrhage in women with resolved low placentation: a multicenter prospective study

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OBJECTIVE: Low placentation (placenta previa and low-lying at 1-20 mm from the internal os) is a well-known risk factor for PPH when present at delivery. However, conflicting data are available on the risk of PPH in women with low-positioned placenta resolved during gestation, with evidence coming mostly from dated or retrospective research.

The aim of our study was to determine whether resolution of low placentation is associated with PPH.

STUDY DESIGN: A prospective, multicenter, 1:3 matched-control cohort study of singleton women with diagnosis of low placentation by transvaginal scan at 19- to 24-weeks. Controls were women with normally located placenta at the same time range, matched for parity.

Low placentation was defined as resolved when placenta was at > 20 mm from the internal os at transvaginal scan (cases). Early resolution was considered < 34 weeks. Exclusion criteria were persistent low placentation at birth and PAS. Enrollment occurred between 1/2021 and 6/2023.

PPH was defined as blood loss ≥ 1,000mL, severe PPH as ≥ 1,500mL.

Multivariable logistic regression was used to estimate the independent association between outcomes after controlling for confounders.

RESULTS: During the study period, 186 women with low placentation and 445 controls were enrolled. Sixty-three cases were excluded because of persistent low placentation or PAS, thus leaving 123 women for analyses. In 84 (68.3%) cases, there was early resolution of low placentation. At multivariate logistic regression, cases displayed a 3- and 5-fold increased risk of PPH and severe PPH (Table). No differences were identified in PPH rate between early and late resolved cases (16.1% vs 20.5% for PPH and 6% vs 7.7% for severe PPH). Women with resolved low placentation were more likely to be admitted for antepartum bleeding and receive 2nd line uterotonic drugs, balloon tamponade, and blood transfusions (Table).

CONCLUSION: Women with a resolved low placentation are at substantially increased risk of PPH and bleeding-related complications when compared with those who always had a normally located placenta.

Variables	Resolved N=123	Controls N=445	p-value	aOR (95% CI)
Maternal age (years)	34.0±4.8	33.4±4.8	0.185	
- >35	50 (40.7)	153 (34.4)	0.204	
Caucasian ethnicity	107 (87.0)	383 (86.1)	0.883	
Pregestational BMI (Kg/m²)	23.4±3.9	23.2±4.6	0.657	
- < 18.5	7 (5.7)	30 (6.7)	0.837	
- ≥ 30	7 (5.7)	35 (7.9)	0.559	
Chronic diseases	4 (3.3)	13 (2.9)	0.771	
Smoking in pregnancy	10 (8.1)	15 (3.4)	0.042	
First pregnancy	43 (35.0)	169 (38.0)	0.599	
Nulliparity	72 (58.5)	246 (55.3)	0.540	
Parity ≥ 3	3 (2.4)	19 (4.3)	0.439	
Prior uterine surgery	29 (23.6)	94 (21.1)	0.539	
- Cesarean section	8 (27.6)	42 (44.7)	0.131	
- D&C	20 (69.0)	46 (49.5)	0.088	
- Myomectomy	4 (13.8)	3 (3.2)	0.053	
Myomas	4 (3.3)	10 (2.2)	0.516	
ART-induced conception	9 (7.3)	23 (5.2)	0.378	
Low-lying placenta at enrollment	83 (67.5)			
Posterior placenta	86 (69.9)	208 (46.7)	<0.001	
Placental morphology anomalies	5 (4.1)	4 (0.9)	0.026	
Antepartum hospital admission for bleeding	8 (6.5)	0	<0.001	
HDP	2 (1.6)	14 (3.1)	0.542	
GDM	20 (16.3)	72 (16.2)	1.000	
Dysthyroidisms	19 (15.4)	45 (10.1)	0.108	
Admitted to labor	116 (94.3)	406 (91.2)	0.351	
Induction of labor	46 (37.4)	121 (27.2)	0.033	
Labor	109 (88.6)	385 (86.5)	0.650	
Cesarean section	22 (17.9)	75 (16.9)	0.787	
- For bleeding	1 (4.5)	0	0.227	
- For fetal malpresentation	4 (18.2)	10 (13.3)	0.730	
Blood loss	552.4±462.2	364.7±262.6	<0.001	
- ≥ 1,000 mL	17 (13.8)	18 (4.0)	<0.001	3.01 # (1.12-8.09)
- ≥ 1,500 mL	8 (6.5)	5 (1.1)	0.002	5.21 # (1.29-21.11)
Manual removal of the placenta *	5 (5.0)	13 (3.5)	0.557	
Prophylactic IV oxytocin *	61 (60.4)	178 (48.1)	0.033	
Labor analgesia *	34 (33.7)	104 (28.1)	0.324	
Intrauterine balloon tamponade	5 (4.1)	2 (0.4)	0.006	
Tranexamic acid	23 (18.7)	31 (7.0)	<0.001	
2nd line uterotonic drugs	38 (30.9)	53 (11.9)	<0.001	
Blood transfusion	8 (6.5)	1 (0.2)	<0.001	
Secondary PPH	4 (3.3)	3 (0.7)	0.043	
Hysterectomy	1 (0.8)	0	0.217	
Preterm delivery (< 37 weeks)	5 (4.1)	20 (4.5)	1.000	
Male newborn	67 (54.5)	247 (55.5)	0.838	
Birthweight	3286.9±435.8	3275.3±443.2	0.397	

Placental morphology anomalies include bilobate placenta and succenturiate placenta.

* Only for women with vaginal delivery (n=101 resolved and n=370 controls).

2nd line uterotonic drugs include sulprostone, carboprost tromethamine, methylergometrine, misoprostol.

#Adjusted for smoking in pregnancy, posterior placenta, placental morphology anomalies, antepartum admission for bleeding, labor induction, prophylactic IV oxytocin.

73 Endocannabinoids and Related Lipids are Associated with Postoperative Opioid Use in Patients Undergoing Cesarean Delivery

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OBJECTIVE: Endocannabinoids (EC) are endogenous cannabinoid receptor agonists that modulate pain and are potential targets for opioid-sparing therapies. We evaluated whether levels of EC and related lipids (structurally related non-EC lipids) in cerebral spinal fluid (CSF) and plasma predict outpatient postoperative opioid use and pain after cesarean delivery.

STUDY DESIGN: Between 2021-2022, we enrolled pregnant patients without opioid use disorder or chronic pain and collected plasma and CSF at the time of scheduled cesarean delivery under regional anesthesia. Preoperatively, EC levels in plasma (2-AG, AEA) and CSF (2-AG), and plasma related lipids (OG, OEA) were measured. All patients received the same opioid prescription at discharge and completed surveys 2 weeks post-delivery reporting number of outpatient opioid tablets used, duration of use, and pain, which was assessed using the McGill Pain Questionnaire (MPQ-2) . We evaluated associations between EC and related lipid levels and outpatient opioid tablets used (primary outcome), duration of outpatient opioid use, and postoperative pain at 2 weeks. Linear regression was used to examine these associations controlling for maternal age, body mass index (BMI) at delivery, and race.

RESULTS: Complete follow up data were available for 136 patients – mean age 31.1 years (SD 5.3), mean BMI 34.4 kg/m^2 (SD 8.6), 27.1% publicly insured, and 77.6% non-Hispanic white. Of the five EC and related lipids studied, three were associated with decreased opioid use after discharge (CSF 2-AG and plasma 2-AG and OG). Higher CSF levels of 2-AG were also associated with decreased duration of outpatient opioid use. No EC or related lipids were associated with measures of postoperative pain intensity (Table).

CONCLUSION: Higher endogenous EC may be associated with reduced outpatient opioid use but not pain after cesarean delivery. These data enhance understanding of mechanisms underlying differential opioid requirements and risk for opioid-related adverse sequelae and could be potential targets for opioid-sparing therapeutics.

Table. Association between endocannabinoid levels and postoperative opioid use and pain

Postoperative Follow-Up Measure	Beta	Standard Error	p-value
Post-discharge opioid use			
Number of Opioid Tabs Used			
CSF 2-AG	-0.106	0.028	**<.001**
Plasma 2-AG	-0.669	0.145	**<.001**
Plasma AEA	0.174	0.127	0.173
Plasma OG (lipid)	-0.403	0.089	**<.001**
Plasma OEA (lipid)	-0.151	0.138	0.271
Number of Days Opioids Used			
CSF 2-AG	-0.098	0.039	**0.012**
Plasma 2-AG	-0.050	0.190	0.794
Plasma AEA	0.081	0.171	0.637
Plasma OG	-0.109	0.117	0.349
Plasma OEA	-0.135	0.184	0.464
Pain Measures[*]			
MPQ-2 Continuous			
CSF 2-AG	-0.078	0.160	0.627
Plasma 2-AG	-0.728	0.779	0.352
Plasma AEA	0.171	0.718	0.812
Plasma OG	-0.782	0.472	0.100
Plasma OEA	0.072	0.764	0.925
MPQ-2 Intermittent			
CSF 2-AG	-0.067	0.191	0.727
Plasma 2-AG	-1.225	0.905	0.178
Plasma AEA	-0.386	0.833	0.544
Plasma OG			
Plasma OEA	-0.406	0.889	0.648
MPQ-2 Neuropathic			
CSF 2-AG	-0.004	0.128	0.973
Plasma 2-AG	-0.575	0.613	0.350
Plasma AEA	-0.337	0.561	0.548
Plasma OG	-0.329	0.373	0.378
Plasma OEA	-0.191	0.599	0.751
MPQ-2 Affective			
CSF 2-AG	-0.064	0.141	0.649
Plasma 2-AG	-0.220	0.672	0.743
Plasma AEA	0.085	0.614	0.890
Plasma OG	-0.491	0.406	0.229
Plasma OEA	0.219	0.654	0.738

AEA: anandamide; EC: Endocannabinoid; MPQ-2: McGill Pain Questionnaire-2, short form; OG: oleoyl glycerol; OEA: oleoyl ethanolamine; 2-AG: 2-arachidonoylglyerol
Bold: statistically significant at p<0.05
Hierarchical linear regressions controlled for the potential confounding effects of maternal age, body mass index at delivery, and race.
[*]MPQ-2 is a validated questionnaire for measuring neuropathic and nonneuropathic pain qualities. It contains 22 items divided into 4 subscales (continuous, intermittent, neuropathic, and affective pain) to described different qualities of pain felt in the last 7 days, rated using a numeric rating scale (0 = none and 10 = worst possible).

74 Predictors of intrauterine vacuum-induced device failure in management of postpartum hemorrhage: a multicenter experience

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OBJECTIVE: A novel intrauterine vacuum-induced hemorrhage control device (Jada System) is being increasingly used in the management of postpartum hemorrhage (PPH). Our objective was to describe maternal outcomes with use of a vacuum-induced hemorrhage control device and to identify predictors of device failure.

STUDY DESIGN: Retrospective multicenter cohort study of patients who delivered at two metropolitan medical centers since introduction of a vacuum-induced hemorrhage control device. Patients were identified either using a natural language search engine, DEEP-6, and/or through institutional quality review of cases with PPH. The primary outcome was device failure, defined as need for additional surgical interventions. Univariable and multivariable logistic regression was performed to determine independent predictors of device failure. Secondary adverse maternal outcomes were also described.

RESULTS: During the study period, there were a total of 11,124 deliveries across sites and 55 (0.49%) patients received an intrauterine vacuum-induced hemorrhage control device for PPH management. Of the 55 patients, 22 (40%) had a total estimated blood loss of over 2 liters, and 12 (22%) required additional interventions, including hysterectomy (n=2), uterine artery embolization (n=7), and dilation & curettage (n=2) (Table). Patients who had device failure were more likely to have delivered via cesarean delivery (67% vs 21%, p=0.002), have abnormal placentation (25% vs 2%, p=0.007), have PPH secondary to coagulopathy (25% vs 0%, p=0.001), and were less likely to be of white race (17% vs 54%, p=0.024). After adjustment for advanced maternal age, obesity, race, and site, both cesarean delivery and abnormal placentation were associated with device failure (aOR 7.9, 95% CI 1.4-46.1 and aOR 26.8, 95% CI 1.5-484). There were 5 (9%) admissions to the intensive care unit, 2 postpartum readmissions (4%), and no maternal deaths.

CONCLUSION: Cesarean delivery and abnormal placentation were associated with need for additional interventions following use of a vacuum-induced hemorrhage control device in the management of PPH.

Table. Predictors of additional interventions following placement of vacuum-induced device for postpartum hemorrhage.

	Total (n=55)	No additional interventions (n=43)	Additional interventions[a] (n=12)	p
Maternal age ≥ 35 years	29 (52.7)	24 (55.8)	5 (41.7)	0.39
Gestational age < 37 weeks	12 (21.8)	9 (20.9)	3 (25)	0.76
BMI ≥ 30 kg/m^2	28 (51.9)	23 (53.5)	5 (41.7)	0.63
Mode of delivery				
Spontaneous vaginal	35 (63.6)	32 (74.4)	3 (25)	0.002
Operative vaginal	3 (5.5)	2 (4.7)	1 (8.3)	0.62
Cesarean	17 (30.9)	9 (20.9)	8 (66.7)	0.002
Abnormal placentation[b]	4 (7.3)	1 (2.3)	3 (25)	0.007
Retained placenta	13 (23.6)	12 (27.9)	1 (8.3)	0.16
Coagulopathy	3 (5.5)	0 (0)	3 (25)	0.001
Fibroids	6 (10.9)	4 (9.3)	2 (16.7)	0.47
Chorioamnionitis	5 (9.1)	4 (9.3)	1 (8.3)	0.92
Cervical laceration	2 (3.6)	2 (4.7)	0 (0)	0.45
Prolonged labor > 24 hours	26 (47.3)	20 (46.5)	6 (50)	0.83
EBL > 2000 mL	22 (40)	12 (27.9)	10 (83.3)	0.001
ICU admission	5 (9.1)	1 (2.3)	4 (33.3)	0.001
Readmission	2 (3.6)	2 (4.7)	0 (0)	0.45

Data are presented as n (%)
[a]Additional interventions: Hysterectomy (2), uterine artery embolization (7), exploratory laparotomy with hemoperitoneum evacuation (1), uterine compression suture placement (1), dilation and curettage (2); one patient underwent uterine artery embolization and subsequently hysterectomy
[b]Abnormal placentation: Placenta previa (2), placenta accreta spectrum (2)
BMI, body mass index; *EBL*, estimated blood loss; *ICU*, intensive care unit

Oral Concurrent Session 8

Labor & Delivery

Abstracts 75–84

WEDNESDAY
February 14, 2024
3:00 pm – 5:30 pm

MODERATOR(S)

Anjali Kaimal, MD

George Saade, MD

LABOR & DELIVERY

Abstracts 75-84

75 A contemporary assessment of uterine contractility in labor: what is adequate?

Nandini Raghuraman[1], Candice Woolfolk[1], Nicole McCandless[1], Brianna Bradley[1], Jeannie C. Kelly[2], Ebony B. Carter[2], Anthony O. Odibo[1], Antonina I. Frolova[1]
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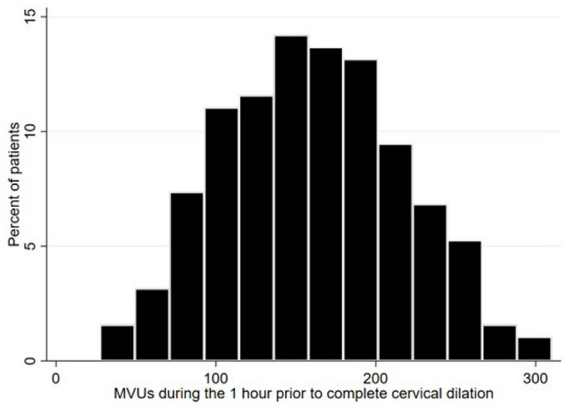
OBJECTIVE: Labor arrest disorders account for over a third of cesarean deliveries. The diagnosis of arrest requires assessment of contraction adequacy, defined in national guidelines as a minimum of 200 Montevideo units (MVU) in the active phase. This MVU cutoff is derived from a historic cohort of 109 patients in the 1980s. We re-assessed uterine contractility measures in a contemporary cohort of patients with universal intrauterine pressure catheter (IUPC) placement.

STUDY DESIGN: This was a prospective cohort study of singleton pregnancies ≥37 weeks gestation admitted in spontaneous labor or for induction of labor. All enrolled patients had IUPCs placed at time of amniotomy regardless of preceding labor pattern. For this analysis, we only included patients who had a vaginal delivery. Contraction data were collected by obstetric nurses blinded to outcomes in ten-minute epochs and averaged over 1 hour. MVUs in the 1 hour before 10 centimeters (cm) dilation were assessed to best represent MVU requirements in the active phase of labor.

RESULTS: Of 224 enrolled patients, 190 (84.8%) had a vaginal delivery and IUPC data within 1 hour of 10cm dilation, and were included in this analysis. 170 (89.5%) underwent IOL, 93 (49%) were nulliparas, and 178 (93.7%) received oxytocin. Among those with vaginal deliveries, the median [5th, 95th percentile] MVU was 163 [63, 260]. Using current definitions of adequacy, 7.4% of patients were adequate for all 60 minutes prior to complete dilation and 50% of patients were never adequate in the 60 minutes before 10 cm dilation. Nulliparous patients had a lower median MVU compared to multiparous patients (145.8 [105.8, 188.3] vs 171.7 [128.3, 213.0], P< 0.01).

CONCLUSION: In this contemporary prospective study with universal IUPC placement not subject to selection bias, there is a wide range of MVUs among patients with successful vaginal deliveries. 50% of patients with vaginal deliveries do not achieve 200 MVUs prior to complete dilation. MVU may be a poor marker of adequacy. If MVUs remain the standard, parity-based stratification of adequacy should be considered.

Figure: Histogram of Montevideo units (MVUs) in the 1 hour prior to 10 centimeters dilation among those with vaginal deliveries



76 Multi-Country Trial of Intrapartum Oral Azithromycin: Cultures of Neonatal Infections

Alan T. Tita
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OBJECTIVE: An intrapartum oral dose of azithromycin (AZI) reduced maternal but not neonatal/fetal death or sepsis. Herein, we compare the frequency of neonatal cultures, organisms and antimicrobial resistance from neonatal infections by AZI vs. placebo groups.

STUDY DESIGN: Ancillary study of the NICHD A-PLUS trial in which women in labor, ≥28 weeks' and planning vaginal birth were randomized to 2g AZI vs. placebo at 8 sites in 7 low- and middle-income countries (LMICs). Culture specimens from suspected newborn infections including sepsis (blood), meningitis (cerebrospinal fluid, CSF), umbilical stump, eye or skin infections (free pus) were evaluated using standard of care clinical microbiological procedures with the addition of AZI susceptibility testing.

RESULTS: Of 29,278 women (29,354 fetuses) randomized, 14,628 had AZI vs. 14,726 placebo. The AZI group was not associated with frequency of neonatal cultures (any source), culture positivity or AZI resistance among those randomized nor with actual neonatal cultures (Table 1A). The most prevalent neonatal pathogens (Table 1B) were gram positive-cocci (GPCs - S. aureus and MRSA) followed by gram-negative rods (GNRs - E. coli, K. pneumonia and Acinetobacter species). The findings were similar when specimens were limited to blood and CSF only.

CONCLUSION: A single intrapartum oral dose of AZI was not associated with the frequency of cultures, culture-positivity or baseline AZI resistance in LMICs. The organisms identified were predominantly expected gram-positive cocci and gram-negative rods with overall AZI resistance of ranging from 60-90%.

Table 1. Neonatal Clinical Cultures, Organisms and AZI Resistance by Group

A	Azithromycin	Placebo	RR (95% CI)	Total
Women randomized, n	14,628	14,726		29,354
Cultured, n/N (%)	806/14,628 (5.5)	844/14,726 (5.7)	0.97 (0.88, 1.07)	1,650/29,354 (5.6)
≥1 + culture (% randomized)	228/14,628 (1.6)	244/14,726 (1.7)	0.94 (0.79, 1.13)	472/29,354 (1.6)
≥1 + culture (% cultured)	228/803 (28.4)	244/844 (28.9)	0.96 (0.80, 1.15)	472/1,647 (28.7)
≥1 organism tested for AZI susceptibility, n/N (%)	99/228 (43.4)	100/244 (41.0)	n/a	199/472 (42.2)
≥1 AZI resistant org (% randomized)	71/14,628 (0.5)	64/14,726 (0.4)	1.12 (0.80, 1.56)	135/29,354 (0.5)
≥1 AZI resistant org (% tested)	71/99 (71.7)	64/100 (64.0)	1.12 (0.80, 1.58)	135/199 (67.8)

B	Azithromycin			Placebo			Total		
	Cultured n	Tested n (%)	Resistant n (%)	Cult. n	Tested n (%)	Resistant n (%)	Cult. n	Tested n (%)	Resistant n (%)
Any organisms	243	106 (43.6)	78 (73.6)	267	102 (38.2)	65 (63.7)	510	208 (40.8)	143 (68.8)
Gram Positive Cocci	155	72 (46.5)	57 (79.2)	178	77 (43.3)	49 (63.6)	333	149 (44.7)	106 (71.1)
Staphylococcus aureus	68	33 (48.5)	24 (72.7)	87	38 (43.7)	17 (44.7)	155	71 (45.8)	41 (57.7)
MRSA	14	10 (71.4)	9 (90.0)	18	11 (61.1)	9 (81.8)	32	21 (65.6)	18 (85.7)
Gram Negative Bacilli	81	31 (38.3)	20 (64.5)	84	24 (28.6)	15 (62.5)	165	55 (33.3)	35 (63.6)
Escherichia coli	20	15 (75.0)	9 (60.0)	14	7 (50.0)	5 (71.4)	34	22 (64.7)	14 (63.6)
Klebsiella pneumoniae	16	5 (31.3)	5 (100.0)	19	6 (31.6)	5 (83.3)	35	11 (31.4)	10 (90.9)
Acinetobacter species	10	0 (0.0)	0 (0.0)	12	1 (8.3)	0 (0.0)	22	1 (4.5)	0 (0.0)

77 Early or late Amniotomy Following Extra-Amniotic-Balloon Cervical Ripening: a Multicenter Randomized Controlled Trail

Atara De Porto[1], Elad proiss[1], Rina Hagege[2], Sarit Tetro[1], Yosef Tovbin[1], Eran Barzilay[3], Enav Yefet[4], Natalia Seledets[5], Dana Vitner[6], Hadar Rosen[7], Eran Weiner[8], Yael Ganor Paz[9]

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OBJECTIVE: Extra amniotic balloon (EAB) is a widespread mechanical method for cervical ripening. Following EAB the clinician may choose the method for induction of labor - either artificial rupture of membranes or oxytocin infusion, delaying amniotomy to a later stage of labor. We aimed to examine the effectiveness of early versus late amniotomy following balloon cervical ripening for labor induction at term.

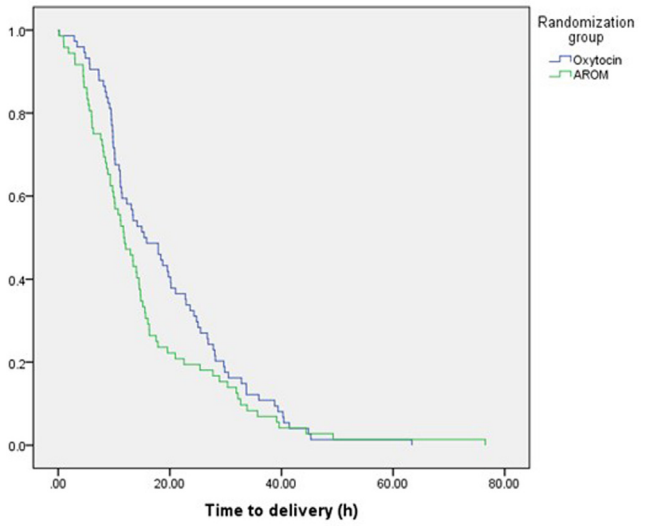
STUDY DESIGN: A prospective, multi center randomized controlled trial included patients underwent labor induction , using an EAB for cervical ripening. Patients were randomly assigned to two groups based on the primary intervention: Early amniotomy group, in which amniotomy was performed as the primary intervention. Oxytocin infusion was begun no earlier than 2 hours following amniotomy. For the late amniotomy group oxytocin infusion was begun as per local protocol. Amniotomy was performed no earlier than 2 hours following commence of oxytocin infusion.

Included were patients at 37-42 weeks gestational age, singleton pregnancy, vertex presentation and medical indication for labor induction. Exclusion criteria included multiple pregnancies, preterm pregnancy, previous cesarean section and uterine malformation.

Primary outcome was interval from primary intervention to delivery. Secondary outcomes were intrapartum and neonatal fever.

RESULTS: Of 146 eligible patients, 72 had early amniotomy as primary intervention and 72 had oxytocin infusion. There was no significant difference between groups in the rate of primiparous patients, achieved Bishop score , or management not by intention to treat. Time to delivery was significantly shorter among patients in the early amniotomy group (15.6 hours (range 9.8-26.9) VS 11.8 hours (range 7-17.7), P=0.025). This difference was significant for intervention to delivery interval above 18 hours, but not longer then 24 hours (Figure). There was no difference in the rate of intrapartum or neonatal fever.

CONCLUSION: After EAB ripening, opting for an early rupture of membranes to induce labor enhances the likelihood of labor occurring within 24 hours of induction.



78 Foley catheter+oral misoprostol versus misoprostol for cervical ripening in nulliparous-obese women: a French multicenter RCT

Paul Guerby[1], Paul Berveiller[2], Charles Garabedian[3], Loïc SENTILHES[4], Franck Perrotin[5], Norbert Winer[6], Alexandre Vivanti[7], Céline Chauleur[8], Malik Boukerrou[9], Florent Fuchs[10], Thierry Abossolo[11], Denis Gallot[12], Marie Victoire Senat[13], Raoul Desbriere[14], Vincent Letouzey[15], Elie Azria[16], Fabrice Pierre[17], Pascale Olivier-Abbal[18], Perrine Cassan[18], Catherine Arnaud[18], Laure Devlamynck[18], Christophe Vayssiere[1]

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OBJECTIVE: Nulliparous obese women are at higher risk of cesarean delivery (CD) for failed induction of labor (IOL) and of other adverse outcomes. Our objective was to evaluate if adding Foley catheter to oral misoprostol (PGE1) reduce CD rate compared to PGE1 alone

STUDY DESIGN: Multicenter randomized controlled 2-stage group sequential design trial in nulliparous obese women (BMI $\geq$30 kg/m^2)

from June 2020 to December 2022 at 17 academic hospitals from the French Research Group (GROG). Inclusion criteria were singleton cephalic pregnancy, intact membranes, GA ≥36 wks, Bishop score ≤5. Exclusion criteria were stillbirth, major fetal anomalies, or contraindication to PGE1. Women received either a 20-Fr 60 cc Foley catheter vaginally + 25 mcg oral PGE1 every 2 hours (max 8 pills) or the same dose of oral PGE1 alone. A minimum latent phase of labor of 12 hours was requested. CD was the primary outcome (PO). Main secondary outcomes (SOs) were CD for abnormal FHR, oxytocin use during labor, and delivery < 24 h after first PGE1 intake. Sample size was 774, based on a 10% decrease between arms assuming a 40% rate in the control arm (CYTOPRO trial) with 80% power and .05 overall α. An interim efficacy/futility analysis was planned once half the women had been randomized and followed up until discharge

RESULTS: The study was stopped after the prespecified interim analysis for ethical considerations due to an unfavorable trend for the PO and the other outcomes. The efficacy analysis included 379 patients (191 in the Foley+PGE1 arm vs 188 in the control arm) and 395 in the safety analysis (190 vs 205 respectively). Baseline characteristics and indications for IOL were similar. A higher CD rate was found in the Foley+PEG1 arm (47.1% vs 42.0%, risk difference of 5.1% with 95% RCI of -10.2 to 20.4, 2-sided p=.32 [significance level of .00267]) as well as unfavorable results for the main SOs (Table) and postpartum hemorrhage ≥1l, 9.0% and 6.3% respectively. Neonatal morbidity was similar between arms

CONCLUSION: In this RCT, adding Foley catheter to oral PGE1 was not associated with decreased CD in obese nulliparous women

Table: Main secondary efficacy endpoints - ITT population

	Balloon catheter + oral misoprostol (N=191)	Oral misoprostol alone (N=188)
Occurrence of cesarean delivery because of abnormal FHR		
n / N (%)	26 / 189 (13.8)	16 / 187 (8.6)
95% CI (a)	(9.2 to 19.5)	(5.0 to 13.5)
Use of oxytocin during labor		
n / N (%)	147 / 188 (78.2)	154 / 186 (82.8)
95% CI (a)	(71.6 to 83.9)	(76.6 to 87.9)
Delivery less than 24 hours after first administration of misoprostol		
n / N (%)	53 / 185 (28.6)	33 / 187 (17.6)
95% CI (a)	(22.3 to 35.7)	(12.5 to 23.9)

Note: Missing data are excluded.
FHR = Fetal Heart Rate. CI = Confidence Interval.
(a) 95% CI, method = Clopper-Pearson (exact).

79 Evaluation of standardized management of category II tracings: Category II action plan study (CAP Study)

Alexandra G. Eller[1], Sean Esplin[2], Donna Dizon-Townson[3], Cempaka Martial[4], Erick Henry[1], Jessica Page[4], Brett D. Einerson[5], Flint Porter[6]

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OBJECTIVE: To determine the effect of system-wide implementation of and compliance with a standardized algorithm for the management of category II (cat II) FHR tracings on rates of composite neonatal morbidity associated with intrapartum hypoxia.

STUDY DESIGN: We performed a pre (Pre-I)- and post (Post-I)-implementation study following initiation of a standardized approach to management of cat II FHR tracings at 21 hospitals from a single healthcare system. The program included education/training, published algorithm with specific indications for team communication, and time frames for intervention. All singleton, nonanomalous pregnancies at > 35 wk were included. The primary outcome was a neonatal morbidity composite including unexpected admission to the NICU and at least 1 of the following: Need for cooling, art pH < 7.10, base deficit > 12, 5-min Apgar < 7, or documented HIE. Logistic regression was performed to control for GA, parity, OB complications, and race-ethnicity between Pre-I and Post-I groups and to assess the effect of compliance (defined as receiving intervention when indicated) on the composite outcome among the Post-I group alone.

RESULTS: There were 34,754 pregnancies in the Pre-I group (1/1/20-6/1/21) and 33,146 pregnancies in the Post-I group - (1/1/22-6/1/23). Table 1 compares demographics and outcomes. There were significantly fewer admissions to the NICU in the Post-I group. There was a small but significant increase in delivery by CS and operative vaginal delivery after implementation. Logistic regression confirmed the absence of significant difference in the primary outcome (aOR 1.03; CI 0.88-1.20) between the Pre-I and Post-I groups. Although compliance with the algorithm increased from 15% to 61% in the Post-I group across the study we could not confirm an association with lower rates of the composite outcome (aOR 0.79; CI 0.61-1.03).

CONCLUSION: Implementation of a standardized approach to management of cat II FHR tracing in a large healthcare system was not associated with reduced rates of the composite outcome among Pre-I and Post-I groups.

Maternal characteristic	Pre implementation		Post implementation		P value
	Count	Percentage	Count	Percentage	
Number of deliveries	34717		33133		
Maternal age, average (SD)	28.61 (5.7)	n/a	28.72 (5.7)	n/a	0.008
Nulliparous	9836	28.33%	10010	30.21%	< 0.0001
Gestational age at delivery, average (SD)	38.55 (1.4)	n/a	38.54 (1.3)		0.61
Presence of any OB complication	4977	14.34%	6129	18.50%	< 0.0001
Diabetes	2264	6.52%	2617	7.9%	< 0.0001
HTN/Pree	2387	6.88%	3054	9.22%	< 0.0001
IUGR	311	0.9%	531	1.6%	< 0.0001
Oligohydramnios	235	0.68%	204	0.62%	0.35
Polyhydramnios	239	0.69%	387	1.17%	< 0.0001
Race					
White	30792	88.69%	28534	86.12%	< 0.0001
American Indian or Alaska Native	254	0.73%	257	0.78%	0.53
Asian	784	2.26%	737	2.22%	0.8
Black or African American	430	1.24%	424	1.28%	0.65
Native Hawaiian or Pacific Islander	697	2.01%	758	2.29%	0.01
Patient Declined	689	1.98%	840	2.54%	< 0.0001
Unavailable	934	2.69%	1438	4.34%	< 0.0001
Outcomes					
Primary Composite Outcome	326	0.94%	327	0.99%	0.54
BD > 12	44	0.13%	67	0.20%	0.02
pH < 7.10	502	1.45%	678	2.05%	<0.0001
Need for cooling	29	0.08%	35	0.11%	0.42
5-minute Apgar < 7	508	1.46%	593	1.79%	0.0008
Final diagnosis HIE	33	0.1%	44	0.13%	0.18
Assisted vaginal delivery rates	1803	5.19%	1936	5.84%	0.0002
Cesarean section	7457	21.48%	7517	22.69%	0.0001
Unexpected admission to NICU/SCN	2852	8.21%	2310	6.97%	<0.0001
NICU LOS among composite outcome, average days (SD)	5.82 (6.5)	n/a	5.94 (5.9)	n/a	0.79

80 Vaginal dinoprostone versus Foley catheter for induction of labor: a randomized controlled trial

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OBJECTIVE: The effectiveness and safety of pharmacological versus mechanical agents for induction of labour (IOL) remains a matter of debate. We compared the effectiveness and safety of dinoprostone versus transcervical Foley catheter for IOL in term pregnant women with an unfavorable cervix.

STUDY DESIGN: We performed a parallel, open-label randomized controlled trial in two maternal centers in Shanghai, China. Individuals with a singleton pregnancy in cephalic presentation at term and an unfavorable cervix (Bishop score < 6) scheduled for IOL. After informed consent, participants were randomly allocated to cervical ripening with either a dinoprostone vaginal insert (10mg) or a 60cc Foley catheter for up to 24 hours. The primary outcomes were vaginal delivery rate and time to vaginal delivery. Secondary outcomes included time to delivery and composites for maternal and neonatal morbidity. A sample size of 1,836 women was planned. Analysis was done by intention-to-treat (China trial registry CTR2000038435).

RESULTS: Between October 2019 and July 2022, we randomly assigned 1,860 women to vaginal dinoprostone (n = 930) or Foley catheter (n = 930). The vaginal birth rates were 72.8% (677/930) vs. 69.9% (650/930) in vaginal dinoprostone and Foley catheter, respectively (aRR 1.04, 95% CI 0.98 to 1.10), with no difference in time to vaginal delivery. The composite poor perinatal outcomes were not significantly different between the two groups (4.5% vs. 3.8%, aRR 1.21, 95% CI 0.78 to 1.88), but more neonatal asphyxia occurred in the dinoprostone group (1.2% vs. 0.2%, aRR 5.39, 95% CI 1.22 to 23.92). Dinoprostone was less likely complicated with suspected intrapartum infection (aRR: 0.62, 95% CI 0.44-0.88) and postpartum infection (aRR: 0.38, 95% CI 0.20-0.72).

CONCLUSION: In term pregnant women with an unfavorable cervix, IOL with vaginal dinoprostone or Foley catheter has similar effectiveness. Foley catheter is safer for neonates, while it may result in a higher risk of maternal infection.

Note: Trial registration was prospectively, but due to a mistake in the trial register it is not correctly projected.

Table 1. Delivery, neonatal and maternal outcomes

	Dinoprostone (n=930)	Foley catheter (n=930)	Relative risk (95% CI)	Adjusted relative risk (95% CI) *	*p* value
Vaginal delivery	677 (72.8%)	650 (69.9%)	1.04 (0.98-1.10)	1.04 (0.98-1.10)	0.172
Indication for caesarean section					
Fetal distress	100 (10.8%)	98 (10.5%)	1.02 (0.78-1.33)	1.03 (0.79-1.33)	0.851
Failure to progress	25 (2.7%)	15 (1.6%)	1.67 (0.88-3.14)	1.67 (0.89-3.15)	0.110
Induction failure	22 (2.4%)	22 (2.4%)	1.00 (0.56-1.79)	1.00 (0.56-1.78)	0.992
Intrapartum fever	37 (4.0%)	60 (6.5%)	0.62 (0.41-0.92)	0.62 (0.42-0.92)	0.018
Maternal request	57 (6.1%)	69 (7.4%)	0.83 (0.59-1.16)	0.83 (0.59-1.16)	0.280
Other reasons	12 (1.3%)	16 (1.7%)	0.75 (0.36-1.58)	0.75 (0.36-1.58)	0.451
Time from start of induction to birth (h; median [IQR])	23.2 (18.6-37.8)	24.6 (20.1-37.3)			<0.001
Hyperstimulation, n (%)	59 (6.3%)	26 (2.8%)	2.27 (1.44-3.57)	2.29 (1.46-3.60)	<0.001
Maternal intrapartum fever					
Temperature ≥37.8°C	121 (13.0%)	146 (15.7%)	0.83 (0.66-1.04)	0.83 (0.67-1.04)	0.100
Intrapartum infection	47 (5.1%)	76 (8.2%)	0.62 (0.44-0.88)	0.62 (0.44-0.88)	0.008
Postpartum infection, n (%)	13 (1.4%)	34 (3.7%)	0.38 (0.20-0.72)	0.38 (0.20-0.72)	0.003
Postpartum haem, n (%)	14 (1.5%)	10(1.0%)	1.40 (0.62-3.14)	1.41 (0.63-3.14)	0.407

*Adjusted for parity and centers

** Calculated in the women who were in labor, 140 women in the dinoprostone group and 165 women in the Foley group were not in labor.

81 The HOME-INDUCTION Randomized Controlled Trial — Women's Opinions on Outpatient Induction of Labor

Sarah M. Nicholson[1], Orla Smith[2], Corina Oprescu[2], Eimear Wall[2], Sara El Nimr[2], Geraldine Gannon[2], Sirisha Bellamkonda[3], Ita Shanahan[4], Bernard Kennedy[2], Ronan Daly[2], Claudia Looi[2], Elena Fernandez[2], Patrick Dicker[1], Zara Molphy[1], Karen Flood[1], Fergal D. Malone[2]

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OBJECTIVE: A major challenge following the ARRIVE Trial has been how to safely accommodate increasing numbers of nulliparous patients on the Labor Ward for induction of labour (IOL). Outpatient induction at home (H-IOL) has been suggested for normal-risk women, but there is a paucity of data regarding women's experience of the process. Our objective was to perform a detailed survey of participants in the HOME INDUCTION RCT, who received either prostaglandin (Propess/Cervidil) or osmotic cervical dilator (Dilapan) to commence their induction at home.

STUDY DESIGN: Normal-risk nulliparous women were randomized at 39 weeks to outpatient cervical ripening with 12 hours of Dilapan, 24 hours of Dilapan, or 24 hours of Propess. A questionnaire was administered (in person/by post) after delivery to assess patients' experience with the process.

RESULTS: Of 271 randomized patients, 113 (41%) completed the survey, with 104 (92%) recommending H-IOL, and 96 (85%) reporting no safety concerns with induction being initiated at home. On a scale of 1-10, (with 10 representing highest discomfort on insertion), patients regarded both methods favorably, rating Dilapan insertion 3.6/10 and Propess insertion 2.8/10 (p=0.46). Patients receiving Propess were significantly more likely to experience contractions at home (58% vs 10%, p< 0.001), and return to the hospital before 24 hours had passed (53% vs 9%, p< 0.001). A total of 82/113 (73%) respondents found the overall induction process to be a positive experience, 18% were unsure, and only 10% disagreed. There were no other significant differences between groups in terms of satisfaction scores.

CONCLUSION: This RCT patient satisfaction data has confirmed that women find elective home IOL to be a positive experience, and almost all would recommend the experience to others. Our data also confirm that some negative commentary expressed about routine 39 week IOL after publication of the ARRIVE Trial, is not supported by prospectively collected data on patients' own opinions and experiences, thereby supporting outpatient initiation of IOL amongst nulliparous patients.

Yes/No questions from the HOME INDUCTION RCT Questionnaire							
Question		All (N=113)	Dilapan 24hr (N=43)	Dilapan 12hr (N=27)	Dilapan All (N=70)	Propess (N=43)	P-value#
Did you experience regular contractions at home?	Yes	32 (29%)	5 (12%)	2 (8%)	7 (10%)	25 (58%)	<0.001
	No	79 (71%)	37 (88%)	24 (92%)	61 (90%)	18 (42%)	
Did you have to return to hospital before the allocated 12 or 24hours?	Yes	29 (26%)	5 (12%)	1 (4%)	6 (9%)	23 (53%)	<0.001
	No	83 (74%)	37 (88%)	26 (96%)	63 (91%)	20 (47%)	
Were you aware that returning home for IOL was an option?	Yes	58 (54%)	25 (60%)	14 (54%)	39 (57%)	19 (49%)	0.621
	No	49 (46%)	17 (40%)	12 (46%)	29 (43%)	20 (51%)	
Would you recommend outpatient IOL to others?	Yes	98 (92%)	37 (95%)	24 (92%)	61 (94%)	37 (90%)	0.735
	No	8 (8%)	2 (5%)	2 (8%)	4 (6%)	4 (10%)	

Agree/Disagree statements from the HOME INDUCTION RCT Questionnaire				
Statement	N	Disagree	Unsure	Agree
I felt I was treated as an individual	107	3 (3%)	7 (6%)	97 (91%)
Staff always took my concerns and questions seriously	113	1 (1%)	5 (4%)	107 (95%)
Staff reassured me	113	2 (2%)	5 (4%)	106 (94%)
I felt safe going home	112	2 (2%)	3 (2%)	107 (96%)
I felt like I got more rest due to going home	113	7 (6%)	8 (7%)	98 (87%)
I felt that I was well looked after	113	7 (6%)	4 (4%)	102 (90%)
I found the overall induction process to be a positive experience	113	11 (10%)	20 (17%)	82 (73%)

P-values for Dilapan All versus Propess.

82 Obesity remains associated with cesarean delivery despite a standardized protocol for labor induction

Melissa Riegel[1], Lisa D. Levine[1], Samuel Parry[1], Celeste Durnwald[1], Rebecca F. Hamm[2]
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OBJECTIVE: Patients with obesity are at increased risk for cesarean delivery (CD), with failed induction of labor (IOL) as a leading indication. Possible explanations for differences in CD include physiologic differences and variation in provider care. We aimed to evaluate CD for patients with obesity before and after implementation of a standardized protocol for IOL. We hypothesized that if differences in CD remained after standardizing labor induction, this would support factors other than variations in care contributing to the risk, such as underlying biological factors.

STUDY DESIGN: This is a secondary analysis of a prospective cohort study conducted at 2 sites comparing 2 years before (PRE) to 2 years after (POST) implementation of an IOL protocol from 2018-2022. This analysis included term, nulliparous, singleton gestations undergoing IOL with unfavorable cervices, intact membranes, and BMI $\geq$30 kg/m^2 at delivery. The standardized IOL protocol recommended active labor management, including frequent cervical exams, amniotomy by first exam $\geq$4cm, and intervention when no cervical change was made after two hours (e.g. oxytocin and IUPC). Patients were stratified by obesity class: 30-34.9; 35-39.9; $\geq$40. The primary outcome was CD. Poisson regression with robust error variance was used to calculate adjusted relative risks (aRR).

RESULTS: 5131 patients were included (PRE: n=2480, POST: n=2651). While patients in the POST group had increased maternal age, less favorable cervical exams, differences in IOL indication, and cervical ripening agent used, there was no difference in BMI class. There were no differences in risk of CD in any obesity class from PRE to POST implementation, even when controlling for confounders (Table). There were also no differences in labor length, maternal, or neonatal morbidity in any obesity class from PRE to POST-implementation.

CONCLUSION: In this work, minimizing variation in IOL management did not impact the relationship between obesity and CD, supporting underlying physiologic explanations.

Table: CD rate for patients with obesity before and after implementation of a standardized labor induction protocol

Group (BMI Range)	PRE N(%)	POST N(%)	p-value	aRR [IQR]*
Class I Obesity (30-34.9)	243/1137(21.4)	272/1213 (22.4)	0.54	1.02 (0.86-1.21)
Class II Obesity (35-39.9)	172/697 (24.7)	181/712 (25.4)	0.75	1.02 (0.83-1.25)
Class III Obesity (≥40)	202/646 (31.3)	237/726 (32.6)	0.59	1.00 (0.83-1.21)

* Variables controlled for: modified Bishop score, maternal age, indication for IOL, starting induction agent utilized

83 Application of Tension on Transcervical Foley Catheter for Induction of Labor in Term Nulliparous Women

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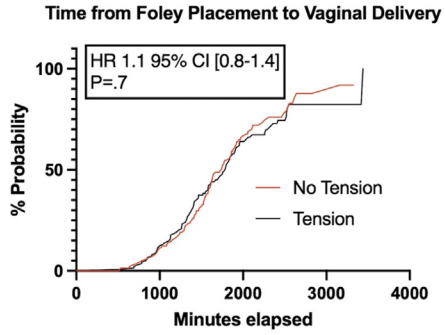
OBJECTIVE: To determine whether applying tension to the catheter decreases delivery times in term nulliparous women undergoing pre-induction cervical ripening with a transcervical Foley catheter.

STUDY DESIGN: This cluster randomized trial included nulliparous patients aged 18 to 49 years with singleton gestation presenting for labor induction with a plan for cervical ripening via transcervical Foley catheter placement. Patients with stillbirth, non-cephalic presentation, prior cesarean, or contraindications for transcervical balloon placement were excluded. Participants were assigned to either the tension or no-tension group based on randomized, weekly clusters (26 total clusters). The primary outcome was the time from initial Foley balloon insertion to delivery. Secondary outcomes included cesarean delivery rates, peripartum infections, and NICU admissions.

RESULTS: 279 subjects were enrolled (138 in the tension and 141 in the no-tension groups). Protocol adherence was 92% in the no-tension and 100% in the tension groups. The baseline characteristics were similar for both groups. In the intent-to-treat population, the median time from Foley placement to delivery was 1596 (range: 430-3438) minutes for the tension group and 1621 (range: 488-3323) minutes for the no-tension group (p=0.8). Results did not differ in the per-protocol analysis. Similar results were noted for time to vaginal delivery (Table). The Log Rank Mantel-Cox test for time to vaginal delivery after Foley balloon placement demonstrated a hazard ratio of HR 1.1; 95% CI [0.8-1.4]; p = 0.7 (Figure). No significant differences were observed in the secondary outcomes, including the incidence of primary cesarean delivery (34 % vs. 30%, p=0.7), peri-partum infections (36 % vs. 31%, p=0.6), and NICU admissions (10% vs. 10%, p=1) between the two groups

CONCLUSION: Applying tension to the catheter during pre-induction cervical ripening with a Foley in term nulliparous women does not reduce delivery times or improve outcomes. It is, therefore, appropriate to forgo tension to improve patient satisfaction and facilitate outpatient cervical ripening.



Outcomes	Intent to Treat Analysis			Per Protocol Analysis		
	Tension (n=138)	No Tension (n=141)	*P*	Tension (n=138)	No Tension (n=130)	*P*
Time Foley balloon in place (min)	720 [75-900]	725 [45-945]	0.6	720 [75-900]	725 [45-945]	0.4
Time from Foley placement to delivery (min)	1596 [430-3438]	1621 [488-3323]	0.8	1596[430-3438]	1608 [507-3323]	1
Time from Foley placement to vaginal delivery (min)	1438 [430-3438]	1542 [522-3159]	0.4	1438 [430-3438]	1542 [522-3159]	0.7

84 Increasing Number of Cervical Examinations in Labor: Does a Risk of Intrapartum Fever Actually Exist?

Chase Calvert[1], Miriam Alvarez[1], Jeny Ghartey[2], Emily Hall[1], Elaine Avshman[3], Sama Jwaied[1], Nandini Raghuraman[4], Lorie M. Harper[1], Alison G. Cahill[1]

[1]University of Texas at Austin, Dell Medical School, Austin, TX, [2]Seton Medical Center Austin, UT Austin, Dell Medical School, Austin, TX, [3]Texas A&M School of Medicine, Bryan, TX, [4]Washington University School of Medicine in St. Louis, St. Louis, MO

OBJECTIVE: Intrapartum fever is a significant contributor to maternal and neonatal morbidity. Theory persists that laboring patients who receive multiple cervical examinations are at increased risk of intrapartum fever. A prior single center study suggested that no such relationship exists once accounting for time in labor, possibly due to unique, homogeneous labor management at that center. We assessed the relationship between cervical exams and intrapartum fever among a diverse population at a tertiary center with a wide spectrum of labor management approaches by both private and university providers.

STUDY DESIGN: A retrospective cohort of singleton pregnancies delivering at ≥37 weeks over a 3yr period. Patients who developed intrapartum fever (> 38.0C) were compared to afebrile ones. Patients were included if they reached the second stage of labor. Patients were stratified into three groups of number of cervical exam by tertials. Time-to-event analyses were used to account for length of labor; Cox proportional hazard models adjusted for induction, bishop score >5 and rupture of membranes.

RESULTS: Of the 3,627 patients, 160 (4.1%) developed intrapartum fever. Women who developed fever had a greater number of cervical exams (median 7, interquartile range [IQR] 5-9) compared to women without fever (median 5, IQR 4-6). However, when accounting for labor duration, the risk of fever significantly *decreased* as the number of cervical exams *increased*; women who had ≥7 exams had the lowest risk (HR 0.24, 95% CI 0.13-0.43), compared to women with 1-4 exams.

CONCLUSION: After accounting for time in labor, increasing number of cervical exams in term labor management does not increase risk of maternal fever. Misconception that increasing number of cervical exams increases the risk of febrile morbidity is most likely due to the confounding of time in labor. Our data suggest that clinically indicated cervical exams should not be avoided due to concern of fever, and that the literature should be collectively evaluated to analyze these findings with those from prior studies to assess the strength of this relationship.

Overall Final Cox Proportional Hazard Model for Intrapartum Fever

Time From Admission to Fever or Delivery		
Number of cervical exams	Hazard Ratio [HR] (95% CI)*	P-value
1-4 (n=1370)	*reference*	--
5-6 (n=1140)	0.54 (0.31 - 0.94)	0.03
= or > 7 (n=856)	0.21 (0.11 - 0.39)	<.0.01
Time from Rupture of Membranes to Fever or Delivery		
Number of cervical exams	Hazard Ratio [HR] (95% CI)*	P-value
1-4 (n=1347)	*reference*	--
5-6 (n=1110)	0.99 (0.54 - 1.81)	0.98
= or > 7 (n=848)	0.50 (0.27 - 0.95)	0.03

*Adjusted for labor induction, Bishop score >5, ROM on admission, ROM-time interaction

Oral Concurrent Session 9

Fetal, US, & Genetics

Abstracts 85–94

WEDNESDAY
February 14, 2024
3:00 pm – 5:30 pm

MODERATOR(S)

Uma Reddy, MD, MPH

Lorraine Dugoff, MD

FETAL, US, & GENETICS

Abstracts 85-94

85 Clinical Utility of Genome Sequencing in Prenatal Diagnosis

Allan Fisher[1], Jane Schuette[2], Kendall Kaufmann[2], Nicolette Sookar[2], Reena Ray Sisk[2], Christine Stanley[2]
[1]St. Louis University, St. Louis, MO, [2]Variantyx, Inc., Framingham, MA

OBJECTIVE: The diagnostic capabilities of chromosomal microarray (CMA) and exome sequencing (ES) have been described in the prenatal (PN) diagnosis arena. However, there is minimal data demonstrating the utility of genome sequencing (GS) in establishing a diagnosis for fetal anomalies identified by ultrasound. This is the first report to explore the diagnostic capability of a large PN cohort.

STUDY DESIGN: PN and POC samples with anomalies were accepted for GS and HPO terms placed after record review. Whole genome short read sequencing was performed using the Illumina DNA PCR-free sequencing NovaSeq 6000 system. Small sequence changes, all copy number variants (including *SMN1/SMN2* and UPD), mitochondrial variants, and short tandem repeats (*FMR1, AR, FXN, DMPK*) were analyzed. Maternal cell contamination analysis was performed on all specimens.

RESULTS: GS was performed on 331 fetuses over 19.5 months at a single laboratory (Variantyx, Inc. Framingham, MA). Results for 13 (3.9%) samples were deemed indeterminate due to high MCC or poor DNA quality. Of the remaining cases, 82.8% were PN and 17.2% were POC. The overall positive rate was 42.8% for Pathogenic/Likely Pathogenic, Candidate, and Uncertain disease-causative variants, consistent with the fetal phenotype. POC samples had a 28.1% positive rate whereas PN samples had a 44.3% detection rate. In the anomaly categories, hydrops, musculoskeletal, CNS, and CVS had the highest positive rates- 56.1, 53.1, 48.1, 44.0%, respectively. GS detected 20 (14.7% positives) more cases than what would be expected, technologically, by ES+CMA. Turnaround time for results was 17 days in 95% of cases received in the last 12 months.

CONCLUSION: The use of WGS in the PN arena is a new technology. Proof of concept of this technology is apparent with a potential higher diagnostic yield than ES+CMA due to more complete coverage. Turnaround time is comparable to other conventional modalities used in PN diagnosis.

86 Genome sequencing as a first-tier prenatal diagnostic test: Is it time to change?

Vaidehi Jobanputra[1], Jessica L. Giordano[2], Josie Pervola[3], Volkan Okur[1], Amanda Thomas-Wilson[1], Saurav Guha[1], Atteeq U. Rehman[1], Ashley Wilson[1], Alexandra Tinfow[3], Stephanie Galloway[2], Avinash Abhyankar[1], Vanessa Felice[1], Cecilia Esteves[1], Endre Hegedus[1], Shruti Phadke[1], Sowmya Thirumalai Srinivasa[1], Shahid Y. Khan[1], Caroline Nava[1], Qi Yan[2], Brynn Levy[3], Ronald J. Wapner[4]
[1]New York Genome Center, New York City, NY, [2]Columbia University, New York, NY, [3]Columbia University, New York, NY, [4]Columbia University Irving Medical Center, New York, NY; on behalf of the Women's Genetics Center

OBJECTIVE: Current standard of care (SOC) for routine prenatal testing includes karyotype, FISH, and/or chromosomal microarray (CMA). Exome sequencing is recommended for fetuses with ultrasound anomalies. Evidence demonstrating the utility of genome sequencing (GS) as a single prenatal diagnostic test for structural anomalies and standard indications is limited. We investigated GS as an alternative to SOC testing in a prospective blinded study.

STUDY DESIGN: 218 fetuses undergoing routine diagnostic SOC testing had GS performed; 132 with ultrasound anomalies and 86 without anomalies. Trio GS testing was performed in 98.6%. Fetuses with aneuploidy detected by FISH were excluded. SOC results were blinded to the laboratory performing GS. SOC reporting criteria followed local clinical laboratory guidelines. Reporting criteria for GS were established by a multidisciplinary team. Reportable variants include clinically significant findings related to the fetal phenotype and/or associated with a severe neonatal, pediatric, or maternal health outcome. Detection rates of reported variants were compared between testing approaches by McNemar analysis.

RESULTS: Overall yield for GS was significantly higher than that of SOC, at 23% compared to 7.3% ($p < .0001$). In anomalous cases, 31% had reportable findings by GS and 7.6% had reportable findings by SOC ($p < .0001$). 76% of findings reported by GS and 30% of findings reported by SOC were related to the fetal phenotype. In non-anomalous cases, 10.5% had reportable findings by GS and 7% had reportable findings by SOC ($p < .0001$). Overall, 4 fetuses had reportable SOC findings missed by GS (2 mosaic tetraploidy, 1 mosaic monosomy X, and 1 balanced translocation) and 47 fetuses had reportable GS findings missed by SOC (single nucleotide variants, indels, copy number variants < 300 kb, uniparental heterodisomy, and repeat expansions).

CONCLUSION: GS identifies most disorders detected by SOC testing and reveals additionally relevant genetic findings in the fetus and mother. GS has the potential to become the superior first-tier prenatal diagnostic test, replacing SOC.

Comparison of Genome Sequencing and Standard of Care (McNemar analysis)

Overall Cohort with GS and SOC (n=218) (p <0.0001)		
	Genome Sequencing	**SOC (Karyotype and/or CMA)#**
Reportable Findings*	50 (23%)	16 (7.3%)
Anomalous (n=132) (p <0.0001)		
	Genome Sequencing	**SOC (Karyotype and/or CMA)**
Reportable Findings	41 (31%)	10 (7.6%)
Non-Anomalous (n=86) (p <0.0001)		
	Genome Sequencing	**SOC (Karyotype and/or CMA)**
Reportable Findings	9 (10.5%)	6 (7.0%)

*Reportable findings = at least one reportable finding based on GS protocol or SOC clinical laboratory guidelines
#SOC = Karyotype and/or CMA: 3 patients had karyotype and no CMA (2 declined CMA due to cost and 1 sample was inadequate); 11 patients had CMA and no karyotype (2 culture failures and 9 declined karyotype)

87 Preoperative Predictors of Survival in Twin-Twin Transfusion Syndrome Undergoing Fetoscopic Laser Treatment

Henry L. Galan[1], Michael V. Zaretsky[1], Nicholas Behrendt[1], Zhaoxing Pan[2], Anthony Johnson[3], Greg Ryan[4], William Goodnight[5]

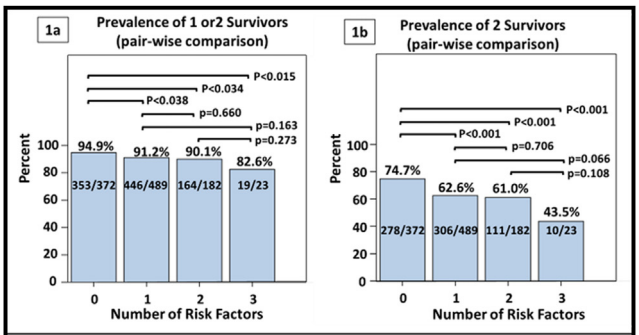
[1]University of Colorado, School of Medicine, Aurora, CO, [2]University of Colorado, School of Medicine, School of Public Health, Aurora, CO, [3]McGovern Medical School at UTHealth Houston, Houston, TX, [4]Sinai Health Center, Toronto, ON, [5]UNC Hospitals, Chapel Hill, NC; on behalf of NAFTNet

OBJECTIVE: Limited data exist regarding the influence of preoperative risk factors (PreopRF) on survival for patients undergoing fetoscopic laser photocoagulation (FLP) for twin-twin transfusion syndrome (TTTS). The objective of this study was to determine preoperative variables predictive of single and dual survival at birth for those subjects treated with FLP for TTTS.

STUDY DESIGN: TTTS pregnancies treated with FLP between 2001-2023 were identified through an international complicated monochorionic twin pregnancy registry (North American Fetal Therapy Network) containing maternal, obstetric, fetal/newborn outcomes, and multiple PreopRF (BMI, gestational age (GA) at FLP, selective fetal growth restriction (sFGR) $< 10^{th}$ and $< 3^{rd}$ percentiles, cervical length (CL) $< <$ 25 and $<$ 15mm, anterior placental location (AP), cardiomyopathy markers, and Quintero TTTS stage). Higher order multiples, fetal anomalies and karyotypic abnormalities were excluded. Predictive rates of single/dual survival based on PreopRF and uni- and multivariate regression analyses were performed with $p < 0.05$ taken as significant.

RESULTS: Of 2728 TTTS cases treated with FLP, 1066 met inclusion criteria. Sequential addition of any Preop RF progressively reduces survival of 1 or 2 twins (Figure 1a) or 2 twins (Figure 1b). Figure 1c shows progressive reduction in predicted survival rates for 1 or 2 twins or 2 twins based on individual and combinations of PreopRF. After uni- and multivariate analyses, the only Preop RF with significant reductions in survival were CL $<$ 25mm for 1 or 2 twins and AP location for 2 twins. Compared to stage I & 2 TTTS, only dual survival is reduced in stage 3 & 4 disease (OR 1.32: 1.02, 1.71; p=0.032)

CONCLUSION: In this large registry, a CL $<$ 25mm was the most predictive PreopRF reducing survival for one or both twins, while AP location was most predictive in reducing survival for both twins. As the number of PreopRF increases for a given TTTS case, there is a progressive reduction in survival. Calculated survival rates based on the presence of one or more PreopRF is useful in the counseling of patients with TTTS.



1c TTTS Survival with and without Preoperative Complications

Anterior Placenta	sFGR < 10 %ile	CL < 25 mm	GA at Laser < 18 week	1 or 2 Survivors	2 Survivors
				93.3%	77.1%
+				92.6%	66.1%
	+			93.5%	67.8%
		+		82.8%	75.6%
			+	91.1%	68.8%
+	+			92.8%	54.9%
+		+		81.2%	64.3%
+			+	90.2%	56.2%
	+	+		83.2%	66.0%
	+		+	91.3%	58.0%
		+	+	77.9%	67.1%
+	+	+		81.6%	52.9%
+	+		+	90.4%	44.5%
+		+	+	76.0%	54.1%
	+	+	+	78.3%	56.0%
+	+	+	+	76.4%	42.5%

88 An assessment of the relation between first trimester fetal cardiac function and subsequent preeclampsia

Rebecca Horgan[1], George R. Saade[1], Alfred Abuhamad[1], Erkan Kalafat[2], Elena Sinkovskaya[1]

[1]Eastern Virginia Medical School, Norfolk, VA, [2]Koc University School of Medicine, Istanbul, Istanbul

OBJECTIVE: To compare fetal first trimester right ventricular (RV) cardiac function in uncomplicated pregnancies and in pregnancies who subsequently develop preeclampsia.

STUDY DESIGN: This prospective longitudinal cohort study on the Human Placenta Project (HD 086313-01) included 610 pregnancies at $<$ 13+6 weeks' gestation without fetal, umbilical cord or placental abnormalities. At the first trimester ultrasound, the fetal RV Tei index was measured. The Tei index is a noninvasive Doppler index of combined systolic and diastolic function, calculated by isovolumic contraction time divided by ejection time. Study subjects were followed for the reminder of pregnancy and outcomes were evaluated by trained and certified research coordinators.Patients who ultimately developed preeclampsia (cases) were compared to those who had low risk pregnancies with normal outcomes (controls: aged 18-35 years, with a body mass index (BMI) $<$ 30, without existing comorbidities, who conceived spontaneously and had an uncomplicated pregnancy, with delivery $>$37 weeks' gestation). We compared fetal RV Tei index measurements on first trimester ultrasound between cases and controls.

RESULTS: Amongst the 610 included pregnancies, 60 patients (9.8%) developed preeclampsia (n=60) and 90 patients were in the control group. Mean RV Tei index in the first trimester was significantly lower in cases versus controls (0.42 vs 0.49, p=0.025). Multinominal logistic regression tests were used for statistical analysis, with $p < 0.05$ used to denote statistical significance (R for Statistical Computing v.4.2.0).

CONCLUSION: Compared with normal patients, fetuses of patients who ultimately develop preeclampsia show changes in cardiac function early in pregnancy. We speculate that this represents early fetal adaptation to the previously described utero-placental-fetal vascular perturbation that precedes preeclampsia.

89 Umbilical arteries resistance indices in the management of FGR fetuses- Only half of the story?

Misgav Rottenstreich[1], Swati Agrawal[2], Homero Flores Mendoza[1], Sarah D. McDonald[1], Bryon DeFrance[1], Jon F. Barrett[3], Eran Ashwal[4]

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OBJECTIVE: Assessing the umbilical artery pulsatility index (UA PI) through Doppler measurement is crucial in evaluating fetuses with impaired fetal growth. This study aims to examine the perinatal outcomes associated with discordant PIs of the UAs in small-for-gestational-age and fetal growth-restricted fetuses.

STUDY DESIGN: A retrospective cohort study from a major university hospital including all singleton pregnancies without fetal genetic/structural anomalies and EFW and/or AC below the 10th centile for gestational age (2017-2022). Only cases in which both UAs were concurrently sampled within 14 days from birth were considered. The study compared cases with discordant UA PI values (defined as one UA-PI $\leq$ 95th centile and the other UA-PI $>$ 95th centile for gestational age) to pregnancies where both UAs had normal PI values and those where both UAs had abnormal PI values. The primary outcome focused on the occurrence of composite adverse neonatal outcomes. Multivariable logistic regressions were conducted, adjusting for relevant covariates.

RESULTS: The study included a total of 1,014 patients, among whom 194 (19.1%) had discordant UAs PI values, 671 (66.2%) had both UAs PI within the normal range, and 149 (14.7%) had both UAs PI indicating abnormal values. Pregnancies with discordant UAs PI demonstrated a worsened fetoplacental phenotype compared to those with both UAs showing normal PI values. Similarly, those cases presented worse perinatal outcomes than those with both UAs displaying normal PI values (Table). Notably, cases with discordant UAs PI demonstrated a more benign fetoplacental status and perinatal outcomes compared to those with both abnormal UAs PI. The multivariate analysis indicated that discordant UAs PI was independently associated with composite adverse perinatal outcomes, with an aOR of 1.67 (95% CI 1.16-2.41).

CONCLUSION: Assessing the resistance indices of both umbilical arteries provide additional essential data and is useful as there was an association of adverse perinatal outcomes among SGA/FGR fetuses with discordant US PIs.

Characteristics and outcomes between cases with discordant UA PI, and those with both normal umbilical arteries pulsatility index, and between cases with both abnormal umbilical arteries pulsatility index

	Discordant UA PI n=194	Both normal UAs PI n=671	p-value[a]	Both abnormal UAs PI n=149	p-value[b]
Fetoplacental evaluation at last ultrasound					
Oligohydramnios	15 (7.9%)	100 (15.1%)	0.01	31 (21.1%)	<0.01
AC < 3rd centile	149 (76.8%)	374 (55.7%)	<0.01	110 (73.8%)	0.53
AC < 5th centile	156 (80.4%)	421 (62.7%)	<0.01	118 (79.2%)	0.78
EFW < 3rd centile	157 (80.9%)	460 (68.6%)	<0.01	126 (84.6%)	0.38
EFW < 5th centile	171 (88.1%)	524 (78.1%)	<0.01	132 (88.6%)	0.90
MCA-PI < 5th centile	38 (20.1%)	67 (15.5%)	0.16	76 (52.1%)	<0.01
DV- PI > 95th centile	3 (6.5%)	7 (9%)	0.63	13 (21.3%)	0.03
Labor and delivery outcomes					
Gestational age at delivery, week	35.7±3.2	36.6±3.2	<0.01	33.2±3.8	<0.01
Preterm birth < 37 weeks	41 (21.1%)	89 (13.3%)	0.01	68 (45.6%)	<0.01
Preterm birth < 34 week	86 (44.3%)	186 (27.7%)	<0.01	117 (78.5%)	<0.01
Antepartum fetal death	1 (0.5%)	1 (0.1%)	0.35	1 (0.7%)	0.85
Unplanned cesarean delivery	63 (32.5%)	128 (19.1%)	<0.01	69 (46.3%)	0.01
Cesarean delivery for fetal distress	39 (20.1%)	89 (13.3%)	0.02	59 (39.6%)	<0.01
Neonatal outcomes					
Composite perinatal outcomes[c]	114 (59.1%)	297 (45.4%)	<0.01	117 (78.5%)	<0.01
Birthweight, g	2302.7±756.4	2535.6±689.7	<0.01	1670.5±675.2	<0.01
5-minute Apgar < 7	16 (8.3%)	48 (7.2%)	0.59	25 (16.9%)	0.02
Arterial cord pH < 7.1	8 (4.4%)	31 (4.9%)	0.80	8 (5.9%)	0.55
NICU admission	94 (48.5%)	212 (31.6%)	<0.01	117 (78.5%)	<0.01
Need for ventilation	57 (29.4%)	166 (24.7%)	0.19	79 (53%)	<0.01
Respiratory distress syndrome	36 (18.7%)	73 (10.9%)	<0.01	58 (39.2%)	<0.01
Necrotizing enterocolitis	1 (0.5%)	2 (0.3%)	0.65	3 (2%)	0.20
Sepsis	4 (2.1%)	9 (1.3%)	0.47	15 (10.1%)	<0.01
Intraventricular hemorrhage	0 (0%)	1 (0.1%)	0.59	0 (0%)	N/A
Prolonged Length of Stay at NICU (>72h)	86 (44.3%)	180 (26.8%)	<0.01	99 (66.4%)	<0.01
Neonatal Death	0 (0%)	2 (0.3%)	0.45	0 (0%)	N/A

[a] comparison between the discordant UAs PI group and the normal UAs PI group
[b] comparison between the discordant UAs PI group and the abnormal UAs PI group
c Composite perinatal outcome included any of the following: antenatal fetal death, cesarean section due to Non-reassuring fetal heart rate, prolonged NICU admission (> 72 hours), 5-minute Apgar < 7, arterial cord pH <7.1, mechanical ventilation, respiratory Distress Syndrome, necrotizing enterocolitis, intracranial hemorrhage, sepsis, neonatal death
AC – abdominal circumference; BPP – biophysical profile; DV – ductus venosus; EFW – estimated fetal weight; MCA – middle cerebral artery; PI – pulsatility index; UA – umbilical artery

90 Three-dimensional fetal body composition and organ volumes in pregnancies complicated by gestational diabetes mellitus

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OBJECTIVE: Gestational diabetes mellitus (GDM) complicates 6-8% of pregnancies and increases the risk of fetal overgrowth and development of obesity and type 2 diabetes in offspring. Two-dimensional (2D) ultrasound measures of abdominal circumference and fat thickness are greater in fetuses of women with GDM. Three-dimensional (3D) ultrasound, however, provides superior capability in characterizing lean and fat mass and can also measure limb and organ volumes, potentially making it more appropriate for identifying fetal growth abnormalities linked to maternal hyperglycemia. Therefore, we evaluated longitudinal 3D fetal body composition, limb, and organ volumes among normoglycemic women and women who developed GDM, enrolled in a diverse, prospective US pregnancy cohort.

STUDY DESIGN: In the NICHD Fetal 3D Study, fetal body composition and organ volumes were measured in up to five 3D ultrasounds from 15 to 40 weeks by certified sonographers. Women were identified as having GDM (n=130, 6%) or normal glucose tolerance (NGT, n=2,205) using standard diagnostic criteria. Trajectories of 3D fetal measures were modeled using linear mixed effect models. Overall and weekly mean differences in fetal growth were tested by glycemic status, adjusted for covariates including maternal age and body mass index.

RESULTS: Fetuses of women who developed GDM, versus NGT, had larger fractional arm and fractional fat arm volumes on average starting at 27 through 35 weeks, reaching statistical significance at 30-31 and 29-31 weeks, respectively, and larger abdominal area starting at 28 weeks, continuing through the end of gestation (Table). No overall differences were observed among the thigh or organ volumes.

CONCLUSION: Fetal body composition differed in fetuses of women who developed GDM, including larger arm volumes manifested by increases in fat volume. Additional investigation is needed to explore how interventions to treat GDM, including lifestyle and medication, may alter the trajectory of fetal fat accumulation in GDM pregnancies.

Table. Summary of overall and weekly comparisons of fetal 3D body composition and organ volumes across maternal glycemic status; NICHD Fetal 3D Study.

	Global Comparison	Weekly Comparisons	
Outcome	Adjusted p-value	GDM vs. NGT Gestational Weeks	Direction of Assocation
Body Composition			
Fractional arm volume, cm^3	**0.00002**	30-31	Larger
Fractional lean arm volume, cm^3	**0.00002**	17-21	Smaller
Fractional fat arm volume, cm^3	**0.03**	29-31	Larger
Maximum arm SCTT, cm	0.54	-	-
Abdominal area, mm^2	**0.0001**	28-34, 39-40	Larger
Maximum abdominal SCTT, mm	**0.01**	34-36	Larger
Fractional thigh volume, cm^3	0.63	-	-
Fractional lean thigh volume, cm^3	0.48	-	-
Fractional fat thigh volume, cm^3	0.92	-	-
Maximum thigh SCTT, cm	0.12	22-25	Smaller
Organ Volumes			
Cerebellar volume, cm^3	0.65	-	-
Average lung volume, cm^3	0.38	27	Smaller
Average kidney volume, cm^3	0.32	-	-
Liver volume, cm^3	0.15	19-23	Smaller

GDM = gestational diabetes mellitus; NGT = normal glucose tolerance
Linear mixed models were adjusted for: maternal age, race/ethnicity, parity, pre-pregnancy BMI, education, and infant sex
Dashes indicate no gestational age for which weekly pairwise comparisons were different

91 Quantitative Vessel Assessment for Fetal Growth Restriction using 3D Ultrasound Microvessel Imaging

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OBJECTIVE: Fetal growth restriction (FGR) is managed using ultrasonography measurements including estimated fetal weight, abdominal circumference, and Doppler measurements (e.g., uterine artery flow). Ultrasound microvessel imaging could be a useful adjunct to assess abnormal placental development associated with FGR. We used 3D scanning to collect microvessel data to assess microvasculature in placentas of both normal and FGR fetuses.

STUDY DESIGN: Subjects having normal (n=13) and FGR (n=21) pregnancies were enrolled and scanned between 32-36 weeks gestation. A Verasonics Vantage 256-channel ultrasound system equipped with a GE-9L was used in this study. Realtime version of highly sensitive Doppler imaging using randomized SVD-based clutter filtering was applied to find a proper scanning location for a placental villous tree. Step-by-step scanning was performed to acquire 3D data, as illustrated in Fig. A. For the post-processing, the SVD-based clutter filtering with background noise suppression was applied to reconstruct all 2D microvessel images from different step scanning. Additionally, we created a user-interface for the physician to select the region of interest (ROI). The 3D vessel density was computed as a percentage ratio of the total vessel volume within the ROI and the total ROI volume. The 3D vessel densities of the placental microvasculature of FGR subjects were then quantified and compared to those of control groups.

RESULTS: Figure B demonstrates 1 slice of microvessel images (overlaid on the B-mode) with and without FGR, demonstrating fewer vessels in the FGR group. Quantification of vessel density detected a significant difference between the FGR and control groups, as shown in Fig C. The median value of mean vessel densities for the FGR and control groups were 8.9% and 19.1%, respectively ($p < 0.01$).

CONCLUSION: This novel ultrasound method detected significant difference in vessel density for the FGR group compared to control group. Further research is needed to determine how 3D microvessel imaging could improve the detection and management of growth restricted pregnancies.

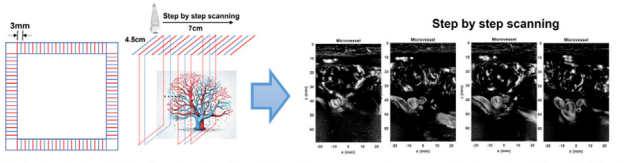

Fig. A. Step-by-step 2D imaging at each position, followed by manual probe movement to the next position guided by the rectangle marker. To cover a 3D volume of scanning, 2D imaging is repeated plane-to-plane for a certain number of planes.

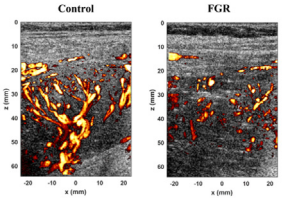

Fig. B. Microvessel images without and with FGR

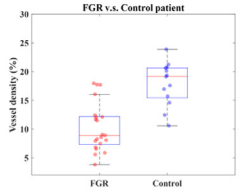

Fig. C. Vessel density of FGR (21 subjects) vs. control groups (13 subjects).

92 Functional deterioration in fetuses with spina bifida on ultrasound

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OBJECTIVE: Open spina bifida (OSB) is associated with lower limb and bladder dysfunction. We describe bladder and lower limb function over gestational age in a longitudinal cohort of OSB fetuses.

STUDY DESIGN: Prospective cross-sectional study of all fetuses with isolated OSB who had two or more ultrasound evaluation at a single center (2015-2019). Gestational age at assessment was categorized into four groups: (< 24, 25-28, 29-31, ≥32 weeks). 3D-volumes of the bladder were taken every 5-10 minutes during US examination. Volumes were measured using VOCAL method. Bladder filling and voiding was calculated and compared to control fetuses matched for gestational age (1:1). The anatomical level of the lesion was determined on ultrasound. The fetal motor functional level was determined by ultrasound based on joint movement of hip, knee, ankle and toes. Correlation between the postnatal and prenatal functional and anatomical level was calculated using weighted kappa. The presence of talipes was assessed as a prognostic factor.

RESULTS: We included 122 examinations from 69 OSB fetuses. Bladder volumes were smaller in fetuses with OSB compared to controls ($p< 0.0001$) and were correlated to gestational age, but not to the level of the lesion. Also urinary flow was lower compared to controls ($p=0.049$). Lower limb motor dysfunction was more frequent at higher gestational ages (simple linear regression: $p=0.0004$) but it was not correlated to the level of the lesion. In utero motor function was a better predictor for postnatal function than the anatomical level (weighted κ 0.33 vs 0.10 at 21-24w and 0.69 vs 0.41 after 32w) however this only became a strong prediction after 29 weeks. Lastly, the presence of talipes at 25 weeks was a negative predictive factor for postnatal motor function, decreasing the in utero motor function with 2 levels compared to the postnatal function.

CONCLUSION: In OSB, bladder volume and function changes are seen prenatally. In utero lower limb function is a good predictor of postnatal function. Conversely the presence of talipes has an adverse effect.

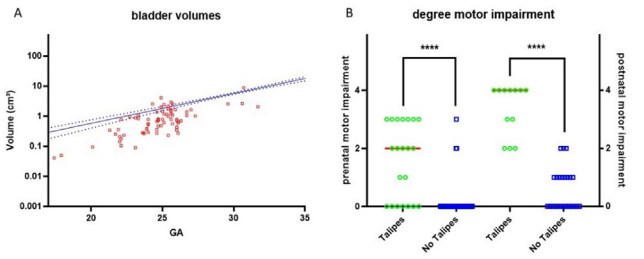

Figure: A) bladder volumes throughout gestation for fetusus with open spina bifida (red) compared to normal controls (bleu line) with 95% CI (dotted line). B) Functional motor impairment assessed prenatally on ultrasound (left) and postnatal (right) for fetuses with talipes (green) and fetuses without talipes (bleu). Red line indicates median. The median anatomic level of both groups was similar. The pre- and postnatal functional level was defined as a score as follows: toe movement or ankle plantar flexion = 0 ; ankle dorsi-flexion = 1 ; knee flexion = 2 ; knee extension = 3 ; hip movement = 4. **** indicates p<0.0001. All data are plotted as individual values.

93 Reliability of "lethal" ultrasound markers in identifying fetuses with truly life-limiting skeletal dysplasia

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OBJECTIVE: Several ultrasound markers have been proposed to identify fetuses with life-limiting skeletal dysplasia. We sought to determine their diagnostic performance in a fortified cohort.

STUDY DESIGN: A single-center retrospective chart review was conducted from 2013 to 2023 for pregnancies suspected to have a skeletal dysplasia. Fetuses were evaluated by ultrasound with attention to measurements predictive of lethality, including thoracic circumference/abdominal circumference (TC/AC) < 0.6, femur length/abdominal circumference (FL/AC) < 0.16, and thoracic circumference (TC) < 2.5%ile. Record review included demographic information, imaging, genetic testing, and fetal/neonatal outcome. Statistical analysis included Mann Whitney U and Fisher's exact tests. Calculation of sensitivity, specificity, positive predictive value, and negative predictive value was also undertaken.

RESULTS: 122 fetuses were identified with prenatal ultrasound findings consistent with a skeletal dysplasia. Of those, 34 (27.9%) had no lethal markers, 52 (42.6%) had one lethal marker, 31 (25.4%) had two lethal markers, and 5 (4.1%) had three lethal markers. Outcomes based on number of lethal markers are detailed in Table 1. 96 (78.7%) patients had complete outcome data. In those, FL/AC ratio < 0.16 and TC < 2.5%ile were associated with death or a life-limiting genetic diagnosis ($p< 0.001$; $p< 0.001$) while TC/AC < 0.6 was not ($p=0.056$) (Table 2). The positive predictive value for predicting death or a life-limiting genetic diagnosis increased from 50.0% with one lethal ultrasound marker to 76.9% with two lethal markers to 100% with three lethal markers. The negative predictive value of no lethal markers was 90.9%.

CONCLUSION: In our cohort, ultrasound markers of lethality did not necessarily portend a life-limiting postnatal diagnosis until three lethal parameters were present and absence of lethal markers did not guarantee a non-lethal dysplasia. This highlights the importance of the combination of thorough ultrasound examination, genetic testing, and balanced parental counseling.

	Alive or non-lethal genetic diagnosis n=47	Deceased or lethal genetic diagnosis n=49	p-value
Gestational age at US	27.1 [21-32]	23.3 [21-26.6]	0.072
TC/AC < 0.6	0	5 (10.2%)	0.056
FL/AC < 0.16	20 (42.6%)	41 (83.7%)	**<0.001**
TC < 2.5%ile	9 (19.1%)	29 (59.2%)	**<0.001**
Number of lethal US markers			**<0.001**
0	20 (42.6%)	2 (4%)	
1	21 (44.7%)	21 (42.9%)	
2	6 (12.8%)	21 (42.9%)	
3	0	5 (10.2%)	

Table 2: Comparison of characteristics between fetuses that are alive or have a non-lethal molecular diagnosis versus those that are deceased or have a lethal molecular diagnosis (FL/AC=femur length/abdominal circumference; TC=thoracic circumference; TC/AC=thoracic circumference/abdominal circumference; US=ultrasound)

94 Fully quantitative operator-independent numeric cervical softening device: Cervical softening rate associated with mode of delivery

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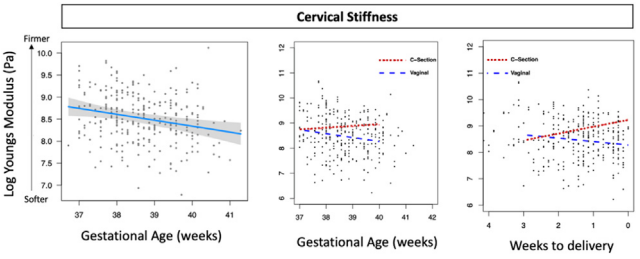
OBJECTIVE: To utilize a novel, fully quantitative cervical elastography system (FQ-CES) to numerically measure cervical stiffness at term to predict mode of delivery.

STUDY DESIGN: This is a prospective longitudinal cohort study of pregnant patients who underwent FQ-CES starting 37 weeks and weekly thereafter until delivery occurred. We invented FQ-CES, which modifies a transvaginal ultrasound probe to quantify both pressure applied and tissue deformation, thereby yielding a fully quantified strain-based elastography system that provides a numeric quantification (Young's modulus) of cervical tissue stiffness. This system is operator independent and can be compared across patients and within patients over time. Singleton pregnancies at 37 weeks

awaiting spontaneous labor and vaginal delivery were enrolled and had FQ-CES measured weekly until delivery occurred. Patients remained enrolled regardless of their eventual timing or indications for delivery. Young's modulus was log transformed to achieve normality of distribution (logYM). Cervical tissue logYM from FQ-CES and CL were analyzed over pregnancy using linear mixed effect models.

RESULTS: A total of 122 patients were included, 109 vaginal births and 12 cesarean births. Cervical tissue stiffness (logYM) decreased from 37 weeks until delivery at a rate of 13% per week (P=0.005). In patients with eventual vaginal birth the softening rate is 15% per week (P=0.001) whereas those with cesarean birth did not soften. The trend lines for rate of softening significantly differed (P=0.02) by eventual mode of delivery.

CONCLUSION: FQ-CES detects different cervical softening patterns at term associated with eventual mode of delivery, which may provide opportunity to define normal and abnormal cervical remodeling ahead of birth.



Abstracts 95-369

95 Application of machine learning in the detection of four chamber abnormalities

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OBJECTIVE: Identification of the normal cardiac landmarks excludes major cardiac defects. Congenital heart defects (CHD) often go undetected in low-risk settings despite having a high incidence, due to training and resource substandardization. The use of Machine learning (ML) in cardiovascular disease has been newly implemented and has the potential to overcome this limitation. We hypothesize that ML technology accurately detects normal vs. abnormal four-chamber views.

STUDY DESIGN: MobileNet is a lightweight neural network model that has an innate understanding of general visual features. We employed an architecture similar to a MobileNet pretrained on the ImageNet dataset and subsequently applied it to our previously collected fetal ultrasound scans. The characteristics of MobileNet are well-suited for small datasets, as its efficiency allows practical training even with limited data. Our data comprised 150 normal and 50 abnormal four-chamber heart views (4ChV) collected between 20-28 weeks of gestation, in patients with a median BMI of 27.9 (17.2-50.2). Normal 4ChV is defined as two equal size atria and ventricles, intact septum, different positions of the crux, and visualization of two pulmonary veins into the left atrium. This dataset was used for training and validation through a 5-fold cross-validation process. The metrics were subsequently compared to other mainstream models using F1 scores (combination of precision and recall).

RESULTS: This model demonstrates excellent proficiency in accurately interpreting normal vs. abnormal 4ChV of the fetal heart images, yielding an F1 score of 0.758±0.038 and an Area Under the Receiver Operating Characteristic curve (AUROC) of 0.884±0.032. These metrics were also higher compared to other existing mainstream ML models (Table).

CONCLUSION: Our study demonstrates the efficacy of integrating advanced deep learning, specifically the MobileNet model, into fetal echocardiography for identifying abnormal 4ChV. The model performs remarkably and offers a promising solution to enhance the clinical diagnosis of fetal cardiac defects.

Table 1: Performance Metrics of Various Deep Learning Models on Fetal Heart Abnormality Detection. AUROC: Area Under Receiver Operating Characteristic, F1: F1 Score, Accuracy: Classification Accuracy, Precision: Positive Predictive Value, Re- call: Sensitivity. Values correspond to mean and standard deviation across 5-fold cross-validation

Model:	AUROC	F1 Score
MobileNet (Pretrained on ImageNet)	0.884 ± 0.032	0.758 ± 0.038
GoogLeNet (Pretrained on ImageNet)	0.832 ± 0.070	0.709 ± 0.044
ResNet18 (Pretrained on ImageNet)	0.858 ± 0.051	0.724 ± 0.091
Baseline Convolutional Architecture	0.799 ± 0.097	0.665 ± 0.066
ResNet18 (Pretrained on US-4)	0.795 ± 0.142	0.707 ± 0.159

96 Maternal and pregnancy outcomes following management of acute appendicitis during pregnancy in the United States

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OBJECTIVE: To compare maternal and pregnancy outcomes according to management strategy for acute appendicitis during pregnancy.

STUDY DESIGN: This retrospective cohort study was conducted using data from the 2016-2019 Nationwide Readmissions Database. Pregnant patients admitted with acute appendicitis were identified and categorized based on the initial management strategy: operative management (OM) vs. non-operative management (NOM). The primary outcomes evaluated were adverse maternal and perinatal outcomes: intrauterine fetal death (IUFD), intrauterine growth restriction (IUGR), spontaneous abortion, preterm delivery, C-section, obstetric bleeding, venous thromboembolism (VTE), chorioamnionitis. Propensity score matching was used to control for confounders including maternal age, gestational age at index admission, maternal comorbidities, maternal obstetric history, multiple gestation, and appendiceal disease severity.

RESULTS: Among 2184 patients identified, 340 (15.6%) underwent NOM for acute appendicitis. At index admission, NOM patients were more likely to be in their first trimester, have Medicaid as primary insurance, and less likely to have a history of previous C-section (all $p < 0.001$). NOM patients were also less likely to have presented with complicated appendicitis. After propensity score-matched analysis, no significant differences were observed in IUFD, IUGR, spontaneous abortion, obstetric bleeding, VTE, or chorioamnionitis between the two groups. Patients who underwent OM had a higher likelihood of preterm delivery (16.0% vs. 9.0%, $p = 0.007$) and C-section (44.9% vs. 35.2%, $p < 0.011$) [Table 1]. NOM patients were more likely to have genitourinary complications during index admission, particularly pyelonephritis (7.8% vs. 0.0%, $p < 0.001$).

CONCLUSION: While operative management of appendicitis is the historical standard of care, this study suggests that there may be an increased risk of adverse maternal or perinatal outcomes with operative management.

Table 1. Clinical Outcomes at Index Admission and Delivery Readmission, in a National Sample of Pregnant Patients Admitted with Acute Appendicitis, by Management Approach in Matched Pairs.

	Non-operative Management (N=332)	Operative Management (N=332)	p-value
Outcomes at Index Hospitalization			
Length of Stay, days (IQR)	3 (2-5)	3 (2-5)	0.18
Stillbirth, n(%)	3 (0.9%)	4 (1.2%)	0.70
VTE, n(%)	3 (0.9%)	2 (0.6%)	0.65
Chorioamnionitis, n(%)	18 (5.4%)	14 (4.2%)	0.47
Neurological Complications, n(%)	0 (0.0%)	0 (0.0%)	
Cardiac Complications, n(%)	0 (0.0%)	1 (0.3%)	0.32
Pulmonary Complications, n(%)	7 (2.1%)	14 (4.2%)	0.12
Gastrointestinal Complications, n(%)	26 (7.8%)	20 (6.0%)	0.36
Genitourinary Complications, n(%)	45 (13.6%)	21 (6.3%)	**0.002**
Acute Renal Failure	4 (1.2%)	4 (1.2%)	1.00
UTI or Cystitis	29 (5.7%)	16 (4.8%)	0.60
Pyelonephritis	26 (7.8%)	0 (0.0%)	**<0.001**
Outcomes at Delivery Admission			
IUFD, n(%)	4 (1.2%)	6 (1.8%)	0.52
IUGR, n(%)	10 (3.0%)	14 (4.2%)	0.41
Spontaneous Abortion, n(%)	9 (2.7%)	12 (3.6%)	0.51
Preterm Delivery, n(%)	30 (9.0%)	53 (16.0%)	**0.007**
C-section, n(%)	117 (35.2%)	149 (44.9%)	**0.011**
Obstetric Bleeding, n(%)	28 (8.4%)	28 (8.4%)	1.00
VTE, n(%)	4 (1.2%)	2 (0.6%)	0.41
Chorioamnionitis, n(%)	26 (7.8%)	19 (5.7%)	0.28
Gestational Age at Delivery, weeks (IQR)	39 (37-39)	38 (35-39)	**<0.001**

VTE: Venous thromboembolism; UTI: Urinary tract infection; IUFD: Intrauterine Fetal Demise; IUGR: Intrauterine Growth Restriction

97 Induction of labor at 12 vs. 24-hours for prelabor rupture of membranes: a retrospective study

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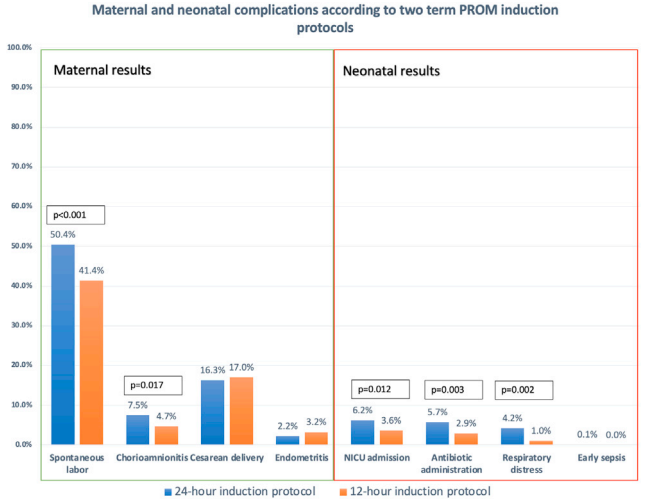
OBJECTIVE: The management of term prelabor rupture of membrane (PROM) is controversial. As spontaneous labor occurs in 60% and 95% of women at 12 and 24-h post PROM, respectively, we changed our department protocol from induction at 12 to 24-h following PROM. We aimed to investigate maternal and neonatal morbidity according to the two induction protocols.

STUDY DESIGN: This retrospective study was conducted in a single tertiary university-affiliated hospital (2020-2023). On 01 July, 2021, we extended the conservative management duration of our term PROM protocol, such as to administer oxytocin after 24 rather than 12 h. We compared the rate of chorioamnionitis between the two induction protocols, among women at term with PROM and without evidence of active labor at admission. Exclusion criteria were complications requiring prompt delivery, and multiple pregnancies.

RESULTS: Following the protocol of 24-h (n=962) versus 12-h (n=802) induction, the proportions were higher of women who labored spontaneously (50.4% vs 41.5%, p< 0.001), and who had chorioamnionitis (7.5% vs 4.7%, p=0.017); cesarean deliveries (CD) occurred similarly. Following the 24-h versus 12-h induction protocol, the rates were higher of neonatal intensive care unit admission (6.2% vs 3.6%, p=0.012), antibiotic administration (5.7% vs 2.9%, p=0.003), and respiratory distress (4.2% vs 1.0%, p=0.002) (Figure). Among women with a previous vaginal delivery, the rate of inductions was lower following the 24-h than 12-h protocol (46.5% vs 57.3%, p=0.041); maternal and neonatal outcomes were similar. Among women with a previous CD, the rates were lower following the 24-h vs. 12-h protocol, for oxytocin use (20.3% vs 43.2%, p=0.003) and CD (28.9% vs 48.6%, p=0.016).

CONCLUSION: Our results advocate shared decision-making in the management of term PROM. Women should be informed of the lower chance for induction and the higher risk of chorioamnionitis, with a 24-h induction protocol approach. Parous women and those with previous CD might benefit from longer expectant management.



98 Is subfebrile fever during prolonged ROM (>12 hours) related to infectious outcomes?

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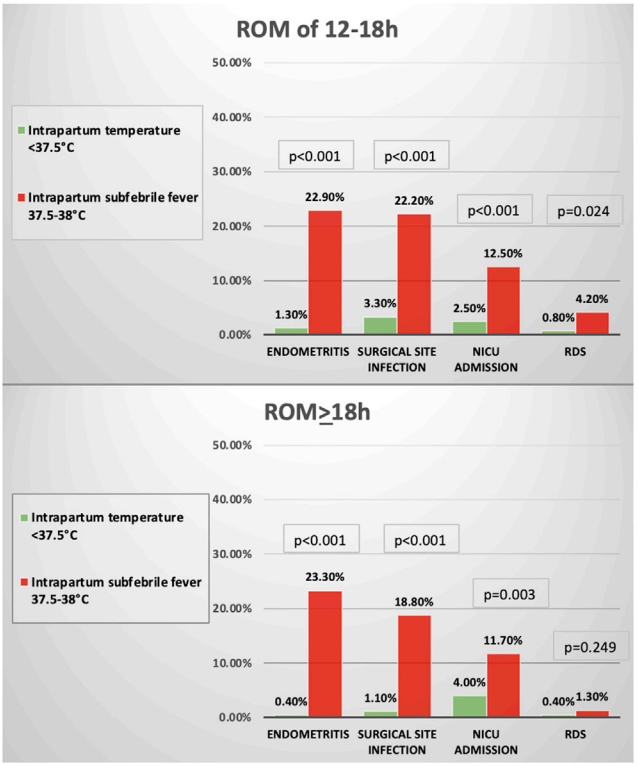
OBJECTIVE: Women with prolonged rupture of membranes (ROM) are at higher risk for peripartum infections. Definitions for intrapartum fever vary. Generally, when intrapartum fever is ≥38°C, antibiotic treatment should be considered. We compared maternal and neonatal outcomes of women with prolonged ROM (>12h), between those with subfebrile fever (37.5-37.9°C) and with normal body temperature (< 37.5°C).

STUDY DESIGN: This retrospective study included women hospitalized in a tertiary university-affiliated hospital between July 2021 and May 2023. The primary outcome, the endometritis rate, was compared between women with intrapartum subfebrile fever and with normal body temperature. Singleton term, ROM >12h and maximal body temperature of 37.9°C were inclusion criteria. The data were analyzed according to two latency period groups: ROM of 12-18h and ROM >18h. Women with ROM >18h received intrapartum ampicillin for group B streptococcus prophylaxis. Chorioamniotic-membrane swabs were obtained in ROM >18h.

RESULTS: Included were 1796 women: 687 with ROM 12-18h and 1109 with ROM >18h. For both latency groups, among women with subfebrile fever vs. normal body temperature, the rates were higher of endometritis (p< 0.001), surgical site infections (p< 0.001), neonatal intensive care admission (p=0.003) and neonatal fever (p< 0.001) (figure). Respiratory distress syndrome rates were higher

among women with subfebrile than normal fever in the ROM 12-18h group (p=0.024). Among women with ROM >18h group, the rates were higher of Enterobacteriaceae isolates in chorioamniotic-membrane cultures, among those who were subfebrile than with normal intrapartum temperature (22% vs 11%, p< 0.001).

CONCLUSION: We report higher maternal and neonatal morbidity among women with subfebrile fever and ROM >12h. Subfebrile fever might be the initial presentation of peripartum infection. This is supported by the higher rates of endometritis and surgical site infection. Clinical trials should focus on whether antibiotic treatment should be considered in this context.



99 A meta-analysis on the impact of doula care on Cesarean section rates

Nnenna E. Achebe[1], Yasmin Dias[2], Michelle M. Doering[3], Rachel Paul[3], Megan L. Lawlor[3], Nandini Raghuraman[3], Jeannie C. Kelly[4], Ebony B. Carter[4]

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OBJECTIVE: Cesarean section account for nearly one-third of all deliveries in the United States. We aimed to pool results from extant literature to determine whether the addition of doula services decreases caesarean delivery rates.

STUDY DESIGN: We conducted a systematic review and meta-analysis by searching electronic databases for randomized controlled trials (RCT) and observational studies comparing prenatal care plus doula services (PC+) to standard prenatal care (PC). The primary outcome was caesarean delivery (CD). Secondary outcomes included instrument assisted vaginal delivery (IAVD-forceps or vacuum) and epidural placement. We conducted a stratified analysis by study type (RCT or observational). Pooled relative risks (RRs) and weighted mean differences were calculated using random-effects models. The Q-test and I2 statistics assessed heterogeneity.

RESULTS: Sixteen studies (8 RCTs and 8 observational studies) met study criteria. Patients receiving PC+ were significantly less likely to have a CD overall (n=16 pooled rates 18.7% PC+ vs. 30.7% PC; pooled RR 0.32; 95% CI 0.25-0.40) and in stratified analysis of RCTs (8 studies: pooled rates 14.4% PC+ vs. 21.9% PC; pooled RR 0.25; 95% CI 0.17-0.37) and observational (8 studies: pooled rates 19.7% PC+ vs. 30.7% PC; pooled RR 0.37; 95% CI 0.27-0.50) studies. There was no difference in rate of epidural placement but those with PC+ were more likely to have an IAVD.

CONCLUSION: Pregnant patients supported by doulas services are 68% less likely to undergo CD than those receiving standard prenatal care, more likely to have IAVD, and have no difference in epidural rates. Additional research is needed to elucidate the impact of doula services on neonatal outcomes. Nonetheless, doula support services represent a promising intervention to decrease the high rates of caesarean section in the United States.

100 Artificial intelligence (machine learning) and molecular classification of sibling twin (TW) placentas in preeclampsia (PE).

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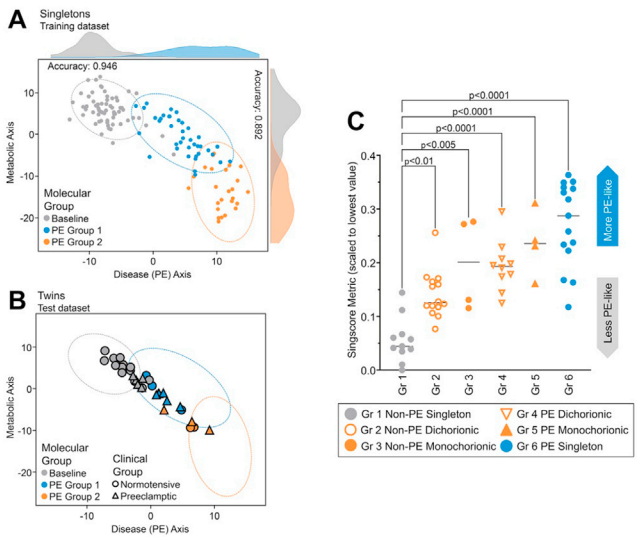
OBJECTIVE: TW pregnancies are at increased risk for PE. Glycolytic metabolic shift is a key transcriptomic signature in PE placenta. Here, we explored transcriptomic features of the TW placenta using artificial intelligence (AI) tools to understand its contribution to the pathobiology of PE.

STUDY DESIGN: RNAseq was performed on villous tissue of TW pregnancies grouped by chorionicity and PE diagnosis: **1)** dichorionic (dc) PE (n=5, GA 33±2 w); **2)** dc non-PE (n=7, GA 32±1 w); **3)** monochorionic (mc) PE (n=2, GA 33±3 w); **4)** mc non-PE (n=2, GA 32±1 w). Placentas from mc cases were sampled twice. A 3-cohort early-onset PE dataset from 127 singleton PE and non-PE placentas (GSE114691, GSE148241, GSE203507) was mined using machine learning (DaMiRseq) and used to train support vector machine (SVM) classifiers (caret R package). A gene-signature scoring (singscore) algorithm quantified molecular phenotypes along a continuum.

RESULTS: In the learning phase, SVM had accuracies of 94.6% and 89.2% for PE and glycolytic metabolic shift, respectively (Fig. A), segregating singleton data in 3 clusters: normal (baseline), disease group 1 (PE, no metabolic shift), and disease group 2 (PE with metabolic shift). In twin pairs, 56% (9/16; dc n=7, mc n=2) had inter-TW placental transcriptional discordance. Individually, 27% (5/18) of clinically non-PE TW placentas were reclassified to a diseased molecular class (group 1 or 2), while 35% (5/14; dc n=4, mc n=1) of clinically PE TW placentas were categorized as baseline (Fig. B). The TW PE placentas had higher (more PE-like) singscores (p< 0.001, ANOVA). Non-PE TW placentas also had elevated scores compared to non-PE singleton placentas (p< 0.01, ANOVA; Fig. C). Among dc pregnancies, only 42% (5/12) of cases had both placentas displaying the same molecular signature simultaneously.

CONCLUSION: Our novel AI approach demonstrates that placental transcriptional metabolic stress and discrepancy between clinical and molecular classification is common in TW. In dc TW one placenta carrying the molecular PE signature may be sufficient to trigger the hypertensive phenotype.



101 Impact of treatment for prenatal depression on cardiovascular disease 24 months after delivery

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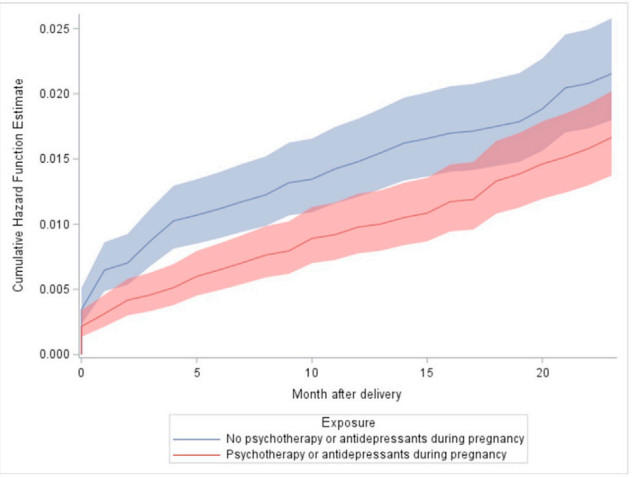
OBJECTIVE: Prenatal depression is associated with an increased risk of new cardiovascular disease (CVD). However, It is unclear how treatment of prenatal depression impacts CVD risk. We sought to determine if treatment of prenatal depression reduces the risk of new CVD within 24 months postpartum.

STUDY DESIGN: Our longitudinal population-based study included pregnant individuals with deliveries in the Maine Health Data Organization's All Payer Claims Data, 2007-2019. We excluded those with pre-pregnancy CVD, multifetal gestations, or no continuous health insurance during pregnancy. Prenatal depression was identified with ICD9/10 diagnosis codes, psychotherapy was identified with CPT procedure codes, and antidepressant medications were identified from pharmacy dispensing data. All were identified using claims with service dates between 6 and 34 weeks' gestation. Primary outcomes were a composite CVD outcome (heart failure, ischemic heart disease, cerebrovascular disease, arrythmia/cardiac arrest, and cardiomyopathy) and new chronic hypertension (cHTN). Cox models were used to estimate hazard ratios, adjusting for potential confounding factors. Censoring events were loss of health insurance or next pregnancy, whichever was earlier.

RESULTS: Of the 15,895 pregnancies with prenatal depression, 54% (n=8517) had antidepressants or psychotherapy visits (34% had antidepressants and 30% had psychotherapy). The cumulative risk of the composite CVD outcome and new cHTN within 24 months postpartum was 1.9% and 3.3%, respectively. Antidepressant medications and/or psychotherapy visits were associated with a decreased risk of the composite CVD outcome (aHR 0.73 [95% CI 0.56-0.96]). (Figure) The risk of new cHTN within 24 months postpartum was not impacted (aHR 1.04 [95% CI 0.83-1.32]).

CONCLUSION: The cumulative risk of new cardiovascular disease within 24 months postpartum was decreased in patients with antidepressant and/or psychotherapy use. This association requires further exploration, but suggests that prioritizing treatment of prenatal depression both improves mood and mitigates cardiovascular disease risk.

Figure: Risk of New Cardiovascular Disease (CVD)[a] in the first 24 months' postpartum among people with Prenatal Depression



[a] Cardiovascular disease = composite outcome (heart failure, ischemic heart disease, cerebrovascular disease, arrythmia/cardiac arrest, and cardiomyopathy)
*Adjusted for maternal age at time of delivery, pre-pregnancy depression, pre-pregnancy hypertension, pre-pregnancy diabetes, obesity, smoking, nulliparity, pregnancy number in dataset, year of delivery, Medicaid coverage during pregnancy, county-level measures, zip-code level measures, hypertensive disorders of pregnancy, gestational diabetes, use of psychotropic medication during 6-34 weeks' gestation, any depression-related hospital or emergency department encounter during 6-34 weeks' gestation.
Data source: Maine Health Data Organization's All Payer Claims Database

102 Circulating EV-miRNA profile in pregnant persons with opioid use disorder treated with buprenorphine

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OBJECTIVE: Maternal OUD has increased with a related rise in NOWS. Buprenorphine has become one of the mainstays for MOUD. The effects of OUD and MOUD on maternal and fetal physiology are not well understood. Because circulating extracellular vesicle miRNAs (EV-miRNAs) from pregnant patients have both a maternal and fetal (placental) origin, they may serve as biomarkers of maternal and fetal health. Hence, we examined the impact of buprenorphine on circulating EV-miRNA cargo in pregnant patients.

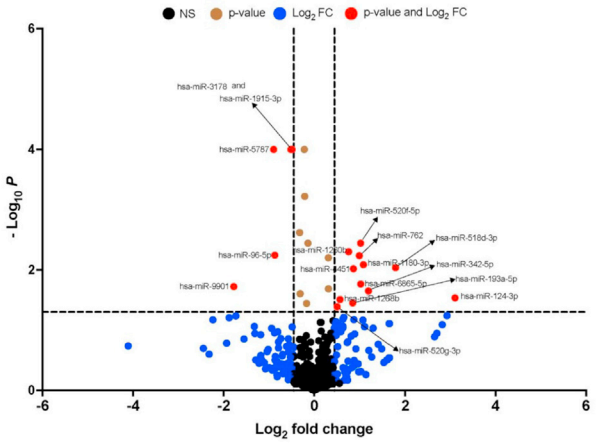
STUDY DESIGN: EV-miRNAs were isolated from the plasma of pregnant women during the 3rd trimester (12 buprenorphine-treated and 12 healthy controls) and small RNA-sequencing was performed to identify miRNAs in both groups. For miRNAs differential presence analysis, read counts were log-10 normalized and 2-way ANOVA comparisons between groups performed with Benjaminini and Hochberg method used to control the false discovery rate (FDR). Targeted biological pathways and disease-associations were assessed with DIANA-miRpath and RNADisease, respectively.

RESULTS: Maternal age and BMI were similar in both groups. There was no difference in timing of maternal blood for EV-miRNAs

evaluation (30.7±2.7 v 31.4±2.9; p=0.56) for controls and buprenorphine respectively. A total of 508 EV-miRNAs were detected, of which 16 were differentially abundant between buprenorphine and control groups (Figure 1). Among the EV-miRNAs enriched in the buprenorphine group, hsa-miR-520f-5p, hsa-miR-520g-3p, and hsa-miR-518d-3p, belong to the placenta-specific, chromosome 19 miRNA cluster (C19MC). RNA-disease prediction analysis revealed *hsa-miR-520g-3p, hsa-miR-124-3p, has-miR-1260b* to be associated with preeclampsia. Moreover, many differentially present EV-miRNAs were linked to cardiovascular disease, stroke, and myocardial infarction. Targeted biological pathways linked to the EV-miRNAs included pathways in cancer, cellular senescence, regulation of actin cytoskeleton, and neurotrophin signaling.

CONCLUSION: This is a novel study which identified unique alterations in circulating EV-miRNAs in buprenorphine treated patients with OUD.

Figure 1. Volcano plot of differentially expressed EV-miRNAs between buprenorphine-exposed pregnant patients and healthy controls. Each dot corresponds to a miRNA. The log2fold change is represented in the x-axis, while the negative log (base 10) of the p-value in the y-axis. The horizontal dashed line represents the threshold with a p-value cutoff <0.05, while the vertical bars represent the absolute log2fold change ≥0.5. The 16 differentially expressed miRNAS (DEMIs) are labeled in the plot (red). The left panel (0 to −6 of log2fold change) is downregulated, while the right panel (0–6 of log2fold change) is upregulated EV-miRNAs.



103 Assessing tranexamic acid utilization for management of postpartum hemorrhage at referral facilities in Ghana

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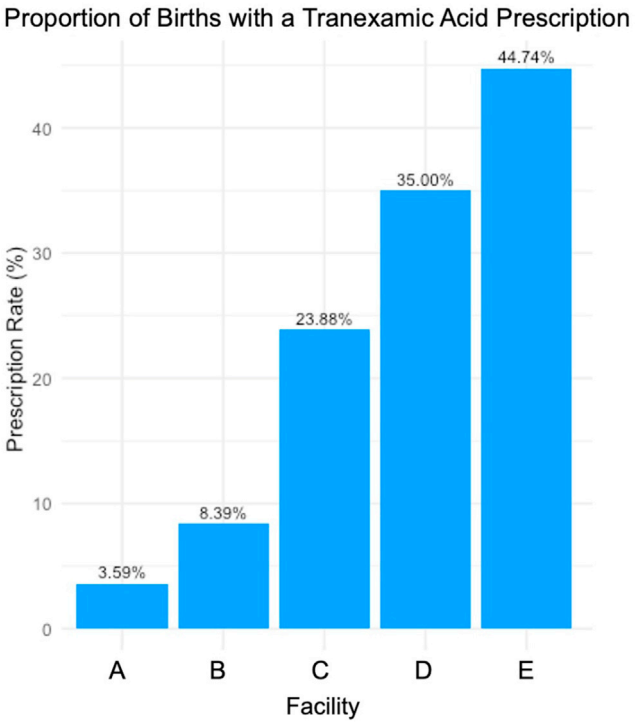
[1]University of Ghana Medical School, Greater Accra, [2]Massachusetts General Hospital, Boston, MA, [3]Program for Surgery and Social Change and, Boston, MA, [4]Program in Global Surgery and Social Change, Brookline, MA, [5]Korle-Bu Teaching Hospital, Accra-North, Armed Forces Africa, Canada, Europe, Middle East, [6]Korle-Bu Teaching Hospital, Accra, Greater Accra, [7]Korle-Bu Teaching Hospital, Accra, Ghana, [8]Mbarara University of Science and Technology, Mbarara, Mbarara, [9]Center for Global Health, Boston, MA, [10]Ghana Health Services, Accra, Greater Accra, [11]Massachusetts General Hospital, BOSTON, MA

OBJECTIVE: Postpartum hemorrhage (PPH) is the leading cause of maternal mortality worldwide. Tranexamic acid (TXA) is a promising intervention for excessive bleeding after childbirth, and is recommended by the World Health Organization for the treatment of PPH. However, there is limited real-world data on current use patterns of TXA in low and middle-income countries, including Ghana. We aimed to assess the utilization of tranexamic acid among women delivering at referral-level facilities in Ghana using electronic medical record (EMR) data and describe variation in use by facility, delivery volume at each facility, and mode of delivery.

STUDY DESIGN: Data was obtained from Lightwave Health Information System (LHIMS), an EMR system implemented across referral facilities in Ghana in 2018. Clinical information is entered into LHIMS by clinicians engaged in patient care. We retrieved data on medicines prescribed, mode of delivery and patient demographics on all births occurring at five regional referral hospitals between August and November 2022. We compared the proportion of births in which TXA was prescribed by facility, delivery volume, patient demographics, and mode of delivery.

RESULTS: Data were available on 3723 births from five facilities. The overall proportion of births in which TXA was prescribed was 20.9% and varied significantly across facilities from 3.5% to 45%. Prescription rates were higher among women delivered by cesarean section compared to those delivered vaginally (51.4% vs 4.3%; p< 0.001). We found no differences in prescription of TXA by age, education or occupation of women delivered, or by delivery volume.

CONCLUSION: We demonstrate the use of a national-level EMR to assess peripartum TXA prescription patterns in Ghana, revealing significant variation in TXA use across referral hospitals in the country and by mode of delivery. Further work is needed to understand variation in practice by facilities and mode of delivery to optimize adherence to recommended practice guidelines



104 Adverse maternal obstetric outcomes by HIV status in Botswana: Data from the 'Treat-All' HIV Era

J. Sroda Agudogo[1], Maya Jackson-Gibson[2], Annliz Macharia[1], Indira Ranaweera[1], Katlego Boikanyo[3], Modiegi Diseko[3], Judith Mabuta[3], Sarah Hanson[1], Dudu Rubgega[4], Bridgette Wamakima[1], Joseph Makhema[3], Michele R. Hacker[1], Rebecca Zash[1], Justus Hofmeyr[4], Roger L. Shapiro[1], Rebecca Luckett[1]

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OBJECTIVE: Botswana has achieved 90-90-90 targets to eliminate HIV and led the region in initiating antiretroviral therapy (ART) at the time of HIV diagnosis ('treat-all'). The impact of HIV and ART on neonatal outcomes have been extensively studied, yet data on maternal obstetric outcomes are limited. This study aimed to evaluate maternal outcomes in a large cohort with high HIV prevalence after implementation of a 'treat-all' policy.

STUDY DESIGN: Data were collected at the time of delivery from the medical record between November 2021 to February 2023; outcomes were recorded in the Tsepamo Birth Outcomes Surveillance and Safe Birth studies at Princess Marina Hospital in Botswana. We evaluated maternal obstetric morbidities and maternal mortality at the time of hospital discharge by HIV status.

RESULTS: We included 6982 participants; 1336 (19%) were pregnant people with HIV (PHIV). 1288 (96%) were on ART, and 439 (93%) of those with known ART regimen were on tenofovir, lamivudine, and dolutegravir (TLD). Of 473 with known CD4 counts, 325 (69%) were >500 cells per μL, 128 (27%) were 200-500 cells per μL, and only 20 (4%) were < 200 cells per μL. Of 898 with known viral loads, 836 (93%) were undetectable. Overall rates of pre-eclampsia were the same between groups (p=0.47). There were no differences in rates of hemorrhage, infections, acute pulmonary or cardiac conditions, or death in people with and without HIV (all p≥0.24). Although an overall rare outcome, acute kidney injury was slightly more common in PHIV (0.4% versus 0.1%, p = 0.04).

CONCLUSION: Rates of adverse maternal obstetric outcomes were similar in people with and without HIV in the treat-all ART era where a majority were virally suppressed on TLD, except for a 3-fold increased risk of AKI for PHIV though numbers were small. This study demonstrates that treat-all with first-line TLD leads to similar maternal obstetric outcomes for PHIV.

Table 1: Adverse maternal obstetric outcomes by HIV status

Complication	People without HIV (n=5646)	People with HIV (n=1336)	P value
Pre-eclampsia	548 (9.7)	121 (9.1)	0.47
Pre-eclampsia without severe features[1]	234 (42.9)	59 (48.8)	0.24
Pre-eclampsia with severe features[1]	312 (57.1)	62 (51.2)	0.24
HELLP syndrome[1]	22 (4.0)	7 (5.8)	0.39
Superimposed preeclampsia[1]	90 (16.4)	24 (19.8)	0.37
Acute kidney injury[2]	8 (0.1)	6 (0.4)	0.04
Obstetric hemorrhage	210 (3.7)	54 (4.0)	0.58
Infection[3]	57 (1.0)	17 (1.3)	0.40
Acute cardiac and pulmonary events[4]	28 (0.5)	7(0.5)	0.89
Maternal death in hospital	4 (0.1)	2 (0.1)	0.32

Data presented as n (%)
[1]denominator is total cases of pre-eclampsia in each group, definitions of categories according to American College of Obstetrics and Gynecology
[2] defined clinically as elevated creatinine > 104 µmol/L or urine output < 30 milliliters / hour
[3] composite outcome of chorioamnionitis, sepsis, wound infection, urinary tract infection, pneumonia
[4]composite outcome of stroke, pericardial effusion, cardiac arrest, peripartum cardiomyopathy, respiratory failure, aspiration, pulmonary effusion, pulmonary embolus, pulmonary edema, and amniotic fluid embolus

105 Medication effectiveness in the treatment of Insomnia in 3rd trimester pregnancies

Daniel Martingano[1], Andrea Ouyang[2], Marwah Al-Dulaimi[1], Jessica Marshall[1], Rachel Amuzu[3], Shavana Singh[4], Alexander Ulfers[5], Benjamin Dribus[6], Kristin Cohen[7], Shailini Singh[8], Jacqueline Marecheau[1], Antonia F. Oladipo[9], Donald Morrish[1]

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OBJECTIVE: Pregnant patients experiencing insomnia in the 3rd trimester is a common occurrence, yet management approaches are highly varied and medication efficacy remains unclear. This study sought to determine which medication proved most effective for patients with insomnia in the 3rd trimester.

STUDY DESIGN: We conducted a multi-center, prospective observational study from 7/2021 to 7/2023 comparing all pregnant patients who received treatment of insomnia at a gestational age range of 28 0/7 to 40 0/7 weeks. Monotherapy medications dimenhydrinate, diphenhydramine, melatonin, gabapentin, benzodiazepines, and magnesium oxide were included as covariates. Patients taking overlapping medications or with allergies to any included medications were excluded. Primary outcomes included the need to switch medication, patient-reported resolution confirmed by provider assessment, patient-reported increased energy level due to adequate sleep, and patient-reported ability to fall asleep reliably with medication as discrete events.

RESULTS: The study included 686 patients who required pharmacologic treatment for insomnia in the 3rd trimester. Baseline demographics were not significantly different. Patients who received magnesium oxide at doses of 800mg or greater were less likely to switch to an alternative medication (61.2% v. 33.1%, $p = 0.03$) with a 68% decreased risk in adjusted models (RR 0.32, 95% CI 0.21-0.73, $p = 0.004$). Patients taking gabapentin at doses exceeding 1200mg (59.1% v. 17.9%, $p = 0.003$) or melatonin at doses of 40mg or greater (49.2% v. 11.5%, $p = 0.01$) had higher rates of increased energy levels due to adequate sleep. Adjusted models demonstrated an additional 44% and 21% increased likelihood when taking gabapentin (RR 1.44, 95% CI 1.23 − 1.77, $p = 0.002$) or melatonin (RR 1.21, 95% CI 1.11 − 1.53, $p = 0.007$), respectively.

CONCLUSION: Magnesium oxide, melatonin, and gabapentin are reasonable medical therapies in the treatment of insomnia for 3rd-trimester pregnant patients.

106 Comparison of surgical techniques for subcutaneous closure during cesarean deliveries complicated by super obesity

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OBJECTIVE: Super obesity is defined as BMI ≥50 kg/m^2 and is increasingly prevalent among pregnant patients nationwide, requiring unique surgical considerations. This study sought to

evaluate the differences between subcutaneous closure techniques for cesarean deliveries complicated by super obesity.

STUDY DESIGN: We conducted a multicenter, prospective observational study from 7/2021 to 7/2023 comparing all pregnant patients with super obesity who required a cesarean delivery between 37 0/7 and 41 0/7 weeks gestational age. Patients were divided into two groups for subcutaneous layer closure: one group received an interrupted technique, and the second received a running technique. Both groups used plain gut sutures and subcuticular skin closures. Surgical technique was determined by surgeon preference. Primary outcomes included wound seroma, dehiscence, wound infection, postoperative pain, compositive wound complication (CWC, including all former outcomes), and surgical time.

RESULTS: The study included 197 patients: 101 receiving an interrupted technique and 96 receiving a running technique. Baseline demographics, use of electrocautery, cesarean order, and use of negative-pressure wound vacuum dressings were not significantly different. Surgical time was less in the running technique group (8.3 v. 13.2 minutes, $p < 0.001$). Rates of wound seroma within 2 weeks postoperative were less in the running suture group (2.1% v. 4.9%, $p = 0.004$) with a 27% decreased risk in adjusted models (RR 0.73, 95% CI 0.39-0.91, $p = 0.003$). Rates of dehiscence, wound infection, postoperative pain, and CWC within 2 or 6 weeks postoperative were not significantly different.

CONCLUSION: Running surgical techniques may have benefits in the 2-week postoperative period for patients needing cesarean deliveries complicated by super obesity.

107 The association of dody mass index with engagement in a perinatal collaborative care model

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OBJECTIVE: Individuals with a higher body mass index (BMI) are less likely to engage in routine healthcare due to the experience of weight stigma. Whether this applies to mental health care, and specifically, the collaborative care model of delivery, remains unknown. This study evaluated the association of BMI with engagement in a perinatal collaborative mental health care model (PCCM).

STUDY DESIGN: This secondary analysis of a prospective cohort study included individuals referred to PCCM at a quaternary care hospital in Chicago, IL from 2017-2022. Individuals were grouped by pre-pregnancy BMI using the World Health Organization classification (class 1: 30-34.9kg/m^2, class 2: 35-39.9kg/m^2, class 3: $\geq$40kg/m^2). The primary outcome, engagement, was defined as the completion of $\geq$2 mental health assessments within the PCCM. Maternal demographics, comorbidities, obstetric factors, and baseline Patient Health Questionnaire-9 (PHQ-9) scores were compared across BMI strata. Multivariable regression accounting for differences in race/ethnicity, parity, mental health history, and tobacco use was performed.

RESULTS: Of the 2,614 individuals included, 1,921 (73.5%) had a BMI< 30, 362 (13.8%) class 1 obesity, 184 (7.0%) class 2 obesity, and 147 (5.6%) class 3 obesity. Myriad differences were observed in sociodemographic and clinical characteristics across BMI categories, aligning with prior literature. Compared to individuals with BMI< 30, individuals with BMI$\geq$30 had higher baseline PHQ-9 scores (median 8 [IQR 5,14], vs. median 7 [IQR 4,12], p=.025) but no difference in engagement (76.2% vs. 78.9%, p=.16). On multivariate regression, having a BMI > 40 kg/m^2 was associated with higher engagement in PCCM (Table 1).

CONCLUSION: Although individuals with a pre-pregnancy BMI$\geq$30 had more baseline depressive symptoms, there was no difference in engagement in PCCM compared to those with BMI < 30. Those with the highest BMI category were found to have paradoxically increased engagement, suggesting that the equity-centered principles of the PCCM extend to the area of weight bias.

Table 1: Engagement with the Perinatal Collaborative Care Model by BMI Class

	BMI < 30kg/m^2 (N=1,921)	BMI 30-34.9kg/m^2 (N=362)	BMI 35-39.9kg/m^2 (N=184)	BMI ≥40kg/m^2 (N=147)
Engagement	76.2%	75.7%	80.4%	85.0%
OR (95% CI)	ref	0.97 (0.75-1.26)	1.28 (0.88-1.87)	**1.76 (1.10-2.80)**
aOR (95% CI)	ref	0.97 (0.73-1.27)	1.32 (0.88-1.96)	**1.73 (1.06-2.82)**

BMI = body mass index; OR = odds ratio; aOR = adjusted odds ratio
Significance indicated in bold for p<0.05.

108 Unique maternal immunoproteomic signatures by trimester and in response to de novo mRNA vaccination

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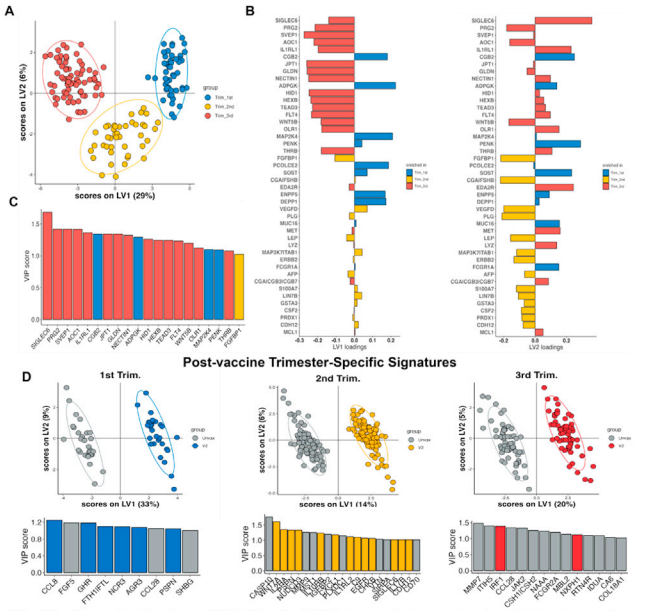
OBJECTIVE: Use of COVID-19 mRNA vaccines in pregnant individuals presents a unique opportunity to define baseline trimester-specific immunoproteomic signatures, and to examine how de novo vaccines might perturb these signatures across trimesters (TMs).

STUDY DESIGN: The maternal proteome was profiled across TMs at baseline and in response to COVID-19 vaccination (vax) in 466 samples from 296 pregnant individuals, including 104 from 1st, 198 from 2nd, and 164 from 3rd TM, using an aptamer-based proteomics assay. Maternal plasma samples were collected prevax/baseline (V0, N=182), 3-4 weeks after 1stmRNA vax (V1, N=120) and 2-6 weeks after 2nd mRNA vax (V2, N=164). Effects of TM, maternal age, BMI, and infant sex on protein expression were evaluated by a local inverse Simpson's Index. Partial least squares discriminant analyses with regularization determined proteins best defining the TMs prevax. Generalized additive modeling (GAM) evaluated TM-specific responses to vaccination, and pathways analysis (IPA) inferred biological implications of differentially-expressed proteins by TM.

RESULTS: 44 proteins distinguished baseline samples across TMs (Fig 1A/B). Variable of importance analysis identified top proteins that distinguished TMs prevax (Fig 1C). IPA analyses demonstrated that the 1st TM was defined by mitogenesis, chemotaxis, and apoptotic signaling; 2nd by pathways of NK- and T-cell survival and differentiation; and 3rd by pro-inflammatory cytokine signaling, immunogenic cell death signaling, and nervous system development. GAM modeling demonstrated TM-specific responses to vaccination after both 1st and 2nd dose of mRNA vax (Fig 1D), including dysregulation of proteins involved in interferon, WNT and apoptosis signaling, and cell-cell adhesion.

CONCLUSION: In normal pregnancy, trimesters were defined by a specific immunoproteomic signature. De novo mRNA vaccination altered expression of proteins in a trimester-specific manner. Enhanced understanding of how vaccines and other exposures alter the immune proteome by trimester may provide new opportunities to optimize maternal and neonatal health.



(A) Partial Least Squares Discriminant Analysis (PLSDA) followed by LASSO feature regularization was performed, resulting in a reduced set of features that were consistently in at least 80 of the 100 LASSO models. Trimester had the strongest impact of all covariates on the baseline maternal proteome. All models had 5-Fold CV: 0.99 and p<0.01 when compared to permutated label model. (B) The bar plots show the loadings of the 44 LASSO-selected proteins on the (left) 1st Latent Variable (LV), and the (right) 2nd LV, with the colors indicating the trimester of collection (1st trim = blue, 2nd trim = yellow, and 3rd trim = red). (C) Variable of importance analysis demonstrates the top proteins that distinguish the maternal proteome across trimesters. (D) Generalized additive modeling (GAM), followed by PLSDA and LASSO feature regularization was used to determine the post-vaccination proteomic signature. Only the post-2nd mRNA vax or V2 signature is shown due to space constraints, but the same approach was performed for the V1 timepoint, demonstrating a well-defined and trimester-specific signature characterized by unique key proteins in each trimester of de novo COVID-19 mRNA vaccination.

109 Prenatal diagnostic testing trends in the era of cell-free DNA screening

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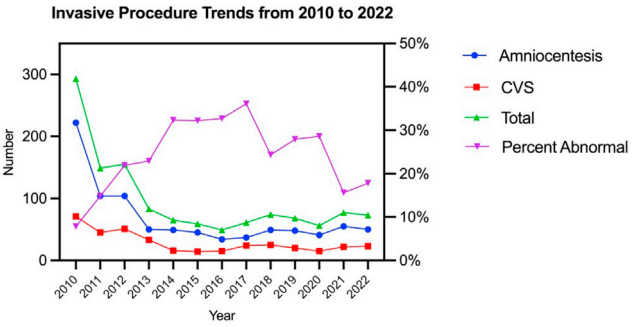
OBJECTIVE: According to the American College of Obstetrics and Gynecology, all pregnant patients should be offered testing for fetal aneuploidy. Cell-free DNA screening became available at our institution in 2012. We investigated the trends of diagnostic testing, diagnostic yield, and indications for procedure in the era of cell-free DNA.

STUDY DESIGN: In this observational retrospective study, all invasive prenatal procedures from 2010 to 2022 were evaluated at a single institution. Indication for procedure was determined (advanced maternal age alone, ultrasound findings, abnormal prenatal screen, single gene testing). Results of diagnostic testing were reviewed and stratified by result and type of genetic abnormality. Categorical variables were assessed using X^2 or Fishers Exact test as appropriate and comparisons of column proportions; continuous variables were analyzed with Wilcoxon rank-sum test.

RESULTS: A total of 1262 invasive procedures were performed in the study period, with 888 (70.4%) amniocentesis procedures and 374 (29.6%) chorionic villus sampling procedures (Figure 1). There was a significant decline in total procedures over time (p< .001). Fifty one percent of patients had prenatal genetic screening, with 28.2% of patients having diagnostic testing for abnormal prenatal screen. In 2017, cell free DNA analysis surpassed analyte testing as the primary genetic screening modality. Overtime, percentage of abnormal diagnostic result increased (Fig 1). There was a significant change in indication over time; advanced maternal age alone declined from 45% to 5.6% during the study period(p< .001).

CONCLUSION: Performance of invasive testing for prenatal chromosomal disorders has dramatically decreased since cell-free DNA testing became universally available. This has resulted in a shift in indication for diagnostic testing and higher diagnostic yield.



111 Establishing a risk score for prediction of intrapartum cesarean delivery among elderly gravidae

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OBJECTIVE: We aimed to determine risk factors for intrapartum cesarean delivery (CD) in women over 40 years old, and to develop a risk prediction score for this outcome.

STUDY DESIGN: We conducted a retrospective cohort study, in a single university-affiliated tertiary medical center with approximately 12,500 deliveries annually (2012-2022). We included all women aged 40 years old or more, who planned a trial of labor and excluded women who opt for an elective CD or those with non-viable fetuses. Maternal and neonatal characteristics of women who delivered vaginally were compared to those who underwent an intrapartum CD. Risk factors were examined using univariate analysis as well as multivariate logistic regression. A specific risk prediction score was developed in accordance with the relative risk, to predict the need for CD. The ROC curve was assessed utilizing the performance of our model.

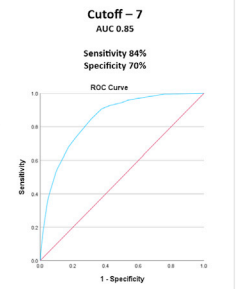
RESULTS: (1) During the study period, 6,122 women aged 40 years old or more attempted a trial of labor. Of them, 428 (7%), underwent an intrapartum CD.

(2) Using multivariate analysis, several independent risk factors for intrapartum CD were identified, including nulliparity, multiple gestations, induction of labor, epidural anesthesia, preeclampsia, gestational diabetes, and previous CD. We attributed a risk score for each risk factor and included them in our score model. [Table]

(3) Our score model, employing a cut-off of 7, demonstrated successful prediction of intrapartum CD with an area under the curve of 0.85 (95%CI [0.83-0.87], p=0.009).

CONCLUSION: Assessment of risk factors before and during labor, using our risk score, can be used by caregivers to offer a more informed consultation to patients facing the decision among mode of delivery.

	aOR (95% CI)	p-value	Score	
			Yes	No
Age > 45	1.4 (0.9-2.1)	0.13	-	-
BMI >35	1.1 (0.5-2.3)	0.68	-	-
Nulliparity	4.9 (3.7-6.5)	<0.001	5	0
Multiple gestation	5.1 (2.8-9.2)	<0.001	5	0
Delivery before 37 weeks	0.7 (0.4-1.1)	0.177	-	-
Previous Cesarean Delivery	7.5 (5-11)	<0.001	7	0
Pre-gestational DM	1.5 (0.6-3.8)	0.3	-	-
Gestational DM	1.4 (1.03-1.8)	0.028	1	0
Pre-Eclampsia	2.3 (1.3 – 3.8)	0.002	2	0
Epidural Anesthesia	2.3 (1.5-3.5)	<0.001	2	0
Induction of Labor	1.8 (1.4-2.4)	<0.001	2	0
Antibiotics use during labor	4.3 (3.3-5.5)	<0.001	4	0
Oxytocin use	0.9 (0.6-1.2)	0.5	-	-



aOR: adjusted odd ratio; CI: Confidence Interval; DM: Diabetes Mellitus

112 Impact of the ARRIVE trial on stillbirth rates in nulliparous individuals

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OBJECTIVE: Following the publication of the ARRIVE trial, rates of induction of labor (IOL) increased, even as early as 37 weeks. We aimed to examine the rate of stillbirth at term before and after the ARRIVE trial.

STUDY DESIGN: This was a cross-sectional analysis of US vital statistics Live Birth and Fetal Death certificates data from 2016 to 2020. We limited analyses to nulliparas with singleton gestation and cephalic presentation who delivered at term (37-42 weeks). The pre-ARRIVE period was from Jan 2016 to Dec 2017. The post-ARRIVE trial period was from Jan 2019 to Dec 2020. Stillbirth and induction rates at each gestational age were calculated based on the number of ongoing pregnancies. Modified Poisson regression was used to calculate adjusted relative risks (aRR) with 95% confidence intervals (95%CI). We performed a secondary analysis in nulliparas without hypertension, preeclampsia, diabetes, or fetal anomaly (low-risk group).

RESULTS: Of 4,077,674 births, 5,200 were stillbirths during our study period. There were 2,087,960 births in the pre-ARRIVE period and 1,989,714 in the post-ARRIVE period. Compared to the pre-ARRIVE period, the rate of stillbirths, per 1000 births, in the post-ARRIVE period was significantly lower at term (1.4 vs. 1.2; aRR 0.84 [95% CI 0.79-0.89]), at 37 weeks (0.4vs. 0.3; aRR 0.79 [0.71-0.88]), and at 38 weeks (0.4 vs. 0.3; aRR 0.89 [0.80-0.95]) (Table 1). However, the change in stillbirth rates at 39 weeks and 40-42 weeks were not statistically significant. Rates of IOL increased at all gestational ages. The findings were similar in low-risk individuals. We estimated that 228 additional IOL were needed to prevent 1 additional stillbirth at 37 weeks whereas 5234 additional IOL were needed at 39 weeks.

CONCLUSION: Despite increased rates of IOL at all gestational ages, stillbirth rates only decreased at 37-38 weeks. An increase in IOL at 39 weeks was not large enough to impact the stillbirth rate at 39 weeks or greater.

Table 1

	Pre-ARRIVE (n = 2,087,960)		Post-ARRIVE (n = 1,989,714)		
	Ongoing pregnancy	n (%)	Ongoing pregnancy	n (%)	Adjusted RR (95%CI)
Entire cohort					
Stillbirth 37-42 weeks	2,087,960	2,841 (0.14)	1,989,714	2,359 (0.12)	**0.84 (0.79-0.89)**
Stillbirth 37 weeks	2,087,960	726 (0.04)	1,989,714	570 (0.03)	**0.79 (0.71-0.88)**
Stillbirth 38 weeks	1,905,908	737 (0.04)	1,786,792	610 (0.03)	**0.85 (0.76-0.95)**
Stillbirth 39 weeks	1,570,210	693 (0.04)	1,452,972	625 (0.04)	0.95 (0.85-1.06)
Stillbirth 40-42 weeks	856,607	685 (0.08)	724,004	554 (0.08)	0.93 (0.83-1.04)
Induction 37-42 weeks	2,087,960	678,996 (32.6)	1,989,714	785,871 (39.6)	**1.19 (1.19-1.19)**
Induction 37 weeks	2,087,960	64,204 (3.1)	1,989,714	88,984 (4.5)	**1.39 (1.38-1.41)**
Induction 38 weeks	1,905,908	83,668 (4.4)	1,786,792	103,180 (5.8)	**1.27 (1.25-1.28)**
Induction 39 weeks	1,570,210	212,918 (13.6)	1,452,972	282,121 (19.4)	**1.40 (1.40-1.41)**
Induction 40-42 weeks	856,607	318,206 (37.1)	724,004	311,586 (43.0)	**1.16 (1.15-1.16)**
Low-risk cohort					
Stillbirth 37-42 weeks	1,819,729	2,213 (0.12)	1,670,259	1,792 (0.11)	**0.85 (0.80-0.91)**
Stillbirth 37 weeks	1,819,729	502 (0.03)	1,670,259	385 (0.02)	**0.81 (0.71-0.93)**
Stillbirth 38 weeks	1,689,943	553 (0.03)	1,541,155	442 (0.03)	**0.85 (0.75-0.97)**
Stillbirth 39 weeks	1,418,601	567 (0.04)	1,287,776	498 (0.039)	0.94 (0.83-1.06)
Stillbirth 40-42 weeks	798,384	591 (0.07)	667,944	467 (0.07)	0.91 (0.81-1.03)
Induction 37-42 weeks	1,819,729	521,795 (28.7)	1,670,259	581,899 (34.9)	**1.22 (1.21-1.22)**
Induction 37 weeks	1,819,729	31,151 (1.7)	1,670,259	38,153 (2.3)	**1.33 (1.31-1.35)**
Induction 38 weeks	1,689,943	47,150 (2.8)	1,541,155	53,540 (3.5)	**1.25 (1.23-1.26)**
Induction 39 weeks	1,418,601	158,349 (11.2)	1,287,776	212,613 (16.5)	**1.48 (1.47-1.49)**
Induction 40-42 weeks	798,384	285,145 (35.7)	667,944	277,593 (41.6)	**1.16 (1.16-1.17)**

Adjusted relative risk (aRR) controlled for age, body mass index, hypertension, diabetes, and fetal anomaly.

113 Women's representation in major obstetrics and gynecology journals

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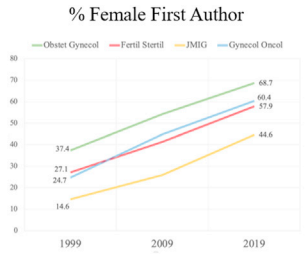
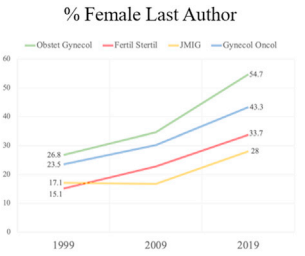
OBJECTIVE: To examine the number of women as first and senior authors in four journals in obstetrics and gynecology over two decades.

STUDY DESIGN: This bibliometric analysis included all original research articles published in 1999, 2009, and 2019 in four obstetrics and gynecology journals—*Gynecologic Oncology (Gynecol Oncol), Obstetrics and Gynecology (Obstet Gynecol), Journal of Minimally Invasive Gynecologic Surgery (JMIGS)*, and *Fertility and Sterility (Fertil Steril)*. Other types of publications including case reports, reviews, and editorials were excluded. The sex of the author was determined by a Google-based webtool. For inconclusive results, a Google search of the authors was attempted to identify gender. If we were not able to identify the sex of the authors, they were excluded from the analysis. Proportions of female first and senior authors were assessed yearly. Interrupted time-series analysis was performed using an autoregressive integrated moving average.

RESULTS: A total of 2,781 articles were analyzed, with a total of 5562 authors. 518 authors (9.3%) were excluded. Over two decades, the proportions of both first and senior authors nearly doubled in all four journals. For example, in 1999, the proportions of the first author were 24.7%, 37.4%, 14.6%, and 27.1% in Gynecol Oncol, Obstet Gynecol, JMIGS, and Fertil Steril, respectively. In 2019, the proportions of the first author were 60.4%, 68.7%, 44.9%, and 57.9% in Gynecol Oncol, Obstet Gynecol, JMIGS, and Fertil Steril, respectively. This increase in proportions was statistically significant (all $P < 0.001$).

CONCLUSION: Proportions of female first and senior authors nearly doubled over two decades.





114 Ultrasound assessment of upper abdominal free fluid after uncomplicated cesarean delivery

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OBJECTIVE: Ultrasound measurement of upper abdominal fluid is commonly used to assess for intraabdominal bleeding after trauma, but it has not been studied after cesarean delivery. We sought to define normal measurements after scheduled cesarean delivery.

STUDY DESIGN: After IRB approval, a prospective cohort of patients undergoing scheduled cesarean delivery was recruited. Ultrasound measurements of fluid in the hepatorenal (RUQ) and splenorenal (LUQ) fossa in were taken in supine position immediately after surgery and repeated on postoperative day #1. Information on medical history, prenatal care, and postoperative course were abstracted from the medical record. Continuous variables were compared with t-test and categorical compared with chi squared.

RESULTS: 42 patients without concern for postoperative complication were included. The immediate postoperative RUQ and LUQ measurements were mean (SD [standard deviation]) 1.2 (1.8) mm and 1.3 (1.4) mm, 90th percentile 2.9 mm and 3.8 mm, and no measurable fluid in 48% and 45% respectively. On postoperative day #1 the RUQ and LUQ measurements were mean (SD) 1.6 (1.2) mm and 1.0 (1.3) mm, 90th percentile 3.5 mm and 3.7 mm, and no measurable fluid in 44% and 53%. Measurements were not obtained due to patient discomfort in 0 to 9.5% of cases. Change from initial to day #1 measurements were calculated, and the 90th percentiles were RUQ 2.0 mm and LUQ 2.2 mm. On postoperative day #1, 28.6% of patients had a composite of at least one measurement or change in a measurement greater than the 90th percentile (table 1). This composite outcome was associated with repeat cesarean (p=.03) and with increased operative time (37 vs 53 minutes, mean difference 15.3 minutes [95% CI 5.8, 24.8], p=.002), but was not otherwise associated with maternal or surgical characteristics.

CONCLUSION: Measurements of fluid in the RUQ and LUQ were easily obtained and well tolerated after routine cesarean delivery, and our data show that finding more than 3.8 mm of fluid is abnormal and may help diagnose intraabdominal bleeding as it does after trauma.

Table 1. Rate of at least 1 measurement of upper abdominal fluid > 90th percentile by maternal and surgical characteristics

Characteristic	No Elevated Measurements	1 or More Elevated Measurement	P-value
Number	n=30	n=12	-
Age (years)	32.6 (5.10)	31.6 (4.74)	.54
Parity	1.2 (1.0)	1.3 (0.50)	.66
Repeat Cesarean Delivery	**21 (70%)**	**12 (100%)**	**.03**
Body Mass Index (kg/m^2)			.14
< 18.5	0	0	
18.5-29.9	9 (30%)	0	
30-39.9	11 (36.7%)	7 (58.3%)	
40-49.9	8 (26.7%)	3 (25%)	
≥ 50	2 (6.7%)	2 (16.7%)	
Hypertensive Disorders	6 (20%)	2 (16.7%)	.80
Diabetes	6 (20%)	2 (16.7%)	.80
Gestational Age (weeks)	38.0 (1.7)	38.4 (1.4)	.43
Birth Weight (g)	3395 (578)	3698 (621)	.15
Quantitative Blood Loss (ml)	582 (302)	638 (268)	.58
Operative Time (minutes)	**37.4 (13.7)**	**52.7 (13.7)**	**.002**
Total Inpatient Oxycodone (mg)	74 (47)	49 (41)	.11
Hemostatic Product Used	8 (26.7%)	3 (25%)	.91
Maternal Length of Stay (days)	2.6 (1.2)	2.6 (0.9)	.97

Numbers are n (%) or mean (standard deviation)

115 Prolonged second stage of labor (P2S) in primipara, and perinatal outcomes

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OBJECTIVE: Duration and optimal management of prolonged second stage (P2S) in the primipara is still controversial and represents a source for primary cesarean deliveries. We assessed maternal and neonatal outcome when the second stage of labor was prolonged according to American College of Obstetricians and Gynecologists guidelines.

STUDY DESIGN: Electronic medical record data from a retrospective cohort (2005—2022) at a tertiary medical center. All nulliparous births with term live singleton vertex fetus that reached full dilation were included. P2S was defined: with epidural > 3 hours, without > 2 hours.

Statistics: Comparisons, adjusted multivariate model; Odds Ratio (OR 95%CI), p< 0.05

RESULTS: Study population included 55309 primiparous deliveries who reached full dilation. P2S occurred in 13.1% of nulliparas, with and without an epidural. Cesarean delivery rates with P2S compared to normal second stage (N2S) were 8.5% vs. 0.8% respectively. Vaginal delivery and assisted vaginal delivery rates were 48.4% vs. 85.6% and 43.1% vs. 13.6% for P2S compared to N2S, respectively. P2S was associated with higher maternal and neonatal morbidity when compared to N2S including PPH (1.1% vs 0.8%), and third-degree or fourth-degree perineal lacerations (1.8% vs 1.0%), Shoulder Dystocia (0.5% vs. 0.1%), NICU admissions >72 hours (3.6% vs. 2.4%), clavicular fracture (0.7% vs. 0.4%) and Apgar score at 5 minutes < 7 (1.3% vs. 0.7%), p< 0.0001 for all. Arrest of descent was the leading indication for CD. Multivariate analyses revealed independent association (OR 2.2 95% CI [2.1-2.4] between prolonged second stage and higher rates of composite maternal adverse outcome (27.9% vs. 13.6%), and composite neonatal adverse outcome 16.8% vs. 11%, p< 0.0001 for all.

CONCLUSION: P2S for primiparous women at term, according to the traditional definition, is associated with adverse maternal and neonatal outcomes. Even with the benefits of increased rate of vaginal delivery, implementation of new relaxed guidelines for 2nd stage of labor might lead to additional health costs.

116 Pregnancy & power: understanding instagram sentiments on weight & strength training using artificial intelligence (MonkeyLearn)

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OBJECTIVE: Exercise in pregnancy, specifically strength training, is safe and encouraged. However, limited and controversial guidelines across social media platforms leads to confusion and misinformation for pregnant patients. We aim to assess the sentiments of Instagram comments concerning weight and strength training during pregnancy, using natural language processing tools (Monkey Learn).

STUDY DESIGN: A cross-sectional analysis of Instagram comments via hashtags #pregnancystrengthtraining and #pregnancyweightlifting was conducted on August 3, 2023. The first 100 posts for each hashtag were reviewed. Content characteristics were obtained. Comments were input into MonkeyLearn Sentiment Analyzer (2023), to assess their sentiments. The confidence percentage of the sentiment was recorded. Chi-square goodness-of-fit test was performed to assess observed proportions of sentiments compared to expected distribution.

RESULTS: 200 Instagram posts were identified, 31 posts were excluded, and 169 were analyzed. For"#pregnancyweightlifting" (n=83), sentiments were 75% positive, 5% negative and 1% neutral ($p< 0.0001$). Confidence levels of positive sentiments ranged from 45.4% to 99.6%, with a mean of 87.0%. Confidence levels of negative sentiments ranged from 43.5% to 77.0%, with a mean of 51.0%. For "#pregnancystrengthtraining"(n=86), sentiments were 80% positive, 4% negative and 2% neutral ($p< 0.0001$). The confidence level of neutral sentiments was 43.4% to 46.0%, with a mean of 44.6%. Confidence levels of positive sentiments ranged from 35.6% to 99.6%, with a mean of 86.3%. Confidence levels of negative sentiments ranged from 49.2% to 91.5%, with a mean of 66.7%

CONCLUSION: Instagram is a unique social platform that pregnant patients can learn about their bodies. Prenatal exercise including weight and strength training show comment sentiment that are significantly positive compared to negative/neutral, thus healthcare providers should continue to encourage, educate, and safely guide patients on the health benefits of prenatal exercise.

117 Pregnancy and delivery outcomes of women who underwent a VBAC with and without epidural analgesia

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OBJECTIVE: To evaluate whether there is an association between Epidural Analgesia (EA) during VBAC (vaginal birth after cesarean) and pregnancy and delivery outcomes.

STUDY DESIGN: In this retrospective population-based cohort study, all women who underwent a VBAC with and without EA, between the years 1996-2016 at the Soroka University Medical Center (SUMC) were included. Women who delivered by cesarean section (elective and non-elective) and those who gave birth to a newborn with chromosomal abnormalities or major malformations, and multifetal gestations were excluded. Demographical, clinical, and obstetrical characteristics were recorded, and pregnancy complications and adverse perinatal outcomes were compared between the groups. Univariate analysis was followed by a multivariate analysis to control for confounders. A p-value of < 0.05 was considered statistically significant.

RESULTS: During the study period 17,516 women who have had a previous CS met the inclusion criteria, of which 15% (n= 2652) used EA during labor, while the rest of the cohort 85% (n= 14,864) were non-EA users. Women in the EA group had higher rates of instrumental delivery and postpartum hemorrhage (PPH) as well as higher rates of oxytocin augmentation and a longer second stage of labor . The use of EA was found to be an independent risk factor for instrumental delivery after controlling for maternal age, ethnicity, parity, DM (diabetes mellitus), hypertensive disorders of pregnancy, oxytocin augmentation and prolonged second stage of labor . However, no significant differences were observed regarding neonatal outcomes including perinatal mortality, birth weight, Apgar scores and shoulder dystocia rates.

CONCLUSION: EA for women undergoing a VBAC was associated with higher rates of instrumental delivery and PPH, oxytocin augmentation and a longer second stage of labor compared with women without EA. However, neonatal outcomes did not differ between the groups.

Instrumental vs. spontaneous vaginal mode of delivery in the presence of epidural analgesia: multivariate analysis

	aOR	95%CI	P value
Epidural analgesia	3.09	2.58-3.69	<0.001
Maternal age	1.02	1.01-1.04	0.01
Jewish ethnicity	0.43	0.35-0.5	<0.001
DM	1.21	0.92-1.59	0.17
Hypertensive disorders of pregnancy	0.77	0.54-1.12	0.17
Oxytocin	1.26	0.82-1.94	0.29
NPL2 %	649.58	317.75-1347.45	<0.001
Parity	0.40	0.33-0.49	<0.001

118 Mediolateral episiotomy and obstetric anal sphincter injuries in nullipara: A propensity score matching study

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OBJECTIVE: The potential protective effect of mediolateral episiotomy against obstetric anal sphincter injuries (OASIs) is controversial. We aimed to investigate mediolateral episiotomy's role in preventing OASIs during vaginal deliveries (VD) or vacuum-assisted deliveries (VAD).

STUDY DESIGN: Retrospective observational study at a tertiary center, from August 2007 to September 2019. Inclusion criteria were for all nulliparous women with a singleton gestation who underwent VD or VAD at ≥ 37 gestational weeks. To adjust for confounding, propensity score matching with a 1:1 ratio was employed. The primary outcome was the incidence of OASIs, and the secondary outcome was a composite of immediate neonatal outcomes (umbilical artery pH < 7.1, neonatal intensive care unit admission, and 5-minute Apgar score < 7).

RESULTS: The study cohort comprised 22,787 deliveries: 17,546 VD (77%) and 5,241 VAD (23%). Episiotomy rates were 38.5% and 75.9% in VD and VAD, respectively. After matching, both groups showed good balance in body mass index, post-term pregnancy, oxytocin use, neuraxial anesthesia, and birth weights. Separate analyses were conducted for the matched VD group (n = 13,500) and the matched VAD group (n = 2,518). Episiotomy was associated with a lower risk of grade 1 and 2 tears in VD (OR 0.110, 95% CI 0.100 − 0.121) and VAD (OR 0.472, 95% CI 0.378 − 0.590). Regarding OASIs, no significant differences were observed in VD (OR 1.147, 95% CI 0.779-1.688) or VAD (OR 0.581, 95% CI 0.324-1.039). However, in VAD, episiotomy demonstrated a borderline protective effect against OASIs with a number needed to treat = 104.917 (95% CI 42.640 - 167.194). Conversely, episiotomy in NVD was associated with a higher rate of composite neonatal outcome (OR 1.227, 95% CI 1.036-1.453), while VAD showed no such association (OR 1.115, 95% CI 0.871-1.426).

CONCLUSION: Propensity score matching reveals no significant protective effect of mediolateral episiotomy on OASIs in women undergoing VD. However, there is a possible benefit in VAD.

Table 1. Results of Mediolateral Episiotomy and Obstetric Anal Sphincter Injuries in Nullipara

	VD N = 13,500			VAD N = 2,518		
Variable	No episiotomy N = 6,750[1]	With episiotomy N = 6,750[1]	p-value[2]	No episiotomy N = 1,259[1]	With episiotomy N = 1,259[1]	p-value[2]
Grade 1 and 2 tears	3,428 / 6,750 [51%]	688 / 6,747 [10%]	< 0.001	252 / 1,259 [20%]	133 / 1,259 [11%]	< 0.001
OASIs	48 / 6,750 [0.7%]	55 / 6,750 [0.8%]	0.489	29 / 1,259 [2.3%]	17 / 1,259 [1.4%]	0.074
PPH	188 / 6,750 [2.8%]	273 / 6,747 [4.0%]	< 0.001	66 / 1,259 [5.2%]	94 / 1,259 [7.5%]	0.022
NICU admission	238 / 6,676 [3.6%]	269 / 6,676 [4.0%]	0.160	120 / 1,219 [9.8%]	134 / 1,241 [11%]	0.437
Umbilical artery pH < 7.1	13 / 5,443 [0.2%]	29 / 5,209 [0.6%]	0.009	8 / 1,056 [0.8%]	5 / 1,029 [0.5%]	0.431
Apgar at 5 minutes < 7	19 / 6,750 [0.3%]	20 / 6,750 [0.3%]	0.873	12 / 1,258 [1.0%]	7 / 1,259 [0.6%]	0.249
Composite fetal outcome[3]	261 / 5,412 [4.8%]	305 / 5,212 [5.9%]	0.018	129 / 1,042 [12%]	140 / 1,029 [14%]	0.407

[1]Frequency [%]

[2]Pearson's Chi-squared test; Fisher's exact test

[3]Composite neonatal outcome was defined as umbilical artery pH < 7.1, neonatal intensive care unit admission, or 5-minute Apgar score < 7.

NICU neonatal intensive care unit; PPH post-partum hemorrhage; OASIs obstetric anal sphincter injuries; VAD vacuum-assisted delivery; VD vaginal delivery.

119 Transplacental transfer of alectinib and osimertinib using an ex vivo human placental perfusion model

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OBJECTIVE: Non-small cell lung cancer is a rare diagnosis in pregnant women but its incidence is increasing during pregnancy. Recent protein kinase inhibitors have improved the prognosis of specific molecular subtypes (epidermal growth factor receptor-mutant and anaplastic lymphoma kinase-rearranged), but little is known about their use during pregnancy. Thus, we aimed to determine transplacental transfer and cotyledon accumulation of osimertinib and alectinib, using the human perfused placental cotyledon model.

STUDY DESIGN: Human term placentas from normal pregnancies were collected after delivery and were perfused with osimertinib or alectinib associated with its principal active metabolite M4 at targeted maternal concentrations. We evaluated transport parameters such as fetal transfer rate (FTR) and clearance index (CI), as well as cotyledon accumulation. Antipyrine was used as a control marker. Samples were collected during a 90 minute-procedure.

RESULTS: Mean FTR and mean CI of osimertinib were 9.5% and 0.42, respectively. Mean osimertinib cotyledon accumulation index was 28.9 % i.e. 116,7 μg/100 mg. Conversely, nor alectinib neither M4 were detected in fetal samples. However, mean alectinib cotyledon accumulation index was 370.7 % i.e., 574 μg/100 mg and mean M4 cotyledon accumulation index was 178.5 % i.e. 79.3 μg/100 mg.

CONCLUSION: Our results suggest that osimertinib significantly crosses the placenta with a moderate placental uptake. Conversely, alectinib and its metabolite M4 do not cross the placental barrier and massively accumulate in placental tissue.

Characteristics of osimertinib, alectinib and M4 transplacental transfer using an *ex vivo* human placental perfusion model

Characteristic	Osimertinib	Alectinib	M4
No. of perfused placentas	6	12	12
Fetal transfer rate (%), median (range)	9,55 (4,5-32)	/	/
Clearance index, median (range)	0,42 (0,2-0,58)	/	/
Placental uptake (µg/100mg), median (range)	116,7 (84,9-545,2)	574 (76,9-2671)	79,3 (22,5-346,2)
Accumulation index (%)	28,9	370,7	178,5

120 Association between distance to fetal treatment center and abortion consideration among people with fetal myelomeningocele

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OBJECTIVE: The relationship between geographic distance and abortion for individuals with fetal myelomeningocele (fMMC) has not yet been elucidated. Thus, we aimed to evaluate the association between distance traveled to fetal treatment center (FTC) and consideration of abortion among patients with fMMC.

STUDY DESIGN: We performed a retrospective cohort analysis of all fMMC consultations at a FTC in Illinois from 2018-2023. The exposure was distance traveled to FTC, collected as miles from patient's zip code of residence to FTC. Distance was analyzed categorically, dichotomized based on median value, and continuously. The primary outcome was abortion consideration, ascertained by a nurse during FTC intake. Bivariate and multivariate log-binomial regression analyses were performed, treating distance traveled as an

interaction factor with state of residence. P< 0.05 indicated statistical significance.

RESULTS: 100 patients were available for analysis. Median distance traveled was 62.2 miles (range 1.2-928.2). On bivariate analysis, people traveling below the median distance were more likely to identify as Latinx, reside within Illinois, and present at an earlier gestational age when compared with those traveling above the median distance (Table). On regression modeling, when compared with individuals living below the median distance and outside Illinois, both living above the median distance and outside Illinois (aRR 0.36, 95% CI 0.17-0.75) and within Illinois (aRR 0.40, 95% CI 0.18-0.79) were independently associated with a lower risk of considering abortion after controlling for maternal ethnicity. On regression modeling after controlling for ethnicity, for every mile traveled, the risk of considering abortion decreased by 1% (aRR 0.99, 95% CI 0.98-1, p = 0.003 for in-state, p = 0.01 for out-of-state).

CONCLUSION: Increased distance traveled is associated with lower risk of abortion consideration prior to presenting to an FTC for fMMC consultation. These data emphasize the nuanced relationship between fetal diagnosis and abortion and importance of providing comprehensive reproductive counseling to FTC patients.

Table. Biomedical and sociodemographic data of pregnant people with fetuses with myelomeningocele, by distance travelled

	Below median distance travelled (n=46)	*Above median distance traveled (n=54)*	*p-value[a]*
Age, in years	31 (27-34)	29 (25-33)	0.17
Self-reported race			
White	31 (67.4)	45 (83.3)	0.15
Black	5 (10.9)	4 (7.4)	
Other	10 (21.7)	5 (9.3)	
Latinx ethnicity	16 (34.8)	4 (7.4)	**0.001**
Residing in Illinois	42 (91.3)	25 (46.3)	**<0.001**
Nulliparous	21 (45.7)	18 (33.3)	0.21
Presentation to CIFH after passage of RHA	13 (28.3)	12 (22.2)	0.49
Presence of genetic and/or structural abnormality	3 (6.5)	4 (7.4)	1.0
Presence of talipes equinovarus[b]	12 (26.1)	15 (28.3)	0.80
Presence of severe ventriculomegaly	18 (39.1)	25 (46.3)	0.47
Grade III Chiari malformation[c]	27 (60.0)	38 (74.5)	0.13
Highest level of lesion[d]			
L3 and above	20 (45.5)	27 (50.9)	0.59
L4-S1	24 (54.5)	26 (49.1)	
Size of lesion, in centimeters[e]	1.5 (1.2-1.9)	1.2 (1-1.6)	0.05
GA at initial consultation	22 (21-22)	22 (21-23)	**0.02**
Candidate for prenatal repair[b]	37 (80.4)	36 (67.9)	0.16

Data are median (IQR) or n (%) unless otherwise specified
[a]Chi-squared or Fisher's exact test for categorical variables, Wilcoxon rank-sum test for continuous variables
[b]Available for 99 participants
[c]Available for 96 participants
[d]Available for 97 participants
[e]Available for 92 participants
CIFH = Chicago Institute for Fetal Health; GA = gestational age; RHA = Reproductive Health Act
Bold indicates statistical significance < 0.05

121 Antenatal corticosteroid exposure in late preterm small for gestational age: A population cohort study

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OBJECTIVE: To examine outcomes in parturients who delivered a small for gestational age (SGA) newborn in the late preterm period and who either received antenatal corticosteroids (ANCS) or did not.

STUDY DESIGN: This population-based retrospective cohort study used U.S. Vital Statistics dataset (2016-2020). The inclusion criteria were singleton, liveborn non-anomalous individuals delivering between 34.0 − 36.6 weeks' gestation with SGA neonate (birth weight < 10% for gestational age, Duryea EL et al) and known status of exposure to ANCS at any time in gestation. The primary outcome was a composite neonatal adverse outcome including Apgar score < 5 at 5 min, immediate assisted ventilation, assisted ventilation > 6 hrs., surfactant use, seizure, or neonatal mortality. Multivariable Poisson regression models were used to estimate adjusted relative risks (aRR) and 95% confidence intervals (CI). A subgroup analysis by gestational age was performed. Annual percent change (APC) was calculated to assess changes in rates of ANCS exposure over study period.

RESULTS: Of 19 million live births during the study period, 109,985 (0.6%) met inclusion criteria, and among them, 26,151 (24%) individuals with SGA neonates received ANCS. After adjustment, the composite neonatal adverse outcome, mainly driven by respiratory complications, was higher among those who received ANCS than those who did not (aRR 1.31, 95% CI 1.27-1.35). This difference persisted in gestational age subgroup analysis at 34 (aRR 1.35, 95% CI 1.29 − 1.42), 35 (aRR 1.27, 95% CI 1.21 − 1.35) and 36 weeks' gestation (aRR 1.31, 95% CI 1.24 − 1.38). The rate of ANCS exposure remained stable over the 5 years period (APC 14.2 95% CI -1.1 − 31.9).

CONCLUSION: Among individuals with late preterm neonates and small for gestational age, 1 out of 4 had exposure to antenatal corticosteroids, and it was associated with a higher risk of neonatal morbidity.

Table. Late preterm birth and small for gestational age

Outcomes	Antenatal steroids	Total live births	n	Rate per 1,000 live births	Crude RR (95% CI)	Adjusted RR* (95% CI)
Composite neonatal adverse outcome	Total	109,266	16,202	148.3		
	Did not receive	83,158	10,702	128.7	1.00	1.00
	Received	26,108	5,500	210.7	**1.64 (1.59 – 1.69)**	**1.31 (1.27 – 1.35)**
5-minute Apgar < 5	Total	109,192	1,692	15.5		
	Did not receive	83,095	1,327	16.0	1.00	1.00
	Received	26,097	365	14.0	**0.88 (0.78 – 0.98)**	**0.81 (0.72 – 0.91)**
Immediate assisted ventilation	Total	109,950	14,883	134.5		
	Did not receive	83,804	9,641	115.0	1.00	1.00
	Received	26,146	5,242	200.5	**1.74 (1.69 – 1.80)**	**1.38 (1.33 – 1.42)**
Assisted ventilation > 6 hours	Total	109,950	5,748	52.3		
	Did not receive	83,804	3,552	42.4	1.00	1.00
	Received	26,146	2,196	84.0	**1.98 (1.88 – 2.09)**	**1.47 (1.39 – 1.55)**
Surfactant use	Total	109,950	1,087	9.9		
	Did not receive	83,804	699	8.3	1.00	1.00
	Received	26,146	388	14.8	**1.78 (1.57 – 2.01)**	**1.42 (1.25 – 1.61)**
Seizure	Total	109,950	96	0.9		
	Did not receive	83,804	77	0.9	1.00	1.00
	Received	26,146	19	0.7	0.79 (0.48 – 1.31)	0.83 (0.48 – 1.40)
Neonatal mortality	Total	109,985	342	3.1		
	Did not receive	83,834	286	3.4	1.00	1.00
	Received	26,151	56	2.1	**0.63 (0.47 – 0.84)**	**0.61 (0.45 – 0.82)**

RR: relative risk; CI: confidence interval. Bold indicates statistically significant results.
*Adjusted for maternal race and ethnicity, payer status, prenatal care, nulliparous, prior preterm birth, hypertensive disorders, gestational age, and year.

122 Association between partner factors on continued substance use among pregnant people with opioid use disorder

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OBJECTIVE: To explore associations between intimate partner factors and continued substance use among pregnant people with opioid use disorder (OUD).

STUDY DESIGN: This is a multi-center prospective cohort study of pregnant people with OUD. We recruited participants >20 weeks' gestation from four clinics specializing in perinatal addiction. We collected data at baseline and at follow-up three months later. At baseline, we collected participant demographics and intimate partner factors including substance use. Intimate partner violence (IPV) was assessed using the validated HARK (humiliation, afraid, rape, kick) questionnaire plus a financial abuse question. We defined continued use as maternal unexpected urine toxicology results at follow-up. We compared participant and partner characteristics between those with and without continued use using chi-square and Fisher's exact test. Multivariable logistic regression was used to explore associations of partner factors with continued use while adjusting for potential confounders.

RESULTS: Eighty participants were enrolled at four sites and 62 (77.5%) completed 3-month follow up. At baseline, 37% of participants (n=22/74 with available urine sample) had unexpected use compared to 32.3% (n=20/62) at follow-up. At baseline, 30% of participants (n=22/73) reported that their partner used substances and 64% (n=50/78) reported partner used alcohol. Many participants (36%, n=29/80) reported IPV at baseline (humiliation 29%, afraid 22%, sexual assault 10%, physical assault 17%, financial 31%). In the adjusted model, participant substance use at baseline (aOR 11.6, 95% CI 2.21, 62.2) and 3-month medication for opioid use disorder (aOR 0.03 95% CI 0.01-1) were associated with continued use at follow-up (Table). Partner factors were not significantly associated with continued use.

CONCLUSION: While limited by small sample size and attrition, this study found that partner factors were not associated with continued use. However, IPV was frequent and systemic screening for financial abuse should be considered in this population.

Table: Participant characteristics and partner factors among pregnant people with opioid use disorder by continued substance use at follow-up

Characteristics n (%)	Baseline n = 80	Follow-up available n=62		Adjusted odds ratio (95% confidence interval)
		No continued use at follow-up	Continued substance use at follow-up	
		42 (68)	20 (32)	
Maternal age (median, inter-quartile range)	29 (26, 31)			0.89 (0.78,1.02)
Married	14 (17.5)	11 (26.2)	2 (10)	0.21 (0.01-5.24)
Medication for OUD at 3 months (methadone or buprenorphine)	56 (93.3)	41 (97.6)	14 (70)	0.03 (0.01-1)
Partner substance use (n=73)	22 (30.1)	8 (19.0)	7 (35)	2.14 (0.26,17.75)
Partner alcohol use (n=76)	50 (65.8)	25 (59.5)	16 (80)	0.68 (0.08,5.45)
Any abuse	34 (42.5)	17 (40)	8 (40)	2.40 (0.36,15.79)
Maternal substance use at enrollment (n=74)	27 (36.5)	8 (19.0)	12 (60)	**11.61* (2.17,62.2)**
Study site				
Utah	24 (30)	14 (33)	3 (15)	1
New Mexico	20 (25)	8 (19)	8 (40)	1.45 (0.08-26.3)
Arkansas	16 (20)	9 (21)	5 (25)	3.271 (0.06-169.6)
Kentucky	20 (25)	11 (26)	4 (20)	1.013 (0.08-13.2)

* p < 0.01

123 Is maternal intrapartum low-grade fever a risk factor for maternal and neonatal adverse outcomes?

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OBJECTIVE: Intrapartum fever (IF) is defined as maternal temperature ≥38°C during labor and is a known risk factor for maternal and neonatal morbidity. Maternal fever between 37.5-37.9°C, although considered as low-grade fever (LG fever), could also be indicative of an underlying maternal infection. This study aims to assess the association between intrapartum LG fever and adverse maternal and neonatal outcomes.

STUDY DESIGN: This retrospective study included all nulliparous women with a singleton pregnancy who gave birth between 2014-2020. The study cohort was divided into three groups: women with low grade intrapartum fever (LG fever group), women with intrapartum fever (IF group) and a control group comprising women with a normal-range body temperature. Maternal and neonatal outcomes were compared between the groups.

RESULTS: A total of 15,093 nulliparous were included, with 1,294 in the LG fever group, 934 in the IF group and 12,865 controls. Compared to the control group, the IF and the LG fever groups had higher rates of post term deliveries (P< 0.001 for all). The LG fever group had higher rates of labor induction (p< 0.001), epidural (P< 0.001), longer duration of the second stage (142 ± 71 vs 109 ± 73, P< 0.001) and vacuum extractions (VE) (27% vs 17%, P< 0.001) compared to the control group. The rate of cesarean delivery (CD) did not differ between the control group and the LG fever group (p= 0.237), but was significantly increased in the IF group (p< 0.001). Compared to the control group the LG fever group had higher neonatal birth weights (3,272 ± 429 vs 3,136 ± 467, P< 0.001), higher rates of shoulder dystocia (1.3% vs 0.4%, P< 0.001) and 5 minutes Apgar score< 7 (0.9% vs 0.4%, p=0.034). Multivariate logistic regression analysis adjusted for confounders revealed that low-grade fever was independently associated with increased likelihood to deliver by VE and to have 5 minutes Apgar score < 7.

CONCLUSION: Intrapartum maternal low-grade fever is associated with maternal and neonatal adverse outcomes and therefore should be taken into consideration during labor.

Maternal and neonatal outcomes in relation to maternal intrapartum fever status

	LG fever 37.5-37.9°C (n=1294)	IF (n=934)	Normal range fever (n=12865)	P-value IF vs normal range fever	P-value LG fever vs normal range fever
Labor induction, N (%)	456, 35	409, 43.7	3741, 29	**<0.001**	**<0.001**
Epidural, N (%)	1232, 95	879, 94.1	10154, 78.9	**<0.001**	**0.237**
Second stage duration (min± SD)	142 ± 71	142 ± 69	109 ± 73	**<0.001**	**<0.001**
Shoulder dystocia, N (%)	17, 1.3	14, 0.4	55, 0.4	**<0.001**	**<0.001**
Instrumental delivery, N (%)	358, 27	295, 31	2204, 17	**<0.001**	**<0.001**
CD, N (%)	165, 12.7	199, 21.3	1794, 13.9	**<0.001**	0.237
Apgar 5 < 7, N (%)	12, 0.9	17, 1.8	62, 0.4	**<0.001**	**0.034**
pH ≤ 7.1, N (%)	30, 2.3	24, 2.5	248, 1.9	0.311	0.618
Phototherapy, N (%)	65, 5	50, 5.3	700, 5.4	0.062	0.458
NICU, N (%)	27, 2	38, 4	361, 2.8	**0.026**	0.131
Respiratory distress with mechanical ventilation, N (%)	12, 0.9	26, 2.7	64, 0.49	**<0.001**	0.051

SD=standard deviation, LG=low grade fever, IF=intrapartum fever, CD=cesarean delivery, NICU=neonatal intensive care unit

124 Prescription opioid exposure and risk of spontaneous preterm delivery

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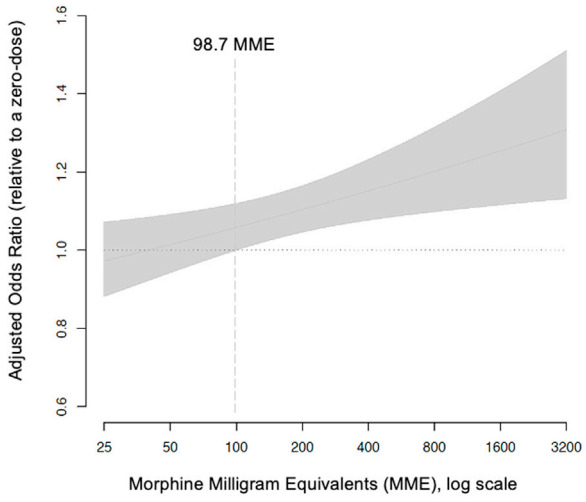
OBJECTIVE: Prior studies that reported associations between opioid exposure during pregnancy and preterm birth did not differentiate between spontaneous and indicated preterm birth or fully investigate a potential dose-dependent relationship with opioid exposure. We investigated the association between prescription opioid exposure proximate to delivery and spontaneous preterm birth, and whether the association is dose-dependent.

STUDY DESIGN: We performed a nested case-control study of pregnant patients enrolled in TN Medicaid. Enrollment files were linked to healthcare encounters, hospital discharge data, birth certificate data, and prescription fill records. We included patients aged 15-44 years with a singleton livebirth at 24 weeks or greater between 2007 and 2019 with linked birth certificate data in the parent cohort. We identified cases of spontaneous preterm birth using a validated algorithm and matched up to 10 controls on case delivery date (index date), conception date, race, ethnicity, maternal age at delivery (±2 years), and preterm birth history. The exposure was total opioid morphine milligram equivalents (MME) filled within the 60 days prior to the index date. We used conditional logistic regression to estimate adjusted odds ratios (aOR) and obtained 95% confidence intervals (95% CI).

RESULTS: We identified 25,383 patients with spontaneous preterm birth (cases) and matched them to 225,436 controls (N=250,819 total). Overall, 8.8% of case patients filled an opioid prescription (median MME 150, IQR 75-338) versus 7.3% of controls (median MME 135, IQR 72-270). Total opioid MME prescribed within 60 days prior to index date was continuously associated with higher odds of spontaneous preterm birth, adjusting for relevant confounders (aOR=1.03 95% CI: [1.07-1.13] per opioid MME). Total opioid doses >98.7 MME were significantly associated with spontaneous preterm birth.

CONCLUSION: We identified an association between higher total opioid exposure and spontaneous preterm birth. Our findings support guidance to minimize opioid exposure proximate to delivery and prescribe the lowest dose necessary.

Figure: Association between total opioid MME prescribed and spontaneous preterm birth



>98.7 MME is the point where the lower bound of the 95% confidence interval becomes statistically significant

Model adjusted for parity, pre-pregnancy body mass index (BMI), education level, tobacco use, hepatitis infections, and pain indications

125 Adverse labor events and childhood autism- is there a link?

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OBJECTIVE: While the global interest and prevalence of autism spectrum disorder (ASD) are on the rise, the underlying mechanism and potential perinatal risk factors for its development are yet to be fully elucidated. In this study, we have sought to examine the potential association between unfavorable perinatal outcomes and ASD during childhood.

STUDY DESIGN: A population-based cohort analysis was conducted that included deliveries at a tertiary referral hospital occurring between 2005 to 2017 (selected following initial analysis that revealed a lower incidence of ASD diagnoses after 2017). The incidence of offspring diagnosed with ASD (both community and hospital-based diagnoses) was compared based on exposure (or lack thereof) to the composite variable "adverse perinatal outcomes" (comprising of 5-min Apgar scores < 7, umbilical cord blood pH < 7.0, and non-reassuring fetal heart rate). A Kaplan-Meier survival curve was used to assess cumulative ASD incidence. A Cox proportional hazards model was used to control for confounders.

RESULTS: Out of the 165,989 births included in the study, 11,070 (6.7%) had adverse perinatal outcomes. These births were more commonly complicated by intra-uterine growth restriction (4.1% vs.

1.8%), preterm delivery (9.6% vs. 6.6%), and cesarean delivery (45.3% vs. 13.4%; p< 0.001 for all). 862 offspring of the cohort were diagnosed during childhood with ASD. Overall, the cumulative incidence of ASD diagnoses was equivalent comparing "adverse perinatal outcomes" exposure status (Kaplan-Meier log-rank p=0.690), while the total ASD diagnoses were higher among offspring of complicated deliveries (0.7% vs. 0.5% respectively; p=0.012; Table). A Cox proportional hazards model, controlling for ethnicity, gestational age, maternal age, cesarean delivery, and gender, found no association between adverse perinatal outcomes and the risk of ASD (adjusted HR = 0.96, 95% CI 0.75−1.22, p=0.72; Table).

CONCLUSION: Adverse labor events, although concerning in terms of immediate neonatal health, do not appear to contribute to a higher risk of ASD in children as they grow older.

Table. The association between adverse perinatal outcomes (i.e., 5-min Apgar score <7, umbilical cord blood pH <7.0, and non-reassuring fetal heart rate) and autism spectrum disorder (ASD) in the offspring.

	Adverse perinatal outcomes (n=11,070)	No adverse perinatal outcomes (n=154,619)	Odds ratio (95% CI)[b]	Adjusted hazard ratio (95% CI)[a,]
ASD (Cases, %)	**76 (0.7)**	**786 (0.5)**	**1.35 (1.06-1.71)**	**0.95 (0.75-1.21)**

[a] P<0.012

[b] Adjusted to ethnicity, gestational age, maternal age, cesarean delivery, and gender.

126 A qualitative study of patient experiences and burdens of antenatal testing

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OBJECTIVE: Expanded outpatient antenatal testing recommendations were released in 2021. Recommendations include individualizing care due to potential negative outcomes including the psychosocial impacts to patients, however limited information is available describing patient experiences and burdens when completing recommended antenatal testing. We sought to better understand patient experiences and potential burdens to those undergoing outpatient antenatal testing.

STUDY DESIGN: A single-center cross-sectional survey was administered to those attending an antenatal testing appointment. A 55-question electronic survey assessing patient knowledge, experience, and potential burdens surrounding completion of antenatal testing was self-administered by the patients. Demographics and survey responses were analyzed using descriptive statistics. Qualitative questions were analyzed with thematic analysis.

RESULTS: 124 patients were approached with 122 agreeing to participate. 103 completed the survey, resulting in 84% survey response rate. Overall, most participants did not consider it difficult to complete testing (86.8%). Missing work was required by 45.9% and obtaining childcare by 34.9%. When rating level of burden experienced, financial burden rated highest for those with household income < $100K with missed work highest for those with household income of $200k+ (Table 1). The median patient non-medical expense for each antenatal testing appointment was $20 (IQR = $5, $80). Thematic analysis of responses identified the following themes related to patient burdens: scheduling availability, requirement for missed work and childcare, high cost, increased stress and anxiety, and inconvenience.

CONCLUSION: For participants completing antenatal testing at our institution, burdens commonly experienced included financial, need for missed work and childcare. For some these negative psychosocial impacts are not insignificant and should be considered when individualizing care.

Table 1. Median [IQR] rating of participant burdens experienced by annual income with "0" signifying no burden and "10" signifying most burdensome.

	Financial	Childcare	Missed Work
< 100k	4 [1 – 6.5]	1 [0 – 6]	1 [0 – 7.25]
100-200k	3 [1 – 4.5]	1 [0 – 4]	4 [0 – 8]
200k +	1 [0 – 2]	1 [0 – 4]	4 [1.25 – 6]

127 Among patients undergoing induction who reach active phase, does prolonged latent phase matter?

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OBJECTIVE: While guidelines exist for diagnosing a failed induction of labor (IOL), there is little data assessing the impact of a prolonged, but not failed, latent phase on the remainder of the IOL trajectory. Therefore, we sought to assess if a prolonged latent phase is associated with an increased risk of Cesarean delivery (CD) or labor arrest among patients undergoing IOL.

STUDY DESIGN: This was a secondary analysis of a large prospective cohort study of term, singleton inductions with intact membranes and an unfavorable cervix at 2 sites from 2018-2022. Only patients who reached active phase (defined as ≥6cm dilation) were included. Prolonged latent phase was defined as < 6 cm dilation after ≥12 hours with ruptured membranes and receiving oxytocin infusion. The primary outcome was CD for any indication. Generalized estimating equations were used to calculate relative risk (RR) and adjust for confounders.

RESULTS: Of 8,509 patients in the cohort, 7,451 (87.6%) reached active phase and were included. 472 (6.3%) had a prolonged latent phase with demographic and clinical characteristic differences noted in the Table. There was a higher rate of CD for those with a prolonged latent phase compared to those without, which remained after adjusting for BMI, insurance type, diabetes, and Bishop score at the start of IOL (25.2% vs 9.9%, p< 0.001, aRR 1.69 95%CI [1.41-2.01]). This increased risk was noted among nulliparous patients (27.8% vs. 14.3%, p< 0.001, aRR 1.67 95%CI [1.39-2.00]) but not multiparous patients (8.1% vs. 3.2%, p=0.03, aRR 2.13 95%CI [0.88-5.12]). In those with a CD, there was a higher rate of CD for labor arrest among patients with prolonged latent phase compared to those without (19.5% vs. 6.3%, p< 0.001), with an increased risk of CD for labor arrest noted among nulliparous (21.7% v. 9.4%, p< 0.001), but not multiparous patients (4.8% v. 1.5%, p=0.07).

CONCLUSION: While the majority of patients with a prolonged latent phase of labor ultimately have a vaginal delivery, it is an independent risk factor for CD in active phase, both overall and among nulliparous patients.

Table 1: Demographic and clinical baseline characteristics in patients with a non-prolonged vs. prolonged latent phase of labor

	Non-prolonged latent phase (n=6979)	Prolonged latent phase (n=472)	p-value
Race			
Black	3042 (43.6%)	188 (39.8%)	0.13
White	2883 (41.3%)	200 (42.4%)	
Other	1054 (15.1%)	84 (17.8%)	
Maternal age (years)[a]	31.2 [26.7-34.6]	31.1 [25.2-34.6]	0.40
BMI (mg/kg2)[a]	31.2 [27.6-36.2]	33.2 [29.0-38.3]	<0.001
Nulliparous	4197 (60.1%)	410 (86.9%)	<0.001
Insurance			
Private	4189 (60.1%)	321 (68.2%)	<0.001
Public	2777 (39.9%)	150 (31.8%)	
Gestational diabetes	540 (7.8%)	54 (11.4%)	0.010
Pre-gestational diabetes	628 (9.0%)	64 (13.6%)	<0.001
Chronic hypertension	567 (8.1%)	45 (9.6%)	0.49
Bishop score at start of induction[a]	2.0 [1.0-3.0]	2.0 [0.0-2.0]	<0.001
Gestational age at delivery (weeks)[a]	39.5 [38.7-40.3]	39.6 [38.5-40.4]	0.51
Indication for induction			
Elective/postdates	2334 (33.4%)	127 (26.9%)	<0.001
Maternal	2402 (34.4%)	207 (43.9%)	
Fetal	1295 (18.6%)	77 (16.3%)	
Other	948 (13.6%)	61 (12.9%)	
IOL agent			
Misoprostol alone	1170 (16.8%)	54 (11.4%)	<0.001
Misoprostol + Foley balloon (FB)	5130 (73.5%)	361 (85.2%)	
FB alone	250 (3.6%)	15 (3.2%)	
FB + Pitocin	419 (6.0%)	41 (8.7%)	
Other	10 (0.1%)	1 (0.2%)	

All data presented as n(%) unless otherwise noted. *a. median [IQR]. BMI: body mass index*

128 Association of borderline fetal growth with progression to fetal growth restriction

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OBJECTIVE: To evaluate if an estimated fetal weight (EFW) between the 10-15th percentiles at time of anatomy ultrasound, referred to as borderline fetal growth, is associated with progression to fetal growth restriction (FGR) on subsequent ultrasound, delivery of a SGA neonate or neonatal intensive care (NICU) admission.

STUDY DESIGN: We performed a secondary analysis using the Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-Be data (NuMom2b). The exposures were normotensive pregnancies with non-anomalous singleton gestations with normal growth, defined as EFW >15th percentile at the anatomy scan compared to borderline fetal growth fetuses defined as those with an EFW in the 10-15th percentile. The primary outcome was FGR at subsequent ultrasound, defined as EFW or AC < 10%. The secondary outcomes were NICU admission and small for gestational age (SGA) neonate. Univariable analyses were performed comparing maternal baseline demographic and clinical characteristics. Multivariable analysis was performed for the primary outcome with variables adjusted a priori for body mass index, smoking status, race/ethnicity, insurance status, and drug use.

RESULTS: 4986 patients met inclusion criteria with 114 in the borderline fetal growth group and 4769 in the normal growth group. There were no significant differences in maternal demographic or medical characteristics (Table 1). In adjusted multivariable analysis, patients with borderline growth had significantly higher odds of being diagnosed with FGR at their subsequent scan (aOR 6.68, CI 3.98-11.20) compared to those with normal growth. For secondary outcomes, patients with borderline fetal growth were significantly more likely to have SGA neonates (6.14% vs. 2.67%, p= 0.025). There was no difference in admissions to the NICU between groups.

CONCLUSION: Diagnosis of borderline fetal growth at time of anatomy scan was associated with a significantly increased odds of progression to FGR at subsequent scan and delivery of a SGA neonate.

Table 1: Maternal demographic and clinical characteristics by EFW at anatomy scan

	EFW >15% (n=4769)	EFW 10-15% (n=114)	P-value
Maternal age (years)	28 (8)	27 (8)	0.11
Smoked within 3 months of pregnancy	790 (16.57)	18 (15.79)	0.96
BMI kg/m^2 (pre-pregnancy)	24.47 (6.85)	24.93 (7.32)	0.74
Race			
White non-Hispanic	2978 (62.44)	61 (54.51)	0.41
Black non-Hispanic	494 (10.36)	15 (13.16)	
Hispanic	842 (17.66)	25 (21.93)	
Asian/Pacific Islander	4 (0.08)	0 (0.00)	
Other	451 (9.46)	13 (11.40)	
Insurance status			
Public	1214 (25.46)	35 (30.70)	0.21
Private	3555 (74.54)	79 (69.30)	
Hypertensive disorder of pregnancy	726 (15.22)	12 (10.53)	0.17
Illicit drug use within 1 month of subsequent scan	32 (0.67)	0 (0.00)	0.56
GA at first scan (weeks)	19 (2)	19 (1)	0.18
GA at subsequent scan	28 (2)	27 (2)	0.53

Data presented as median (IQR), n (%)
BMI: body mass index; GA: gestational age; EFW: estimated fetal weight

129 Impact of group prenatal care on postpartum contraception choice and rapid repeat pregnancy

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OBJECTIVE: Group prenatal care (GPNC) offers extended time for health education on topics including family planning (contraception methods, healthy pregnancy spacing). Patients who receive evidence-based family planning counseling often choose long acting reversible contraceptive (LARC) options. We sought to compare the initiation rates of postpartum LARC in patients participating in GPNC versus individual prenatal care (IPNC).

STUDY DESIGN: This was a secondary analysis of a single-center 1:1 randomized controlled trial comparing pregnancy outcomes for patients in GPNC versus IPNC, stratified by self-reported race and ethnicity. Patients with a spontaneous abortion, fetal demise, or who were lost to follow-up after delivery were excluded. The primary outcome was initiation of LARC by 8 weeks postpartum. Secondary outcomes included initiation of LARC across racial and ethnic groups, initiation of LARC prior to hospital discharge, and short-interval pregnancies. A sensitivity analysis compared outcomes in per compliance (>5 visits in assigned arm, PC) groups. Multivariable logistic regression was used to adjust for baseline differences between groups.

RESULTS: 1,998 (85.0%) of the Centering and Racial Disparities (CRADLE) participants met inclusion criteria for this analysis. Demographic characteristics were similar between treatment groups with the exception of tobacco use prior to pregnancy. There was no

significant difference in the rates of LARC initiation between GPNC and IPNC participants at 8 weeks postpartum (adjusted odds ratio [aOR] 1.08, 95% confidence interval [CI] 0.89, 1.30). LARC initiation did not differ by racial and ethnic groups across exposures. There was also no significant difference between the rate of LARC initiation at hospital discharge (aOR 1.05, 95% CI 0.87, 1.26) nor the frequency of short-interval pregnancies (odds ratio 1.04, 95% CI 0.81, 1.33). These findings did not differ when comparing PC groups.

CONCLUSION: In this secondary analysis, participation in GPNC was not associated with increased rates of LARC initiation or decreased rates of short-interval pregnancies.

	IPNC (n = 1,008)	GPNC (n = 990)	OR (95% CI)	P	aOR (95% CI)[a]	P
All LARC	33.9 (342)	35.8 (354)	1.08 (0.90, 1.30)	0.39	1.08 (0.89, 1.30)	0.44
Levonorgestrel IUD	18.0 (181)	18.3 (181)	1.02 (0.81, 1.28)	0.85	1.01 (0.80, 1.28)	0.93
Copper IUD	1.9 (19)	2.9 (29)	1.57 (0.88, 2.82)	0.13	1.52 (0.85, 2.74)	0.16
Implant	14.1 (142)	14.6 (144)	1.04 (0.81, 1.33)	0.77	1.04 (0.81, 1.35)	0.74
LARC by Race / Ethnicity						
Black[b]	31.2 (121)	34.3 (137)	1.15 (0.86, 1.55)	0.35	1.17 (0.86, 1.58)	0.31
White[c]	38.3 (144)	37.1 (131)	0.95 (0.70, 1.28)	0.74	0.93 (0.68, 1.26)	0.63
Hispanic[d]	32.3 (75)	36.0 (81)	1.18 (0.80, 1.73)	0.41	1.16 (0.78, 1.73)	0.46
Permanent contraception	11.7 (118)	10.9 (108)	0.92 (0.70, 1.22)	0.88	0.92 (0.69, 1.21)	0.54
Short-Interval pregnancy[e]	25.5 (170)	26.2 (175)	1.04 (0.81, 1.33)	0.75	-	-
Interpregnancy interval, months	8.9 (6.0 – 13.5)	10.1 (6.0– 13.7)	-	0.54	-	-

Data are % (n) or median (interquartile range).
[a]Adjusted for tobacco use prior to pregnancy; [b]n = 388 for IPNC and 399 for GPNC; [c]n = 376 for IPNC and 353 for GPNC; [d]n = 232 for IPNC and 225 for GPNC; [e]n = 668 for IPNC and 668 for GPNC

130 Vaginal birth after cesarean (VBAC) success and uterine rupture among twin compared to singleton gestation

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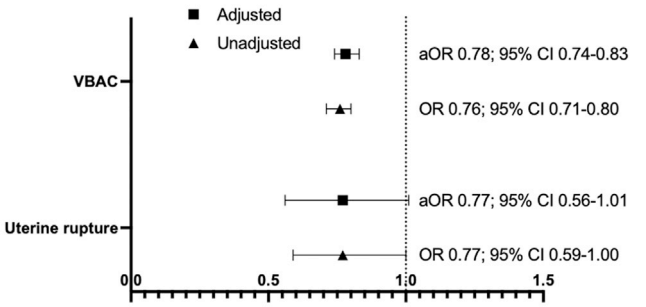
OBJECTIVE: Rates of vaginal birth after cesarean (VBAC) success and uterine rupture risk are well described for singleton gestations undertaking a trial of labor after cesarean (TOLAC). However, data are limited for twin gestations. We aimed to evaluate rates of VBAC success and uterine rupture among twin compared to singleton gestations undergoing TOLAC.

STUDY DESIGN: Retrospective cohort study including deliveries >20 weeks' gestation from 2016-2018 with data available in the MarketScan Research Database. Individuals with prior cesarean delivery and undertaking TOLAC were included. Those with contraindication to vaginal delivery or higher order multiples were excluded. The primary outcome was successful VBAC, defined as vaginal delivery among those with history of cesarean. The secondary outcome was uterine rupture. Outcomes and covariates were identified using ICD-10 codes. Univariate analyses compared baseline characteristics for twins compared to singleton gestations. Multivariate logistic modeling estimated the association between twin compared to singleton TOLAC and the outcomes.

RESULTS: Of 51,214 eligible deliveries, 10,368 (20.2%) were twin gestations. Twin compared to singleton gestations were more likely to have chronic hypertension (10.3% vs 8.1%, p< 0.001) and gestational diabetes (14.6% vs 12.5%, p< 0.001). In unadjusted and adjusted modeling, twin compared to singleton TOLAC was associated with lower VBAC success (14.40% vs 18.18%; OR 0.76, 95% CI 0.71-0.80; aOR 0.78, 95% CI 0.74-0.83) but no statistically significant difference in uterine rupture (0.65% vs 0.84%; OR 0.77, 95% CI 0.59-1.0; aOR 0.77, 95% CI 0.56-1.01; Figure).

CONCLUSION: TOLAC in twin gestations compared to singletons was associated with decreased VBAC success but no difference in rates of uterine rupture. This information may be used to help counsel patients with twin gestations considering TOLAC.

Figure. Vaginal birth after cesarean (VBAC) success and uterine rupture among twin compared to singleton pregnancies undertaking trial of labor after cesarean (TOLAC)



Adjusted for maternal age, gestational or preexisting diabetes mellitus, chronic hypertension or hypertensive disorders of pregnancy, class III obesity (body mass index >40 kg/m^2), and placental abruption.

131 Urinary immune complexome profiling allows for clinical subphenotype differentiation in preeclampsia (PE)

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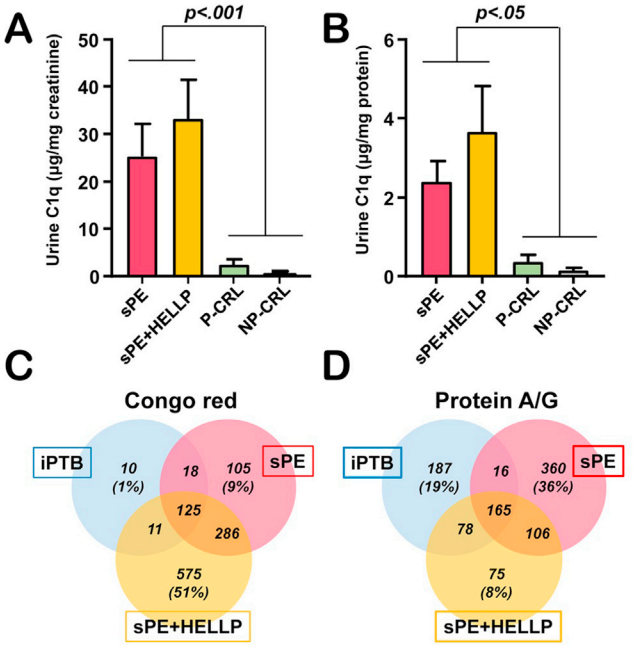
OBJECTIVE: Urine of patients with PE harbors unique antigenic proteins in the form of conformational neoepitopes reactive with monoclonal antibodies raised against prototype pre-fibrillar amyloid proteins. The objectives of this study were to discover if **1)** the counterpart conformational autoantibodies and immune complexes (ICs) binding to the amyloid neoepitopes are also present in PE urine and **2)** if PE clinical subphenotypes are linked to specific antigenic neoepitopes peptides.

STUDY DESIGN: In a cross-sectional study design we analyzed urine samples of 77 subjects as follows: **1)** normotensive nonpregnant (NP-CRL, n=9) or **2)** non-PE pregnant persons (P-CRL, n=17, GA: 28±1w); **3)** early-onset severe features PE (sPE, n=28, GA: 29±1w) without and **4)** with clinically manifest HELLP (sPE+HELLP, n=23, GA: 29±1w). Urine ICs were assayed by ELISA employing C1q (subcomponent of ICs) and normalized to creatinine or total protein levels. Urine ICs of a subset of sPE, sPE+HELLP or spontaneous preterm birth (sPTB, n=5) patients were precipitated with polyethylene glycol (PEG), Protein A/G or the amyloidophilic dye Congo red and then subjected to LC/MSMS. Protein identities (IDs) were assigned to functional classes using Scaffold, g:Profiler, Cytoscape with STRING and ClueGO Apps for further analysis.

RESULTS: Compared to CRLs, sPE and sPE+HELLP patients had significantly higher urine IC concentration (Figs. A&B). While quantitatively, there was no difference in IC output between sPE and sPE+HELLP, we observed that different IC enrichments captured distinct ID repertoires. Congo red identified the highest proportion of unique IDs in sPE+HELLP (Fig. C). Protein A/G captured the highest proportion of unique IDs in sPE (Fig. D). Compared to sPE and iPTB, the non-immunoglobulin ID repertoire in sPE+HELLP

had higher representation of proteins involved in extracellular processes, hemostasis and protein-lipid interactions.

CONCLUSION: Our findings highlight the importance of the autoimmune response in PE pathogenesis and support the notion that sPE and HELLP may associate with different repertoires of autoantigens.



132 Time to intervention or delivery in monochorionic diamniotic twins with abnormal screening ultrasound findings

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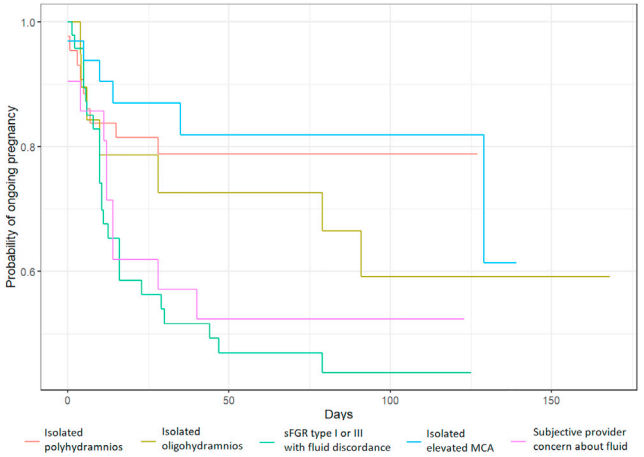
OBJECTIVE: This study sought to examine the natural history of monochorionic diamniotic (MCDA) twins that do not meet criteria for twin-twin transfusion syndrome (TTTS), twin anemia-polycythemia sequence (TAPS), or selective fetal growth restriction (sFGR) but have an abnormal finding during screening for these conditions.

STUDY DESIGN: This retrospective case-control study longitudinally reviewed all MCDA twins between 2018-2022 at a tertiary fetal care center. Twins with normal imaging acted as controls, and those with abnormalities on screening ultrasounds (US) were included as cases. Excluded were twins with clear diagnostic findings of TTTS, TAPS, or sFGR as well as higher-order multiples, anomalies which could affect fluid or Dopplers, and having only one US. Cases were divided into subgroups including those with polyhydramnios of one twin, oligohydramnios of one twin, sFGR with fluid discrepancy, subjective provider concern about fluid discrepancy, and middle cerebral artery (MCA) Doppler $\geq$ 1.5 MoM without fluid abnormalities. The primary outcome was time from an abnormal finding to laser or to delivery. Kaplan Meier (KM) curves were generated with cases censored at laser, delivery, or at last scan when delivery records were unavailable.

RESULTS: Of 751 gestations, 227 were excluded for clear diagnosis, 19 for fetal anomaly 10 for higher order multiples, and 44 for having only one US. Of the remaining 438, 224 with normal imaging became controls, and the remaining 214 were cases. The probability of two ongoing weeks of pregnancy without fetal intervention or delivery differed between controls and case subgroups (control, 100%; isolated polyhydramnios, 83%; isolated oligohydramnios, 77%; sFGR with fluid discrepancy, 65%; abnormal MCA, 87%; provider concern, 62%, p = 0.01). KM curves demonstrate that sFGR with fluid discrepancy and subjective provider concern were the most morbid findings; elevated MCA Doppler was the least.

CONCLUSION: Families of MCDA twins with abnormal ultrasound findings can be counseled on the likelihood of ongoing uncomplicated pregnancy based on their condition.



133 Anemia negatively impacts perinatal outcomes in a large cohort of 1,724,828 pregnancies in California.

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OBJECTIVE: Anemia is common in pregnancy and associated with maternal and fetal morbidity. However, the incidence and risk factors of perinatal outcomes are largely derived from international cohorts with higher rates of anemia and are less representative of pregnancies within the United States (US). The objective of this study was to evaluate perinatal outcomes associated with anemia diagnosis in pregnancy in a modern, large California-based cohort.

STUDY DESIGN: We performed a cohort study of California-linked hospital discharge-vital statistics data from 2016-2019. Deliveries 23-42 weeks' gestation were included and anemia was identified using birth certificate and International Classification of Disease (ICD-10) codes. Chi-squared and multivariable logistic regression were utilized for statistical analyses.

RESULTS: A total of 1,724,828 births met study inclusion criteria; 303,718 (18%) had a maternal diagnosis of anemia. Pregnancies affected by anemia compared to those without anemia were associated with a higher frequency of hypertensive disease (12.1% vs 8.1%, aOR: 1.51 (1.49-1.53)), preterm delivery (10.4% vs 7.7%, aOR: 1.30 (1.28-1.32)), and very preterm delivery (1.8% vs 1.1%, aOR: 1.49 (CI: 1.45-1.54). Neonatal morbidity was increased in the presence of maternal anemia with more NICU admissions (11.5% vs 9.5%, aOR: 1.12 (1.11-1.14)), respiratory distress syndrome (7.5% vs

5.6%, aOR: 1.33, (1.31-1.35)), hypoglycemia (3.8% vs 2.8%, aOR 1.34 (1.31-1.37)) and low birth weight infants (< 2500 gm) (7.9% vs 6.1%, aOR 1.22 (1.20-1.24)).

CONCLUSION: Anemia during pregnancy is associated with numerous adverse perinatal outcomes. These findings support anemia as a potentially modifiable risk factor in maternal and neonatal morbidity. Increased screening for anemia may provide timely intervention and mitigation of associated morbidity

Table 1. Multivariable logistic regression models showing association of anemia with perinatal outcomes.

Perinatal Outcome	No anemia N=1,724,828	Anemia N= 303,718	Adjusted odds ratio (95% Confidence interval)†
Hypertensive disease	115,363 (8.1%)	36,636 (12.1%)	1.51 (1.49, 1.53)
Preterm birth (<37 weeks)	110,014 (7.7%)	31,546 (10.4%)	1.30 (1.28, 1.32)
Very preterm birth (<32 weeks)	14,967 (1.1%)	5,335 (1.8%)	1.49 (1.45, 1.54)
NICU admission	135,124 (9.5%)	34,959 (11.5%)	1.12 (1.11, 1.14)
Respiratory distress syndrome	79,112 (5.6%)	22,724 (7.5%)	1.33 (1.31, 1.35)
Infant deaths	3,749 (0.3%)	1,020 (0.3%)	1.15 (1.07, 1.24)
Hypoglycemia	39,283 (2.8%)	11,425 (3.8%)	1.34 (1.31, 1.37)
Low birth weight (<2500 gm)	87,083 (6.1%)	23,879 (7.9%)	1.22 (1.20, 1.24)

†Adjusted for maternal race and ethnicity, age, level of education, body mass index, parity, insurance, prenatal visits, chronic hypertension and pre-existing diabetes.

134 Late preterm antenatal corticosteroids and neonatal hypoglycemia: a cohort study

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OBJECTIVE: To determine associations between antenatal corticosteroid (AC) administration in late preterm fetuses with presence of neonatal hypoglycemia (NH).

STUDY DESIGN: Retrospective cohort study in pregnant women with late preterm deliveries at University Hospital Fundación Santa Fe de Bogotá 2019−2022. The exposure of interest was AC administration of betamethasone during pregnancy between 34 0/7 and 36 6/7 weeks in singleton and twin gestations. The primary outcome was NH. Descriptive analysis based on averages and percentages, and multivariable logistic regression were used to estimate the association between AC exposure and NH. We stratified the study by singleton and twin gestations, corticosteroids dose, maternal outcomes and neonatal outcomes. Statistical analysis was performed using Odds Ratio(OR), confidence intervals and *p* values.

RESULTS: 6017 total deliveries, 528 (8.7%) late preterm, 378 (71,5%) singleton and 150 (28.5%) twin pregnancies. 330 mothers received AC, 260 (78.8%) were singleton and 70 (21.3%) were twin pregnancies. There were no statistical differences between all late preterm fetuses who received AC and those who did not received and developed NH (OR=1.09, 95% CI [0.71-1.67], p=0.699), no significant statistically relationship between AC and NH when we adjusted by: singleton (OR= 0.78, 95%CI[0.43-1.43], p=0.428), or twins (OR=1.12, 95%CI[0.56-2.25], p=0.742). There were no association when we adjusted by number of corticosteroids dose, full course, or partial course (OR=0.96, 95%CI[0.62-1.48], p=0.860). There were no significant statistically relationship between AC and NH adjusted by maternal and neonatal clinical conditions such as preeclampsia, premature rupture of membranes, gestational diabetes, fetal growth restriction, oligoamnios, neonatal sepsis, polycythemia, jaundice, and respiratory distress syndrome.

CONCLUSION: Exposure to AC in singletons and twins during late preterm period is not associated with increased odds of hypoglycemia. In our population several maternal and neonatal clinical conditions do not change the significant statistical relationship between AC and NH.

135 Distressed community index and the association with preterm birth

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OBJECTIVE: To determine whether more socioeconomically distressed communities experience higher rates of preterm birth or earlier gestational age at delivery at a tertiary care hospital in Washington state.

STUDY DESIGN: We conducted an IRB-approved retrospective cohort study using the Obstetrical Care Outcomes Assessment Program (OBCOAP) at the University of Washington Medical Center. We included the first pregnancy in the dataset for each individual with complete data on gestational age (GA) at delivery and distressed community index (DCI), a tool for measuring the comparative economic well-being of U.S. communities. We evaluated the association between DCI quintile and GA at delivery using linear regression, adjusting for pre-pregnancy substance use, smoking, diabetes, hypertension, and urban/rural class. Chi-square test and Kruskal-Wallis rank test were used for comparison of outcomes across quintiles.

RESULTS: A total of 10,143 individuals were included for analysis, with 39.0% of individuals living in the least distressed communities (DCI quintile =1), and 2.9% in the most distressed communities (DCI quintile = 5). For individuals in the least distressed quintile, gestational age at delivery was 2.5 weeks (95% CI: 2.06, 2.93) later than for individuals in the most distressed quintile, after adjustment for confounders. Individuals in the most distressed communities experienced significantly higher rates of extremely preterm, very preterm, moderate preterm, and late preterm birth compared to the least distressed communities (Table 1).

CONCLUSION: Our findings indicate that the DCI has the potential to identify patient populations at risk for preterm birth independent of classic risk factors such as smoking, diabetes, substance use, and hypertension. Promising DCI applications could include the creation of neighborhood-specific interventions for addressing the rising rates of preterm deliveries in vulnerable communities.

Table 1. Gestational age and preterm birth status by distressed community quintile

	Quintile 1 (n=3,959)	Quintile 2 (n=3,163)	Quintile 3 (n=1,764)	Quintile 4 (n=964)	Quintile 5 (n=293)	p-value
GA at delivery, weeks	39 (38, 40)	39 (37, 40)	39 (36, 40)	38 (35, 39)	37 (35, 39)	<0.001
Birth Status						<0.001
Extremely preterm (≤ 28 weeks)	89 (2.3)	111 (3.5)	106 (6.0)	81 (8.4)	24 (8.2)	
Very preterm (28-32 weeks)	59 (1.5)	104 (3.3)	77 (4.4)	56 (5.8)	19 (6.5)	
Moderate preterm (32-34 weeks)	90 (2.3)	112 (3.5)	89 (5.1)	63 (6.5)	20 (6.8)	
Late preterm (34-36 weeks)	354 (8.9)	376 (11.9)	232 (13.2)	159 (16.5)	55 (18.8)	
Term (> 37 weeks)	3,367 (85.1)	2,460 (77.8)	1,260 (71.4)	605 (62.8)	175 (59.7)	

Values expressed as median (IQR) or N (%)

136 A systematic review of interventions for opioid use disorder during the first year postpartum

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OBJECTIVE: Opioid use disorder (OUD) is a leading cause of maternal mortality, particularly postpartum (PP). The objective of this systematic review is to provide a qualitative summary of published interventions for PP opioid abstinence or reduction.

STUDY DESIGN: This systematic review was registered with PROSPERO (ID CRD42023405688). A comprehensive search of CINAHL, MEDLINE, PsycINFO, and EMBASE was conducted for intervention trials with $\geq$ 5 subjects aimed at opioid use reduction or abstinence in the first year PP. Studies without a comparison group or interventions continued PP were excluded. All abstracts were summarized, if eligible, by 2 independent reviewers. Risk of bias was assessed with the Cochrane Risk of Bias or Newcastle-Ottawa Scale.

RESULTS: Of 812 articles screened, 14 were assessed for full-text eligibility and 3 were included for full-text review (Table). Study 1 assessed a therapeutic workplace (TW) that provided a job with reimbursement for opioid abstinence. Abstinence was increased in TW (n=20) compared to usual care (UC) (n=20) in the first 6 months PP, but the change was not significant (52% vs 33%, p=0.06). Study 2 assessed a comprehensive perinatal clinic's effect on patients with substance use and demonstrated drug use abstinence during pregnancy in 93/97 (96%) of participants. However, only 10% of patients in the study had OUD, 22% were lost to follow up PP, and 13% relapsed to heavy drug use by 6 months PP. Study 3 compared motivational interviewing to UC in 60 participants and found a significant reduction in PP opioid use (23% vs 60%, p=0.004).

CONCLUSION: Despite the large contribution of OUD to maternal mortality, only 3 intervention studies have assessed strategies to reduce opioid use PP. Existing studies vary widely in intervention type and effect. Our systematic review illustrates the paucity of evidence-based interventions for PP OUD. This underscores the pressing need to further address this significant public health concern and contributor to maternal mortality.

Table: Opioid use disorder interventions identified in systematic review

Methods	Study Result
1. Silverman et al. A reinforcement-based therapeutic workplace for the treatment of drug abuse: six-month abstinence outcomes. Exp Clin Psychopharmacol. 2001 Feb;9(1):14-23.	
Study Type: RCT, n = 40 **Intervention:** Therapeutic workplace **Outcome:** Opioid abstinence **Inclusion criteria:** Pregnant or PP women 18-50 years, unemployed, on methadone maintenance with ≥1 UDS + for opiates or cocaine within 6 weeks of enrollment **Exclusion criteria:** At risk for suicide or had psychiatric disorder that might disrupt ability to work or provide informed consent	Increase in opioid abstinence after 6 months (UC 33% vs TW 52%, p = 0.060)
2. Wright et al. Implementation and evaluation of a harm-reduction model for clinical care of substance using pregnant women. *Harm reduction journal*, 2012. 9(1), 1-10.	
Study Type: Prospective Cohort Study, n = 213 **Intervention:** Comprehensive perinatal care **Outcome:** Substance use reduction **Inclusion criteria:** Pregnant and PP women with SUD	Abstinence at delivery (93/97, 96%) Lost to follow up PP (n/n, 22%) Relapse rate to heavy substance usage at 6 months PP (n/n, 13%)
3. Esmaeilinejad et al. Effect of Motivational Enhancement Therapy on Patterns of Substance Abuse in Postpartum Women: A Randomized Clinical Trial. J of Holistic Nursing and Midwifery 2022	
Study Type: RCT, n = 60 **Intervention:** Motivational-Enhancement Therapy **Outcome:** Substance use reduction **Inclusion criteria:** PP women age 15-45 years with SUD **Exclusion criteria:** Absence from one session, committing a crime, using other counseling services	Reduction in the number of opium (p=0.008) and methadone (p=0.003) users. Reduction in the *amount* of opium and methadone use (p<0.05). Opium usage decreased significantly in the intervention group (p=0.01).

RCT, randomized controlled trial; TW, therapeutic workplace; UC, usual care; SUD, substance use disorder; UDS, urine drug screen; Postpartum, PP

137 Outcomes of twin patients referred for shunt placement: a single institution's 16-year experience

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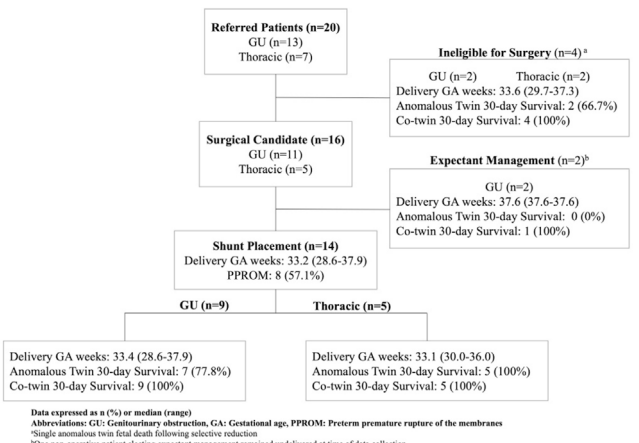
OBJECTIVE: Fetal shunt placement in twins remains controversial due to technical difficulties and potential procedure-related risks to the healthy co-twin. We report outcomes following referral for possible shunt placement in twins.

STUDY DESIGN: Retrospective case series of twin gestations referred for shunt placement at a single center (2007-2023). Conditions eligible for shunt placement included: cystic fetal lung lesions or pleural effusion(s) with secondary fetal hydrops, and genitourinary (GU) tract obstructionwith oligohydramnios. Results are reported as n (%) or median (range).

RESULTS: Among the 20 patients referred for possible shunt surgery, 4 were not eligible [chest lesion without hydrops (n=2), GU obstruction without oligohydramnios (n=2)]. Of the 16 eligible patients, 14 underwent shunt placement (9 GU, 5 thoracic) and 2 elected expectant management (2 GU). Gestational age (GA) at initial surgery was 21.9 (17.7-33.7) weeks. Four (28.6%) patients underwent a second procedure for displaced shunt. No intra-operative complications (e.g., incidental septostomy) occurred. Latency from initial surgery to delivery was 12.3 (2.43-20.0) weeks. Pregnancy outcomes are described in the Figure. Delivery GA was 33.2 (28.6-37.9) weeks in shunted patients vs. 35.5 (29.7-37.6) for all non-operative referred patients. All 20 unaffected co-twins were 30-day survivors. Twelve (85.7%) shunted twins were 30-day survivors with 100% co-twin 30-day survival. Significant co-twin prematurity related morbidity after shunting was rare (necrotizing enterocolitis and late onset sepsis after 28 and 34-week preterm births, respectively). Non-operative anomalous and healthy co-twin 30-day survival was 2 (50%) and 5 (100%), respectively.

CONCLUSION: Shunt placement in twins meeting surgical criteria can be accomplished with relatively minimal risk to the co-twin. Well-counseled patients with twin gestations should not be excluded from undergoing fetal shunt placement at experienced centers.



138 Late prenatal repair of open spina bifida (OSB) and postnatal cerebrospinal fluid (CSF) diversion

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OBJECTIVE: Risk factors for postnatal CSF diversion after prenatal OSB repair were identified in a meta-analysis from 2002-2021. These included lateral ventricle ≥ 15 mm, lesion level T12-L2, myeloschisis, and gestational age (GA) at surgery ≥ 25 weeks. The aim of this study was to assess the risk factors for CSF diversion by 12 months of life after percutaneous fetoscopic OSB repair performed ≥ 25 weeks' gestation.

STUDY DESIGN: This was a prospective study of patients who underwent percutaneous fetoscopic OSB repair from 2019-2023 at GA ≥ 25 weeks. The decision to offer CSF diversion was based on postnatal MRI and clinical findings. Preoperative, operative, and neonatal characteristics were examined as predictors for a CSF diversion procedure (ventriculoperitoneal shunt or endoscopic third ventriculostomy) within the first 12 months of life, using bivariate analyses and multiple logistic regression models.

RESULTS: Of 47 patients that had prenatal repair ≥ 25 weeks' gestation, some degree of hindbrain herniation (HBH) reversal was noted at birth in 41 (87.2%) and complete HBH reversal in 22 (46.8%). CSF diversion by 12 months of age was required in 14 cases (29.8%). In bivariate analysis ($p < 0.05$), both fetal ventricular measurement ≥ 15 mm prior to surgery and lack of complete hindbrain HBH reversal at neonatal assessment were associated with a CSF diversion procedure. Multiple logistic regression showed that cases with a lateral ventricle ≥ 15 mm were 7 times more likely to have CSF diversion (OR 7.63, 95%CI 1.52-38.20, $p = 0.0134$), and cases lacking complete HBH reversal were 5 times more likely to have CSF diversion (OR 5.25, 95%CI 1.07-25.83, $p = 0.0414$).

CONCLUSION: Percutaneous fetoscopic repair of OSB at 25-27 weeks was associated with a 29.8% risk of postnatal CSF diversion at 12 months of life. This compares favorably to the ~40% risk in the published literature in which prenatal repair is typically done £ 25 weeks. Further study is required to assess the risks/benefits of postponing prenatal repair of OSB beyond 25 weeks' gestation.

Table 1. Bivariate analysis of cases that underwent percutaneous fetoscopic repair of open spina bifida (OSB) and requirement for CSF diversion procedure by 12 months of age. Data are expressed as n (%) or mean ± standard deviation.

	ALL PATIENTS (N=47)	*PATIENTS WITH CSF DIVERSION (N=14)*	*PATIENTS WITHOUT CSF DIVERSION (N=33)*	*P-VALUE*
Lesion type				1.000
Myelomeningocele	30 (63.8%)	9 (64.3%)	22 (63.6%)	
Myeloschisis	17 (36.2%)	5 (35.7%)	12 (36.4%)	
Upper anatomical level of lesion				0.499
L2	5 (10.6%)	3 (21.4%)	2 (6.1%)	
L3	7 (14.9%)	2 (14.3%)	5 (15.2%)	
L4	15 (31.9%)	5 (35.7%)	10 (30.3%)	
L5	13 (27.7%)	3 (21.4%)	10 (30.3%)	
S1	7 (14.6%)	1 (7.1%)	6 (18.2%)	
Largest lateral ventricle (mm)	12.9 ± 3.0	15.1 ± 3.2	11.9 ± 2.4	0.003
Lateral ventricle ≥ 15 mm (either)	11 (23.4%)	7 (50.0%)	4 (12.1%)	0.009
Gestational age at surgery (weeks)	27.1 ± 0.7	27.0 ± 0.7	27.2 ± 0.7	0.150
Repair type				0.108
2-Layers (dura patch, skin layer)	18 (38.3%)	8 (57.1%)	10 (30.3%)	
3-Layers (2-layers + myofascial flap)	29 (61.7%)	6 (42.9%)	23 (69.7%)	
Gestational age at delivery (weeks)	34.1 ± 3.2	32.8 ± 2.9	34.7 ± 3.2	0.079
Vaginal delivery	26 (55.3%)	9 (64.3%)	17 (51.5%)	0.528
CSF leakage at repair site at birth	3 (6.4%)	1 (7.1%)	2 (6.1%)	1.000
Motor function ≥ 2 levels better than anatomical level in neonatal period	22 (46.8%)	8 (57.1%)	14 (42.4%)	0.524
Hindbrain herniation (HBH) reversal				
No HBH reversal	6 (12.8%)	3 (21.4%)	3 (9.1%)	0.344
Any HBH reversal	41 (87.2%)	11 (78.6%)	30 (90.9%)	0.344
Complete HBH reversal	22 (46.8%)	3 (21.4%)	19 (57.6%)	0.029

139 The impact of maternal depression and fetal attachment on fetal heart rate variability

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OBJECTIVE: The purpose of this study is to investigate the association between mental health of pregnant women and fetal heart rate variability (HRV).

STUDY DESIGN: A total of 92 normal pregnant women at third trimester (28 to 40 weeks of gestation) participated. The maternal and fetal HRV were measured by the software-based instrument, Philips HR, by a standard protocol that calculates the time and frequency domain during a rest period of approximately 30 minutes. The sociodemographic and obstetric measures, as well as psychological measures including depression, maternal-fetal attachment, mental health well-being, and sleep were conducted. Statistical analysis was conducted through Pearson r and spearman correlation coefficient.

RESULTS: In fetal HRV, total score of maternal-fetal attachment scale, its two subscales and self-rating scores of fetus' moods from mother were positively correlated with time domain indices (sdnn; sdann, $p < 0.05$). Sleep disturbance (rmssd; sdsd, $p < 0.01$), sleep latency (sdnn; $p < 0.05$), sleep quality (rmssd; sdsd, $p < 0.05$), the stress level within a year (sdnn; sdann, $p < .05$) and age (sdann; $p < 0.01$)

were negatively correlated with time domain indices. The number of artificial abortion was negatively correlated with frequency domain measures (lf; hf, $p < 0.05$). In mother's HRV, one of the subscales of maternal-fetal attachment scale (sdann; $p < 0.05$) and the number of artificial abortion (sdnn; sdann; rmssd; sdsd, $p < 0.01$) was positively correlated with time domain indices. Habitual sleep quality was negatively correlated with frequency domain indicator (hf; $p < 0.05$).

CONCLUSION: This study suggests that indices of fetal HRV have significant association with the mental health of the mother and mental health in the perinatal period plays a major role in considering the overall health of the fetus and the development of autonomic nervous system of fetus.

140 Association of neighborhood walkability with adverse pregnancy outcomes in gestational diabetes

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OBJECTIVE: To examine the association of neighborhood walkability with adverse pregnancy outcomes (APO) in patients with gestational diabetes (GDM).

STUDY DESIGN: Retrospective cohort study of pregnancies with GDM at a Midwestern academic center. Participants' primary residential addresses were geocoded at the census tract level to the 2018 Environmental Protection Agency (EPA) National Walkability Index. The exposure of neighborhood walkability was analyzed continuously and categorically per EPA recommendations as block groups: least walkable (score 1-5), below average (6-10), above average (11-15), and most walkable (16-20). APO included maternal composite outcome of preeclampsia, preterm birth, cesarean birth, 3rd/4th degree laceration, postpartum hemorrhage, wound infection, and neonatal composite outcome of LGA, SGA, LBW< 2500g, fetal or neonatal death, shoulder dystocia, brachial nerve palsy, hypoglycemia, RDS, and NICU admission. These composite outcomes were chosen as they are associated with GDM and were utilized by us in prior work.

RESULTS: Of 892 patients with GDM, 6.4% lived in least walkable, 39.1% in below average walkable, 38.1% in above average walkable, and 16.4% in most walkable neighborhoods. Non-Hispanic White patients were more likely to live in less walkable neighborhoods (43.2% in most walkable vs. 93.0% in least walkable, p< 0.001), while the opposite was observed for non-Hispanic Black patients (1.8% in least walkable vs. 26.7% in most walkable, p< 0.001). Nulliparity (p=0.02), being single (p< 0.001) and public insurance (p< 0.001) increased with higher neighborhood walkability. In adjusted analyses, higher neighborhood walkability as a continuous measure was associated with lower odds of composite maternal APO (aOR 0.96, 95% CI 0.92, 0.99). When analyzed as EPO block groups, neighborhood walkability was not associated with APO (Table).

CONCLUSION: Among pregnant patients with GDM, neighborhood walkability was associated with sociodemographic characteristics. Those who lived in most walkable neighborhoods were at lower likelihood of maternal APOs.

Table. Association of national walkability index with adverse pregnancy outcomes in gestational diabetes

	Unadjusted Odds Ratio (95% CI)	[a]Adjusted Odds Ratio (95% CI)
Composite maternal APO with walkability index analyzed as a continuous variable	0.99 (0.96, 1.03)	**0.96 (0.92, 0.99)**
Composite neonatal APO with walkability index analyzed as a continuous variable	**1.03 (1.00, 1.07)**	1.02 (0.98, 1.06)
[b]Composite maternal adverse outcome analyzed as EPA block groups		
Block 1: Least walkable (1-5)	Ref	Ref
Block 2: Below average (6-10)	1.53 (0.85, 2.74)	1.36 (0.74, 2.52)
Block 3: Above average (11-15)	1.33 (0.74, 7.38)	0.88 (0.47, 1.68)
Block 4: Most walkable (16-20)	1.25 (0.66, 2.37)	0.81 (0.40, 1.62)
[c]Composite neonatal adverse outcome analyzed as EPA block groups		
Block 1: Least walkable (1-5)	Ref	Ref
Block 2: Below average (6-10)	**0.51 (0.29, 0.90)**	0.55 (0.30, 0.95)
Block 3: Above average (11-15)	**0.74 (0.42, 1.29)**	0.67 (0.17, 1.22)
Block 4: Most walkable (16-20)	**0.93 (0.51, 1.73)**	0.83 (0.46, 1.59)

APO, Adverse pregnancy outcomes; CI, Confidence Interval.
[a]Adjusted for age, race, nulliparity, marital status, insurance type and pre-pregnancy BMI
[b]Composite of hypertensive disorder of pregnancy, preterm birth, operative or cesarean delivery, 3rd or 4th degree perineal laceration, postpartum hemorrhage, wound infection
[c]Composite of large for gestational age, small for gestational age, low birthweight <2500 grams, fetal or neonatal death, shoulder dystocia, brachial nerve palsy, hypoglycemia, respiratory distress syndrome, NICU admission

141 Adrenomedullin upregulates mRNA expression of nutrient transporters in human trophoblast cell line: implications for GDM

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OBJECTIVE: Mechanisms underlying the pathophysiology of Gestational Diabetes Mellitus (GDM) and its adverse effects on mother and fetus remain poorly understood. Adrenomedullin (ADM) is elevated in pregnancies complicated by GDM. Studies from our laboratory previously showed elevated ADM levels play a role in maternal dyslipidemia and defective β-cell adaptation associated with GDM. However, the effects of increased circulating ADM levels on placental function and nutrient transport are still unknown. We performed a series of in vitro experiments investigating the effects of increased ADM on the expression of trophoblast cell nutrient transporters.

STUDY DESIGN: First-trimester human trophoblast cell line HTR8/SVneo was cultured with increasing doses of ADM (0, 0.1, 1.0, or 10 nM) for 24 hours. Cells were then harvested, mRNA extracted, cDNA synthesized, and real-time qPCR performed for genes related to lipid, glucose, and amino acid transport, that have previously been shown to be upregulated in placentas with GDM.

RESULTS: Treatment with ADM increased the expression of several transporter genes: lipid transporters EL (p=0.03), FABP3 (p=0.0002), FABP5 (p=0.006), FABP7 (p=0.02), FATP1 (p=0.01), FATP6 (p=0.01), and CD36 (p=0.0087); glucose transporters GLUT3 (p=0.02) and GLUT4 (p=0.002); amino acid transporters SNAT1 (p=0.04), SNAT2(p=0.03), and LAT2 (p=0.001). LAT1 (p=0.06) was downregulated. These effects in gene expression progressed in a dose-dependent fashion.

CONCLUSION: These studies demonstrate in vitro treatment with ADM upregulates the expression of trophoblast cell nutrient transporters in a dose-dependent fashion. Data from this study further implicates ADM in the pathogenesis of fetal macrosomia associated with GDM. Future in vivo studies will explore the possibility of using ADM as a biomarker of GDM. By increasing our understanding of molecular pathways involved in placental nutrient transport, we may be able to develop future therapies to reduce the maternal and fetal complications associated with GDM.

142 Estimated fetal weight versus abdominal circumference in predicting adverse outcome in fetal growth restriction

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OBJECTIVE: To identify fetal growth restriction (FGR) based on estimated fetal weight (EFW)< 10%ile, abdominal circumference (AC)< 10%ile or both AC and EFW< 10%ile (AC/EFW< 10%ile). To determine whether EFW< 10%ile, AC< 10%ile or both EFW and AC< 10%ile are associated with adverse neonatal outcomes in singleton FGR pregnancies.

STUDY DESIGN: Retrospective cohort study of singleton deliveries with prenatal FGR diagnosis at single tertiary hospital system 1/1/2021-12/31/2021. FGR was defined at earliest abnormal ultrasound by: EFW < 10%ile only, AC < 10%ile only, or both AC/EFW < 10th% ile. Adverse outcomes included premature delivery, neonatal intensive care unit (NICU) admission, APGAR < 7 at 1 or 5 minutes, neonatal cooling, arterial pH < 7.1, stillbirth, and neonatal death.

RESULTS: 647 patients met inclusion criteria, 340 with AC/EFW < 10%ile, 168 with only EFW < 10%ile, and 139 with only AC < 10% ile. Maternal demographics did not differ between groups. Premature delivery occurred at a higher frequency in patients meeting EFW< 10%ile (21.4%) and AC/EFW < 10%ile (25.6%) compared to AC < 10%ile alone (12.2%) (p= 0.006). Higher rates of NICU admission were observed in EFW < 10%ile (25.6%) and AC/EFW< 10%ile (27.4%), in contrast to AC < 10%ile alone (14.4%) (p = 0.009). Gestational age at delivery in days was earlier in patients with AC/EFW < 10%ile (264 [258, 273]) compared to AC < 10%ile (269 [264, 274]) (p< 0.001). FGR diagnostic group was not associated with other differences in neonatal outcomes. Although not reaching statistical significance, there was higher rate of severe preeclampsia in the AC/EFW < 10%ile (20%) compared to the EFW < 10%ile or AC < 10%ile (13.1%, 13.7%) (p= 0.078).

CONCLUSION: In pregnancies diagnosed with FGR, AC/EFW < 10% ile and EFW < 10%ile had increased rates of preterm delivery and NICU admission compared to those with AC < 10%ile alone. Delivery occurred earlier in pregnancies diagnosed with FGR based on AC/EFW < 10%ile and EFW < 10%ile compared to AC < 10%ile. These findings can inform risk counseling in pregnancies diagnosed with fetal growth restriction.

Table 1. Outcomes in fetal growth restricted pregnancies diagnosed by estimated fetal weight versus abdominal circumference

		Overall				
Factor	N	Total	EFW less than 10%ile (N=168)	AC less than 10%ile (N=139)	Both AC and EFW less than 10%ile (N=340)	p-value
Chronic HTN	647	67 (10.4)	20 (11.9)	12 (8.6)	35 (10.3)	0.64[b]
Preeclampsia	647	35 (5.4)	10 (6.0)	6 (4.3)	19 (5.6)	0.80[b]
Severe preeclampsia	647	109 (16.8)	22 (13.1)	19 (13.7)	68 (20.0)	0.078[b]
HELLP	647	4 (0.62)	0 (0.00)	1 (0.72)	3 (0.88)	0.66[c]
gHTN	647	89 (13.8)	25 (14.9)	21 (15.1)	43 (12.6)	0.69[b]
GA at earliest US diagnosis (days)	647	226.0 [196.0, 251.0]	176.0 [134.5, 225.0] [3,3]	244.0 [215.0, 258.0] [1,3]	228.5 [210.0, 252.0] [1,2]	***<0.001****
GA at delivery (days)	647	267.0 [259.0, 273.0]	267.0 [259.0, 273.5]	269.0 [264.0, 274.0] [1]	264.0 [258.0, 273.0] [2]	***<0.001****
Premature delivery (<37 weeks)	647	140 (21.6)	36 (21.4)	17 (12.2) [3]	87 (25.6) [2]	***0.006**[b]*
NICU Admission	647	156 (24.1)	43 (25.6) [2]	20 (14.4) [1,3]	93 (27.4) [2]	***0.009**[c]*
APGAR 1 min <7	645	82 (12.7)	24 (14.3)	12 (8.6)	46 (13.6)	0.26[c]
APGAR 5 min <7	646	29 (4.5)	6 (3.6)	2 (1.4)	21 (6.2)	0.059[c]
Arterial pH <7.1	390	12 (3.1)	1 (0.96)	1 (1.3)	10 (4.9)	0.13[d]
Neonatal cooling	645	2 (0.31)	1 (0.60)	0 (0.00)	1 (0.30)	0.73[d]
Stillbirth	646	2 (0.31)	0 (0.00)	0 (0.00)	2 (0.59)	0.99[d]
Neonatal death	645	7 (1.09)	4 (2.4)	0 (0.00)	3 (0.89)	0.12[d]

Statistics presented as Median [P25, P75], N (column %).
p-values: aoKruskal-Wallis test, boPearson's chi-square test, coFisher's Exact test.
1: Significantly different from EFW less than 10th%ile
2: Significantly different from AC less than 10th%ile
3: Significantly different from both EFW and AC less than 10th%ile met
Post-hoc pairwise comparisons were done using Bonferroni adjustment.
Hypertension (HTN), Hemolysis, Elevated Liver enzymes and Low Platelets Syndrome (HELLP), Gestational hypertension (gHTN), Gestational Age (GA), Neonatal Intensive Care Unit (NICU)

143 Accuracy of fetal fraction measurements in SNP-based non-invasive prenatal testing (NIPT)

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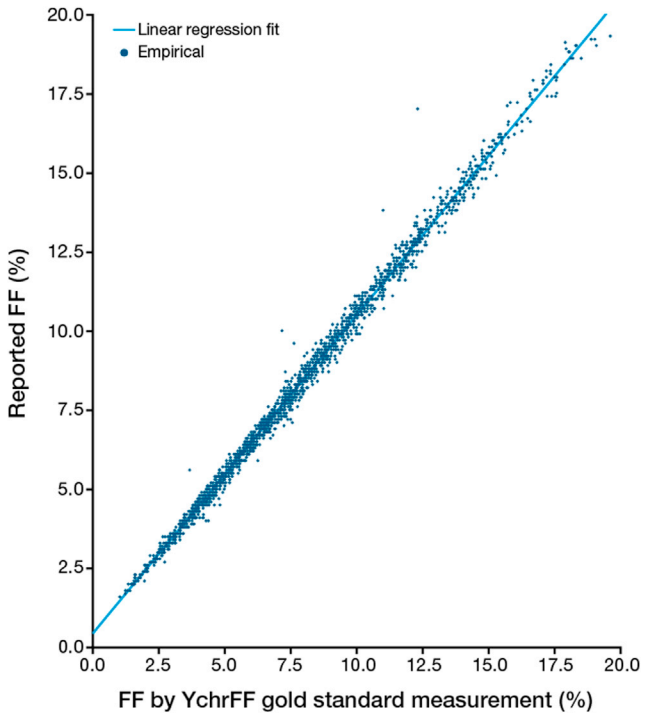
OBJECTIVE: Measuring fraction of cell free-DNA (cfDNA) that is fetal/placental in origin (fetal fraction (FF)) is an important, guideline-supported, quality assurance metric in non-invasive prenatal testing (NIPT). We assessed the accuracy of FF measurements for a SNP-based NIPT using measures of Y-chromosome DNA as a reference standard.

STUDY DESIGN: We reviewed a total of 3,046 pregnancies (1,886 low-risk by SNP-based NIPT singleton male fetus cases with reported FF≥2.8%, and 1,150 cases with low FF (< 2.8%)). Each cohort was from randomly selected referrals between March-May 2022. A published maximum likelihood method, considering 9,267 SNPs exclusively from autosomal chromosomes, provided the "Reported FF". FF was also assessed by considering 277 SNPs from homologous non-recombinant regions (HNRs) of the Y chromosome that must be fetal in origin ("YchrFF"). We calculated the Pearson correlation coefficient between the ReportedFF and YchrFF; the accuracy standard deviation (SD) defined as SD (ReportedFF-YchrFF); and bias defined as mean (ReportedFF-YchrFF).

RESULTS: Linear regression showed a very strong correlation between ReportedFF and YchrFF across the YchrFF range of 0.6% to 20% (r squared = 0.996). The accuracy standard deviation was 0.14% for samples with a Reported FF between 0.6%-2.8%; 0.19% for FF between 2.8%-5.0%%; 0.20% for FF between 5.0-7.0%; 0.26% for FF between 7.0-10.0%; and 0.38% for FF >10%.

CONCLUSION: Using Y-chromosome DNA as a reference standard, this SNP-based NIPT had reported FF's that were substantially more accurate (accuracy SD=0.14-0.38%) than those previously reported for other NIPT methods (accuracy SD 1.3%-2.5%) (Persson and Prensky, Clin Chem 2021;67:863-6). Reported FF for the SNP-based NIPT can be reliably interpreted at values as low as 0.6% which is well below the 2.8% FF threshold used by this laboratory for interpreting SNP data. FF is an important quality assurance metric and all laboratories should be held to a high standard in its measurement.



144 Changes in cytokine levels during progression in twin gestations and association with pregnancy outcome

Mariarosaria Di Tommaso[1], Angela Silvano[2], Giovanni Sisti[3], Viola Seravalli[2], Noemi Strambi[2], Astrid Parenti[2], Amedeo Amedei[2], Steven S. Witkin[4]
[1]Azienda Ospedaliero-Universitaria Careggi, Firenze, Toscana, [2]University of Florence, Florence, Toscana, [3]College of Medicine, University of Arizona, Tucson, AZ, [4]Weill Cornell Medicine, New York, NY; on behalf of the Fondazione Ente Cassa di Risparmio Firenze

OBJECTIVE: To evaluate the plasma concentrations of multiple cytokines during each trimester of twin pregnancies and identify associations with preterm birth and gestational age at delivery.

STUDY DESIGN: This prospective, observational study was conducted at Careggi University Hospital, Florence, Italy. Plasma from 82 women with twin pregnancies was collected in each trimester for measurement of multiple cytokines (IL-1β, IL-6, IL-10, IL-12p70, TNF-α). Demographic and clinical outcome data were subsequently obtained by chart review. Data were analyzed by Friedman pairwise comparison or Wilcoxon analysis with the Bonferroni correction and the Mann-Whitney test.

RESULTS: 78 women were White, 2 were Asian and 2 were African. Their median (interquartile range) age was 35 (33, 38) years old. Body mass index was 21.5 (19.6, 23,9) kg/m^2. Thirty of the women (36.6%) conceived by assisted reproduction technology, either intrauterine insemination or in vitro fertilization. The mean age at sample collection was 12.2 weeks in the first trimester, 22.0 weeks in the second trimester and 31.0 weeks in the third trimester. Gestational diabetes mellitus was diagnosed in 17 (21.0%) of the women. The mean (standard deviation) gestational age at delivery was 36.0 (1.6) weeks and 9 women (11.0%) had a spontaneous preterm birth. Gestational age at delivery was inversely correlated with the TNF- α concentration in the second ($p = 0.015$) and third ($p< 0.002$) trimester. TNF- α was also positively associated with preterm birth in the second and third trimester ($p = 0.042$ and 0.023, respectively). The IL-6 level in the third trimester was also associated with gestational age at delivery ($p < 0.002$). The IL-1 β concentration in 3rd trimester was positively associated with gestational diabetes mellitus (p=0.022). Additionally, plasmatic cytokines concentrations and their comparison between the three trimesters were reported in Table 1. Values are reported as median and interquartile range.

CONCLUSION: Quantitation of TNF-a and IL-6 in plasma are predictors of earlier gestational age at delivery in multifetal gestations.

Maternal plasma cytokines (pg/ml)	I Tr	II Tr	III Tr	Comparison between 3 trimesters overall (Friedman test)	P value I tr vs II tr (Wilcoxon test with Bonferroni correction)	P value I tr vs III tr (Wilcoxon test with Bonferroni correction)	P value II tr vs III tr (Wilcoxon test with Bonferroni correction)
IL-1β	3.18 (1.66-5.63)	5.53 (3.72-8.61)	7.6 (5.53-12.05)	< 0.001	< 0.001	< 0.001	< 0.001
IL-6	0.3 (0.21-0.44)	0.3 (0.23-0.64)	0.6 (0.3-1.07)	< 0.001	0.086	<0.001	< 0.001
IL-10	2.12 (1.28-3.83)	2.21 (1.3-3.79)	2.32 (1.11-4.01)	0.917	ns	ns	ns
IL-12p70	0.9 (0.9-1.03)	0.9 (0.9-1.00)	0.9 (0.9-1.25)	0.382	ns	ns	ns
TNF-α	7.07 (4.97-11.33)	7.51 (5.37-11.38)	10.12 (7.09-15.59)	< 0.001	0.33	< 0.001	< 0.001

145 Acute treatment of severe hypertension in pregnancies with fetal growth restriction: Does medication choice matter?

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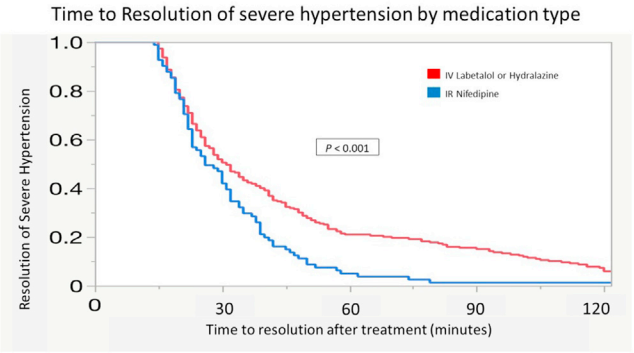
OBJECTIVE: To evaluate whether medication type affects time to resolution of acute severe hypertension (HTN) in pregnancies complicated by fetal growth restriction (FGR).

STUDY DESIGN: Passive prospective cohort analysis of patients with their first singleton gestations in which they received acute treatment for severe HTN at a single academic tertiary care center (2011-2020). This subanalysis of duration of severe HTN after acute treatment was limited to pregnancies meeting Delphi consensus criteria for FGR. Those initially treated with either intravenous (IV) labetalol or hydralazine were compared with those treated with immediate release oral nifedipine. This study design was the result of visual inspection of nonparametric survival curves that revealed violation of the proportional hazards assumption when analyzing the three agents individually or combining pregnancies with and without FGR in the same analysis. A Cox proportional hazards model incorporated factors associated with time to resolution of severe hypertension up to two hours after treatment.

RESULTS: Of 998 patients with severe HTN, 331 (33%) met Delphi consensus criteria for FGR and, of these 301 underwent acute treatment of severe HTN with either IV labetalol (n=151), IV hydralazine (n=69), or oral nifedipine (n=81) as the initial medication of choice. Median time to resolution was 26 (IQR 23,31) vs 31 (IQR 27,35) minutes with nifedipine vs the IV agents respectively (Log-rank $P < .001$). After adjustment for pre-gravid BMI, treatment postpartum, and pre-treatment pulse pressure, 2 factors were independently associated with longer time to resolution of severe HTN: pre-treatment mean arterial pressure (MAP) >125 mmHg [adjusted hazard ratio (aHR) 0.63, 95%CI 0.49-0.80)] and requiring ^{3} 2 medication doses (aHR 0.53, 95%CI 0.41-0.69). The bias-corrected bootstrapped (1000 replicates) aHR for acute treatment with nifedipine is 1.48 (95% CI 1.13-1.95).

CONCLUSION: Acute treatment with nifedipine is associated with a shorter time to resolution of severe hypertension compared to IV hydralazine and labetalol in pregnancies complicated by FGR.



146 A novel first-trimester ultrasound marker for cesarean scar pregnancy: the tadpole sign

Bridget M. Donovan[1], Laura A. Smith[2], Guadalupe Arambula[2], Anna M. Modest[2], Olga Brook[2], Uma Deshmukh[2], Yinka Oyelese[2], Cassandra R. Duffy[2], Scott A. Shainker[3]

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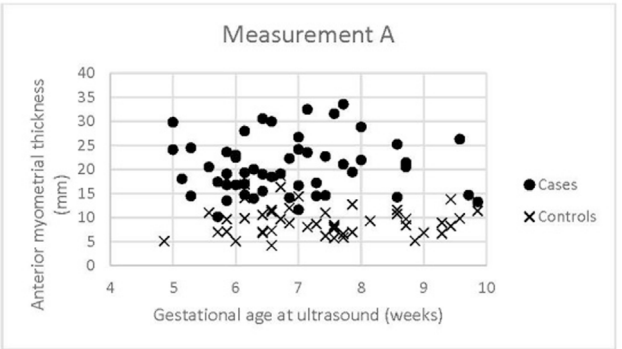
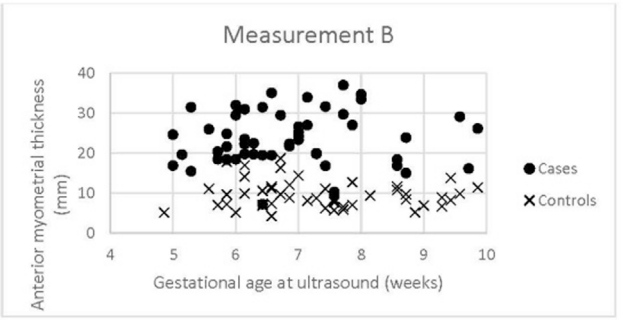
OBJECTIVE: We aim to describe a first trimester ultrasound marker for cesarean scar pregnancy (CSP) diagnosis and compare it to the currently used "crossover sign".

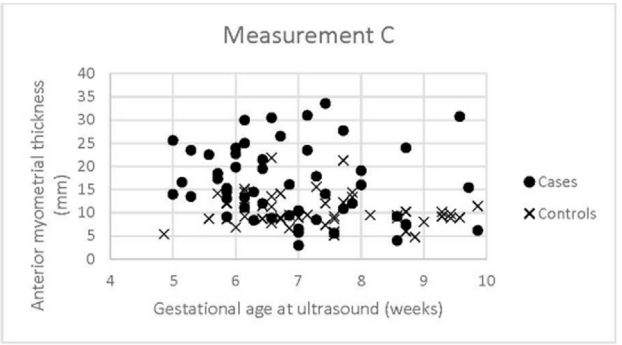
STUDY DESIGN: This is a retrospective case-control study of first trimester transvaginal ultrasound (TVUS) images from obstetric imaging databases. All images were in the midsagittal plane of the uterus with visualization of cervix to fundus. Cases were those with suspected CSP diagnosed radiographically. Controls were the next available first trimester TVUS of a viable singleton intrauterine pregnancy with prior cesarean delivery matched for gestational age. Images were independently reviewed by two experts. The distance from point "M" (as defined by the crossover sign) to the fundus was divided into thirds, with point A closest to fundus, B in the middle, and C at the "M-line". At each point the anterior myometrial thickness was measured and compared between cases and controls. The visual "tadpole sign" is the presence of the gestational sac (the "head") fixed anteriorly towards the cesarean scar, with closed uterine cavity extending cephalad towards the fundus (the "tail"). Analyses included interclass correlation coefficient (ICC) and area under the curve (AUC) with 95% confidence intervals (CI).

RESULTS: We identified 52 CSP cases and 52 controls. Distribution of the myometrial thickness measurements at each of the three points are presented in image 1. The ICC for the measurements at points A, B and C were 0.88, 0.95, 0.86, respectively. The AUC and 95% CI for each measurement was 0.96 (95% CI 0.93-0.99), 0.98 (95% CI 0.94-1.0), 0.75 (95% CI 0.65-0.85), respectively. There was 100% agreement between the crossover sign and tadpole sign in identifying CSPs. Both the tadpole sign and crossover sign identified all CSPs accurately except one case.

CONCLUSION: The tadpole sign highly correlates with the crossover sign for diagnosis of CSP. Myometrial thickness correlates well to the presence of the tadpole sign. This novel sign is easily identified and carries strong interrater reliability without need for additional ultrasound image manipulation.







147 Letters of recommendation for MFM fellowship: What are program directors looking for?

Sarah K. Dotters-Katz[1], Matthew R. Grace[2], Lisa Hofler[3], Lorene Temming[4], Rachel A. Pilliod[5], Anthony L. Shanks[6]

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OBJECTIVE: Letters of recommendation(LOR) for MFM fellowship are a critical part of the applicant evaluation process. Data regarding best practices for LOR writing for MFM is limited. This study aimed to describe what MFM program directors(PDs) value in a LOR.

STUDY DESIGN: Subject matter experts used research from obstetrics/gynecology residency and other specialties to develop an e-survey querying the importance of various LOR 'best practices' described by other specialties, and deployed it to MFM PDs using the SMFM PD listserv in February 2023, with 2 reminder emails. The primary outcome was the importance of various practices to PDs queried on a Likert scale of 1-5. Responses of important or very important were grouped.

RESULTS: Of 104 MFM PDs sent the survey, 70 (67%) responded.

MFM PDs reviewed an average of 78 applications(SD ± 30)/cycle, 60% wrote≥3 letters/year, and 91% noted that LOR are important/

very important in shaping impression of the applicant. 93% stated that **well-crafted** LOR convinced them to consider a **weaker** candidate more favorably while 66% stated a **poorly** crafted LOR convinced them to consider a strong candidate **less** favorably.

LOR characteristics that were most important to PDs included: descriptions of the depth of interaction with applicant, the specific behavior traits of the applicant, and the applicant's abilities(Table). A summative statement about the strength of the recommendation was also important(Table). Other "less important" letter writing 'techniques' include: use of bold/italics, use of competency-based framework and use of personal stories about the applicant. Only half of PDs felt letter length of 1 page or less was important, and 22.4% felt including highlights from the applicant CV was important.

CONCLUSION: From the MFM PD perspective, descriptions of applicants' abilities, behavior traits, and depth of the writer's interactions with applicant are important aspects of a MFM LOR, while letter length, use of bold/italics, and including highlights form the CV are not. These LOR-writing practices should be incorporated by those writing MFM LOR.

Importance of letter-writing practices*	Median (% rated important)
Description of the depth of interaction with applicant	5 (94.0)
Description of behavior traits	5 (91.0)
Description of applicant's ability	4 (97.0)
Use of summative statement about strength of recommendation	4 (82.1)
Description of letter writer's role/experience with residents	4 (62.7)
Academic rank of letter writer	4 (56.7)
Use of competency based framework	4 (54.7)
Inclusion of personal stories about the applicant	4 (54.5)
Letter length 1 page or less	3.5 (50.0)
Inclusion of highlights from the CV	2 (22.4)
Long, descriptive letter (ig more than 1 page)	2 (10.5)
Use bold/italics	2 (19.7)

*Responses are average (SD) of Likert scale of 1-5, with 4 being important, 5 very important

148 Trends in the MFM fellowship match: How should we counsel applicants?

Sarah K. Dotters-Katz[1], Lorene Temming[2], Sarah Ellestad[1], Matthew R. Grace[3], Anthony L. Shanks[4]

[1]Duke University Medical Center, Durham, NC, [2]Atrium, Charlotte, NC, [3]Vanderbilt University Medical Center, Nashville, TN, [4]Indiana University School of Medicine, Indianapolis, IN

OBJECTIVE: Maternal Fetal Medicine (MFM) Fellowship match process is complicated, Limited resources exist to guide applicants and fellowship program leadership regarding this trend. This study seeks to illuminate data aspects of the application and match in MFM.

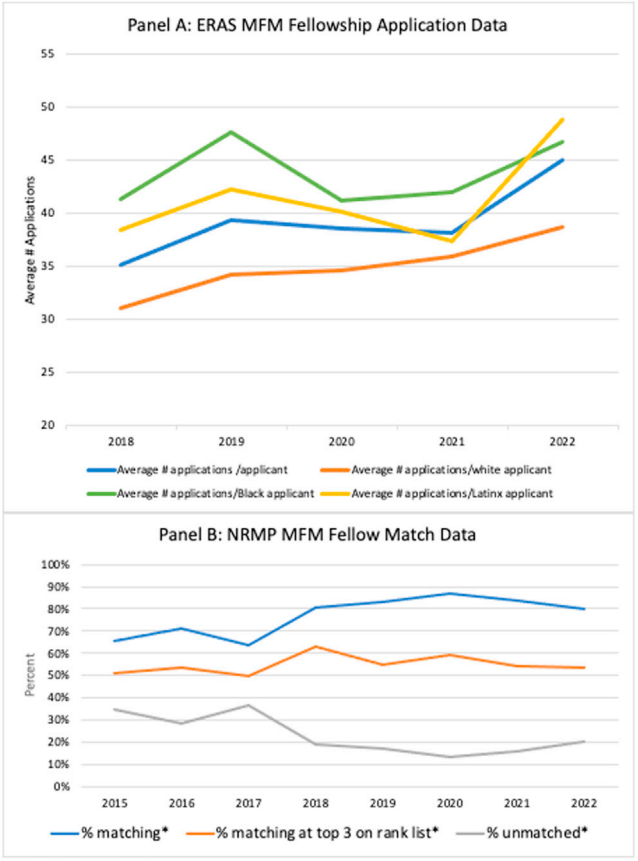
STUDY DESIGN: After IRB exemption, publicly available data were obtained from the Electronic Residency Application Service(ERAS) website and from the National Residency Match Program(NRMP) website. Applicants registering for MFM fellowship in ERAS in 2018-22 included in application analysis. Applicants registering for MFM match with NRMP from 2015-22 included in match phase analysis. Descriptive and bivariate statistics were used to analyze data. Cochrane-Armitage test performed to assess for change over time.

Primary outcome was % of applicants matching and % matching at top choice. Secondary outcomes include % matching at top 3, % not matching, and total number of programs applied to overall, stratified by URM status. URM status match data not publicly available for NRMP data.

RESULTS: From 2018-22, 840 applicants applied for MFM fellowship in ERAS(average:168/yr). Applicants applied to an average 39 programs/yr. URM applicants applied to more programs than white applicants (average 9 apps/yr, SD:3 for Black applicants; 6/yr, SD:3 for LatinX applicants(Panel A).

In the past 8 yrs, 1,171 applicants entered the NRMP match, (avg 146/yr), with an increase in positions from 97→137. The average MFM match rate is 76.7%(range 63.5-86.6, p-trend=0.07, Panel B), with an average of 37.3% matching at #1 choice annually(range 31.6,42.9). An average of 54.9% of applying applicants are matching in their top 3 annually(range 50,63.2,p-trend=0.38, Panel B)

CONCLUSION: The overall match rates for MFM fellowship is high, with over $^1/_2$ applicants matching in their top 3. These data may be helpful for those counseling individuals applying for MFM fellowship.



*P-for-trend NS for all

149 Association between postpartum continuous glucose monitoring and oral glucose tolerance testing for screening after GDM

Kathleen Drexler[1], Kim Boggess[1], Ashley N. Battarbee[2]

[1]University of North Carolina, Chapel Hill, NC, [2]University of Alabama at Birmingham, Birmingham, AL

OBJECTIVE: ACOG/ADA recommend diabetes screening after GDM pregnancies; however, only half complete postpartum oral glucose tolerance testing (OGTT). Given high satisfaction with continuous glucose monitoring (CGM) for diabetes management, we aimed to determine the association between postpartum CGM and OGTT.

STUDY DESIGN: Prospective observational study of pregnant individuals with GDM who wore a masked Dexcom G6 CGM for 10 days and completed a 75g, 2hr OGTT at 3 study visits postpartum—immediate (< 48hr), 6wk, and 6mo. Participant satisfaction was also surveyed. Using ACOG/ADA criteria, OGTT results were categorized as normal, prediabetes (preDM) or type 2 diabetes (T2DM). Ordinal

logistic regression estimated the association between average glucose on CGM and OGTT diagnosis, adjusted for study visit timing and clustering by individual. Secondary outcomes (normal OGTT, T2DM, fasting and 2hr glucose) were analyzed using logistic and linear regression. In sensitivity analyses, we evaluated the association between other CGM metrics and OGTT diagnosis.

RESULTS: 32 participants completed CGM and OGTT at 53 visits (27 immediate, 20 at 6wk, and 6 at 6mo). Average prepregnancy BMI was 35±9kg/m^2 with 7.5kg gestational weight gain. For every 10mg/dL increase in average glucose on CGM, there was 1.83 times higher odds of preDM or T2DM vs normal GTT and 1.83 times higher odds of T2DM vs normal or preDM (Table). Study visit timing did not modify this effect (interaction p=0.10). With increasing average glucose on CGM there were lower odds of normal OGTT, higher odds of T2DM, and higher fasting and 2-hour glucose levels (Table). While other CGM metrics (TIR, TAR, TBR, and variability) were not associated with OGTT, the % time >250mg/dL was associated with higher odds of preDM or T2DM (aOR 5.63, 95%CI 2.06-15.4). Finally, 87% preferred CGM, 13% had no preference and none preferred OGTT.

CONCLUSION: Postpartum average glucose on CGM was associated with OGTT. Validation of these findings and development of diagnostic CGM criteria may provide a more acceptable alternative to postpartum OGTT for diabetes screening after GDM.

Table. Association between average glucose on postpartum continuous glucose monitoring and oral glucose tolerance test results

	Adjusted Odds Ratio (95% CI)*
2-hour OGTT Diagnosis† Normal Prediabetes Type 2 Diabetes	1.83 (1.29-2.61)
Normal OGTT	0.63 (0.45-0.88)
Type 2 Diabetes by OGTT	2.32 (1.42-3.78)
	Adjusted Beta Coefficient (95% CI)*
Fasting glucose (mg/dL)	3.65 (1.56-5.75)
2-hour glucose (mg/dL)	14.4 (8.57-20.15)

*For every 10mg/dL increase in average glucose on CGM, adjusted for timing of study visit and clustering by individual
†Normal=FBG<100 and 2hr<140; Prediabetes=FBG 100-125 or 2hr 140-199; Type 2 Diabetes=FBG≥126 or 2hr≥200

150 Looking for a blueprint for changing patient behavior: Group Prenatal Care improves breastfeeding knowledge

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OBJECTIVE: Despite providing both maternal and neonatal benefits, breastfeeding rates remain lower than goal targets. Prior research suggests that breastfeeding initiation rates are higher for group prenatal care (GPNC) compared to individual care (IPNC), but little is known about its effectiveness for improving breastfeeding knowledge and self-efficacy.

STUDY DESIGN: This is a secondary analysis of the Centering and Racial Disparities (CRADLE) randomized control trial comparing the impact of GPNC vs IPNC on preterm birth. The primary analysis used an intent-to-treat (ITT) approach and the primary outcome was breastfeeding at hospital discharge. Patient surveys administered prior to delivery included questions on breastfeeding knowledge (adapted from the Infant Feeding Practices II Survey) and self-efficacy (adapted from Wells' 20-item Prenatal Breast-feeding Self-efficacy Scale). A subgroup analysis was conducted on primigravid patients.

RESULTS: 2350 participants were enrolled and 80.4% (1890) completed the surveys. Participants identified as either African American (40.6%), Hispanic (21.4%), White (36.8%), or Other race/ethnicity (1.3%) and 62.7% were primigravid. Compared with IPNC, GPNC did not improve breastfeeding at hospital discharge (71.7% IPNC vs 72.0% GPNC; OR 1.02, 95% CI 0.84 − 1.23). Participants assigned to GPNC were more likely to provide correct answers for all knowledge questions ($p \leq 0.04$) except one item and scored higher (p=0.007) on the composite knowledge score when compared to IPNC (Table 1). These findings were consistent for primigravid participants, but no significant differences were noted for multigravid participants. There was no difference ($p > 0.29$) in self-efficacy questions by prenatal care type.

CONCLUSION: GPNC increased breastfeeding knowledge, especially for primigravid patients, but this did not translate into increased rates of breastfeeding at hospital discharge.

	IPNC	GPNC	p value
Breastfeeding Knowledge	51.8 (976)	48.2 (914)	
Infant formula is as good as breast milk[a]	1.76 ± 1.27	1.70 ± 1.28	0.38
If a baby is breastfed, he or she will be less likely to get sick with ear infections, diarrhea, and breathing infections	3.16 ± 1.11	3.30 ± 1.00	0.003
Babies who are breastfed have a lower risk of SIDS (sudden infant death syndrome)	2.93 ± 1.14	3.07 ± 1.09	0.005
Moms who breastfeed are more likely to return to their pre-pregnancy weight	3.04 ± 1.03	3.19 ± 0.96	0.002
Any amount of breastfeeding is good	3.24 ± 1.00	3.33 ± 0.96	0.03
For the first six months, it is best to only breastfeed	3.07 ± 1.01	3.16 ± 1.03	0.04
Composite Knowledge Score	17.52 ± 4.39	18.07 ± 4.48	0.007
Breastfeeding Self-Efficacy			
I can make time to breastfeed my baby even when I feel busy	3.02 ± 1.13	3.05 ± 1.13	0.60
I can breastfeed my baby even when I am tired	3.04 ± 1.12	3.08 ± 1.10	0.48
I can find out what I need to know about breastfeeding my baby	3.26 ± 0.95	3.30 ± 0.92	0.38
I can breastfeed my baby without feeling embarrassed	3.20 ± 1.06	3.25 ± 1.00	0.29
Composite Self-Efficacy Score	12.47 ± 3.84	12.61 ± 3.74	0.40

Likert scored as 0–strongly disagree, 1–somewhat disagree, 2–neither agree nor disagree, 3–somewhat agree, 4–strongly agree; [a]Reverse scored for composite

151 A comparison of techniques for antibody titers in screening for hemolytic disease of the fetus

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OBJECTIVE: To compare the relationship between titer concentrations via gel microcolumn agglutination (GMA) and conventional tube

testing (CTT) methods to examine if critical titer thresholds should differ between the two techniques.

STUDY DESIGN: Retrospective chart review on all obstetric patients treated at a single tertiary care center with RBC antibodies from November 2018 to October 2022. Patients were included in the statistical analysis if there were parallel CTT and GMA titration studies available. GMA vs CTT titers were graphed via bubble plots, and polynomial regression analysis was used to evaluate the correlation between the two methods. Logistical regression was used to evaluate the sensitivity and specificity of GMA titers for prediction of a critical CTT titer of 16.

RESULTS: **166** GMA titers from 87 patients had corresponding CTT titers. The most common antibody was anti-Rh(D) (76) followed by anti-Kell (29). Polynomial regression indicated a relationship between GMA titers and CTT titers ($R2 = 0.5325$, $p < 0.001$). The relationship changed significantly with removal of anti-Kell antibodies ($R2 = 0.6733$, $p < 0.001$). GMA titers were predictive of a critical CTT (AUC 0.97, $p< 0.001$) for non-anti-Kell antibodies but not predictive for anti-Kell antibodies ($p = 0.134$). Overall a GMA titer of 64 was predictive of a CTT titer of 16 or higher with 90.7% (95% CI 82.5-95.9%) sensitivity and 85.0% (95% CI 75.3-92.0%) specificity (Table 2). All GMA results of 32 or higher for anti-Kell antibodies had CTT of at least 16, whereas the same could not be said of the non-anti-Kell antibodies until GMA titers reached at least 512.

CONCLUSION: There is a correlation between GMA and CTT titers. GMA titers are consistently higher than CTT titers in all antibodies tested in our study except for anti-Kell. A predictive table was created for provider reference if their hospital's blood bank only employs GMA techniques.

GMA titer	Sensitivity of prediction of CTT of at least 16 (with 95% CI)	Specificity of prediction of CTT of at least 16 (with 95% CI)	Predictive value that GMA at or below this threshold will yield a CTT < 16	Predictive value that GMA above this threshold will yield a CTT > 16
All antibodies				
16	41.86% (31.3-52.99)	97.5% (91.26-99.7)	94.74% (82.25-99.36)	60.94% (51.92-69.44)
32	69.77% (58.92-79.21)	92.5% (84.39-97.2)	90.91% (81.26-96.59)	74% (64.27-82.26)
64	90.7% (82.49-95.9)	85% (75.26-92)	86.67% (77.87-92.92)	89.47% (80.31-95.34)
128	97.67% (91.85-99.72)	73.75% (62.71-82.96)	80% (71.07-87.17)	96.72% (88.65-99.6)
256	98.84% (93.69-99.97)	65% (53.52-75.33)	75.22% (66.22-82.86)	98.11% (89.93-99.95)
512	98.84% (93.69-99.97)	52.5% (41.02-63.79)	69.11% (60.14-77.12)	97.67% (87.71-99.94)
Anti-Kell antibodies				
16	100% (39.76-100)	92% (73.97-99.02)	66.67% (22.28-95.67)	100% (85.18-100)
32	100% (39.76-100)	80% (59.3-93.17)	44.44% (13.7-78.8)	100% (83.16-100)
64	100% (39.76-100)	76% (54.87-90.64	40% (12.16-73.76)	100% (82.35-100)
128	100% (39.76-100)	52% (31.31-72.2)	25% (7.27-52.38)	100% (75.29-100)
256	100% (39.76-100)	44% (24.4-65.07)	22.22% (6.41-47.64)	100% (71.51-100)
512	100% (39.76-100)	36% (17.97-57.48)	20% (5.73-43.66)	100% (66.37-100)
All non-anti-Kell antibodies				
16	39.02 (28.44-50.43)	100 (93.51-100)	100 (89.11-100)	52.38 (42.41-62.22)
32	68.29% (57.08-78.13)	98.18% (90.28-99.95)	98.25% (90.61-99.96)	67.5% (56.11-77.55)
64	90.24% (81.68-95.89)	89.09% (77.75-95.89)	92.5% (84.39-97.2)	85.96% (74.21-93.74)
128	97.56% (91.47-99.7)	83.64% (71.2-92.23)	89.89% (81.67-95.27)	95.83% (85.75-99.49)
256	98.78% (93.39-99.97)	74.55% (61-85.33)	85.26% (76.51-91.7)	97.62% (87.43-99.94)

152 Impact of WIC on hypertensive disorders in pregnancy, stratified by BMI category, among medicaid participants

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OBJECTIVE: To investigate whether participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) has differential impacts on gestational hypertensive disorders for individuals of different BMI categories.

STUDY DESIGN: A retrospective cohort study was performed using 2012-2020 national vital statistics patient discharge data from the Centers for Disease Control and Prevention (CDC). The analysis was restricted to data from Medicaid recipients without pre-existing or gestational diabetes, who had non-anomalous, singleton births between 23 and 42 weeks. We compared hypertensive disorders between those who did and did not receive WIC benefits, and further stratified by BMI categories (underweight, normal weight, overweight, and obese). Participants were excluded if they had missing WIC status or BMI data. The outcome of interest was gestational hypertension or pre-eclampsia, which are collapsed in CDC vital statistics. We performed a multivariable logistic regression, controlling for race/ethnicity, age, education, prenatal care, and smoking.

RESULTS: Of the 12,245,325 Medicaid recipients meeting inclusion criteria, 8,556,373 (69.87%) received WIC benefits. Compared to those without WIC benefits, WIC recipients of all BMI categories had a lower prevalence of gestational hypertension (Figure 1). Multivariable logistic regression demonstrated that the adjusted odds of gestational hypertension or preeclampsia in those who received WIC benefits, relative to those who did not receive WIC benefits, were 0.953 (95% CI: 0.919, 0.989) in underweight individuals, 0.951 (95% CI: 0.941, 0.961) in normal weight individuals, 0.911 (95% CI: 0.902, 0.921) in overweight individuals, and 0.925 (95% CI: 0.917, 0.933) in obese individuals.

CONCLUSION: Among Medicaid recipients, WIC had a small, inverse association with hypertensive disorders in pregnancy across all BMI categories, with the strongest association demonstrated in overweight and obese individuals.

Figure 1. Gestational hypertension among Medicaid recipients who do and do not receive WIC, stratified by BMI Category

BMI Category	WIC	No WIC	Adjusted Odds Ratio (95% CI)
Underweight	2.92%	2.95%	0.953 (0.919, 0.989)
Normal Weight	3.65%	3.80%	0.951 (0.941, 0.961)
Overweight	5.07%	5.67%	0.911 (0.902, 0.921)
Obese	8.33%	9.20%	0.925 (0.917, 0.933)

153 Impact of WIC benefits on neonatal outcomes, stratified by BMI category, among medicaid participants

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OBJECTIVE: To investigate whether participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) has differential impacts on neonatal outcomes for mothers of different BMI categories.

STUDY DESIGN: A retrospective cohort study was performed using 2012-2020 national vital statistics patient discharge data from the

Centers for Disease Control and Prevention (CDC). The analysis was restricted to data from Medicaid recipients without pre-existing or gestational diabetes, who had non-anomalous, singleton births between 23 and 42 weeks. We compared pregnancy outcomes between those who did and did not receive WIC benefits, and further stratified by pre-pregnancy BMI category (underweight, healthy weight, overweight, and obese). Participants were excluded if they had missing WIC or BMI data. Outcomes of interest were preterm delivery (< 37 weeks) and NICU admission. We performed a multivariable logistic regression, controlling for race/ethnicity, age, education, prenatal care, and smoking.

RESULTS: Of the 12,245,325 Medicaid recipients meeting inclusion criteria, 8,556,373 (69.87%) received WIC benefits. Compared to infants whose parents did not receive WIC benefits, infants whose parents did receive WIC benefits were less likely to be delivered preterm or be admitted to the NICU across all BMI categories (Figure 1).

CONCLUSION: Among Medicaid participants, WIC participation demonstrated a mildly inverse association with preterm delivery and NICU admission, with similar effects seen in all BMI categories. These results further support the body of evidence that WIC participation during pregnancy is associated with fewer adverse neonatal outcomes, and provide evidence that the benefit of WIC is seen across people of varying body size.

Figure 1. Neonatal Outcomes among Medicaid recipients who do and do not receive WIC, stratified by BMI Category

Preterm Delivery Under 37 Weeks			
BMI Category	**WIC**	**No WIC**	**Adjusted Odds Ratio (95% CI)**
Underweight	12.01%	13.91%	0.909 (0.892, 0.926)
Normal Weight	9.30%	10.52%	0.911 (0.905, 0.917)
Overweight	8.72%	10.01%	0.910 (0.902, 0.918)
Obese	9.36%	10.81%	0.909 (0.901, 0.916)
Preterm Delivery Under 32 Weeks			
BMI Category	**WIC**	**No WIC**	**Adjusted Odds Ratio (95% CI)**
Underweight	1.71%	2.44%	0.818 (0.783, 0.855)
Normal Weight	1.30%	1.84%	0.794 (0.781, 0.807)
Overweight	1.29%	1.86%	0.797 (0.781, 0.813)
Obese	1.52%	2.25%	0.787 (0.773, 0.801)
NICU Admissions			
BMI Category	**WIC**	**No WIC**	**Adjusted Odds Ratio (95% CI)**
Underweight	8.38%	10.35%	0.861 (0.843, 0.880)
Normal Weight	7.26%	8.72%	0.869 (0.863, 0.876)
Overweight	7.15%	8.53%	0.878 (0.870, 0.887)
Obese	7.96%	9.44%	0.881 (0.874, 0.889)

154 Antenatal late preterm steroids in twin gestations

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OBJECTIVE: The administration of antenatal steroids in the late preterm period (34+0 to 36+6 weeks gestation) to improve neonatal outcomes is now common. Our objective was to evaluate maternal and neonatal outcomes in twin gestations who received antenatal steroids in the late preterm period.

STUDY DESIGN: We conducted a retrospective cohort study of twin gestations delivered between 34+0 and 36+6 weeks gestation within our health system from 2020-2021. Subjects were excluded if they received steroids before 34 weeks gestation or had Type 2 diabetes. Our primary outcome was a composite of respiratory treatment for either or both twins (continuous positive airway pressure or high-flow nasal cannula for at least 2 hours, supplemental oxygen with a fraction of inspired oxygen of 30% for at least 4 hours, extracorporeal membrane oxygenation, mechanical ventilation, or death). Secondary outcomes included other adverse neonatal outcomes and maternal infection and length of stay. Groups were compared via t-tests, chi-squared analysis, Fisher's exact test, and linear and logistic regression.

RESULTS: 205 patients delivered in the late preterm period without administration of steroids before 34 weeks gestation. Of these, 71 (34.63%) received steroids in the late preterm period. Those receiving steroids were older (32.0 vs. 30.6 years, $p < 0.05$), more likely to have a hypertensive disorder of pregnancy (43.7% vs. 29.9%, $p < 0.05$), and delivered earlier (35.6 vs. 35.9 weeks, $p < 0.05$). Between the two groups, there was no difference in the primary composite outcome of respiratory support requirement, neonatal intensive care unit admission, neonatal hypoglycemia, or other neonatal outcomes. Those who received steroids had longer maternal postpartum stays (3.2 vs. 2.7 days, $p < 0.05$), including when controlling for other factors.

CONCLUSION: There was no difference in neonatal outcomes with administration of late preterm steroids to multiple gestations. Maternal postpartum length of stay was longer, suggesting patients receiving antenatal steroids may have been more unwell at baseline.

Adjusted analysis for impact of steroids on outcomes		
	Unadjusted OR/RC (95% CI)	Adjusted OR/RC* (95% CI)
Primary Outcome	1.56 (0.76-3.23)	1.25 (0.56-2.77)
CPAP >2 hrs	2.27 (0.91-5.65)	1.56 (0.58-4.15)
FiO2 >4 hours	3.31 (0.77-14.27)	2.75 (0.61-12.47)
Intubation	0.49 (0.13-1.83)	0.38 (0.09-1.53)
ECMO	-	-
Death	-	-
Composite - severe	1.42 (0.73-2.75)	1.05 (0.51-2.16)
CPAP >12 hr	1.42 (0.73-2.745)	1.05 (0.51-2.16)
FiO2 > 24 hrs	1.43 (0.31-6.59)	1.15 (0.23-5.78)
CPAP/HFNC/BiPaP	0.86 (0.47-1.55)	0.62 (0.33-1.19)
Respiratory distress syndrome (RDS)	0.85 (0.42-1.74)	0.49 (0.21-1.15)
Transient tachypnea of newborn (TTN)	1.95 (0.88-4.31)	1.72 (0.75-3.92)
Apnea	0.85 (0.28-2.54)	0.70 (0.22-2.22)
Surfactant use	1.08 (0.31-3.83)	-
Composite of RDS, TTN, Apnea	1.21 (0.67-2.18)	0.87 (0.44-1.70)
Apgar <7	0.41 (0.11-1.49)	0.40 (0.11-1.50)
Birth weight <10th %ile		
Twin A	0.86 (0.28-2.60)	1.11 (0.34-3.56)
Twin B	0.90 (0.39-2.05)	1.06 (0.45-2.51)
Hypoglycemia	1.6 (0.88-2.91)	1.60 (0.86-2.97)
>24 hours before feed	1.05 (0.50-1.99)	0.68 (0.32-1.48)
NICU admission	1.36 (0.74-2.51)	1.01 (0.51-2.03)
Chorioamnionitis/endometritis	1.83 (0.11-29.68)	1.78 (0.08-41.52)
Maternal length of stay	0.50 (0.21-0.79)	0.35 (0.06-0.63)
*Controlled for maternal age, hypertensive disorders of pregnancy, and gestational age at delivery		

156 Post partum maternal readmission rates using the Robson classification groups

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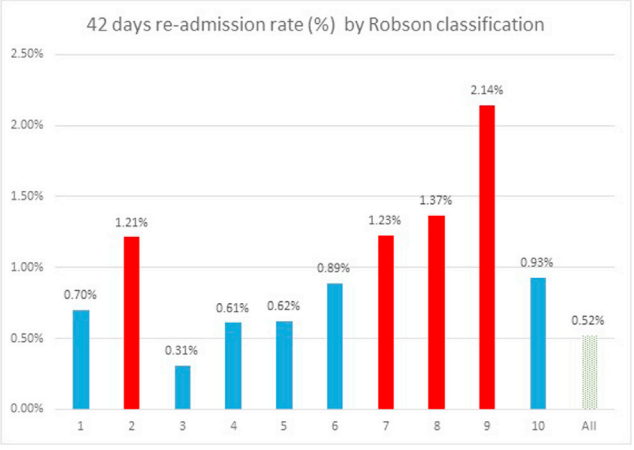
OBJECTIVE: Post partum maternal readmission is a significant burden for mother, neonate and family as well as health system. The postpartum readmission rate is used to evaluate quality of care and to guide beneficial interventions. Thus, identifying women at risk for readmission is of high value. The WHO established the internationally used Robson group (RG) classification as an optimal measure of caesarean section (CS) rates. Although intended for evaluation of CS rates, in recent years the utilization of the RG classification has been expanded to evaluate other obstetrical outcomes.

We aim to describe the rates of postpartum maternal readmission across RG classification and to identify risk groups.

STUDY DESIGN: Retrospective register-based cohort study of women who delivered at a tertiary medical center. All women were classified into 1 of the 10 RGs. Rates of post-partum readmission within 42 days of delivery were calculated for each group.

RESULTS: A total of 295,215 deliveries were classified to the 10 Robson classification groups. The 42-day readmission rate for the whole database was 0.52%. Maternal readmission rate varied significantly between RGs. Groups identified with a significant rate of maternal readmission were RG 9 (transverse lie) 2.14%, RG 8(multifetal pregnancies)1.37%, RG 7 (multiparous breech pregnancies)1.23% and RG2 (nulliparous pregnancies $\geq$ 37 w, labor induction' or prelabor cesarean) 1.21%.

CONCLUSION: Post partum readmission rates varies among the RGs. Interventions aimed to lower the number of women in RG 2,7,8 and 9; such as use of external cephalic version, vaginal delivery of breech and multifetal pregnancies may be beneficial. The neonatal impact of such policy remains to be considered for each center.



157 Another reason to address social determinants and disparities: It saves money

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OBJECTIVE: Inherent in healthcare policy/medical practice changes are 2 components: 1. Does it improve care, & 2. How much does it cost? Serious attention is finally being paid to medical ramifications of Social Determinants of Healthcare, racism, and resultant inequitable care. This study focuses on the second question: What are the short and long-term financial consequences (FC) of disparate care? Cesarean delivery rates (CDR) by race/ethnic group, have higher levels of morbidity and mortality and serve as a surrogate for quality of care.

STUDY DESIGN: Using a GDP-based statistical dollar value metric of each life, we calculate long-term FC of disparate care. We compare representative states having generally perceived high and low spending on obstetrical care infrastructures and posed the following question: if CDR for Black patients were reduced to that of white patients, what FC would there be for short-term and long-term care. Long term costs are calculated as (additional hospital stay days X avg. cost per day) + (additional avg. recovery days X avg. daily GDP contribution).

RESULTS: Most states show considerably higher CDR and morbidity/mortality for Black patients vs. white. Reducing Black CDR to white levels, short-term US savings would be $263M. Maternal and neonatal mortality rates (MMR and NMR) for Blacks are also higher [excess cost for Black MMR = $224M]. States with higher maternal and neonatal MR have significant impact on lifetime economic productivity. Nationally, the annual cost of excess MMR & NMR is $3.147 Billion from increased costs, reduced incomes, and tax revenues. In CA economic reductions are $471 per delivery; in GA it's $1665.

CONCLUSION: In addition to general societal deleterious effects of disparities, the perception of "saving" money by not spending for better care is wrong. Long term State FC show no short-term savings and increased long term expenses. Ignoring (momentarily) the commonly articulated quality of care reasons for fixing the provision of care, it costs the US $ 3.634 Billion per year that could be better allocated.

STATE	White CDR%	Black CDR%	$XS Cost Black CDR	XS Cost per C-Delivery	White MMR	Black MMR	$XS Cost Black MMR	White NMR	Black NMR	$XS Cost Black NMR	XS Long Term YLL Costs	$XS Cost/ Delivery
CA	30.00	36.5	$ 16,495,000	$ 4,648	12.6	45.8	$ 10,417,000	3.06	9.04	$ 187,707,000	$ 198,124,000	$ 471
FL	32.8	37.9	$ 18,696,000	$ 3,609	22.1	95.6	$ 33,842,000	4.53	10.60	$ 286,635,000	$ 320,477,000	$ 1,482
GA	34.7	37.9	$ 9,364,000	$ 3,215	59.7	95.6	$ 15,451,000	5.01	9.18	$ 191,182,000	$ 206,633,000	$ 1,665
NY	31.8	39.5	$ 28,080,000	$ 5,795	12.1	60.6	$ 19,938,000	3.19	7.65	$ 193,118,000	$ 213,056,000	$ 1,011
NC	29.9	34.2	$ 9,641,000	$ 3,233	19.8	56.8	$ 9,239,000	4.81	12.01	$ 194,170,000	$ 203,409,000	$ 1,688
US	31.0	36.8	$263,294,000	$ 3,594	26.6	69.9	$224,520,000	4.40	10.38	$3,147,009,000	$3,371,529,000	$ 920

MMR= Number of Maternal deaths per 100,000 live births. NMR= Number of Neonatal deaths per 1000 births. YLL=Years of Life Lost

158 Nulliparas with term PROM and an unfavorable cervix, induction of labor with prostaglandin or oxytocin

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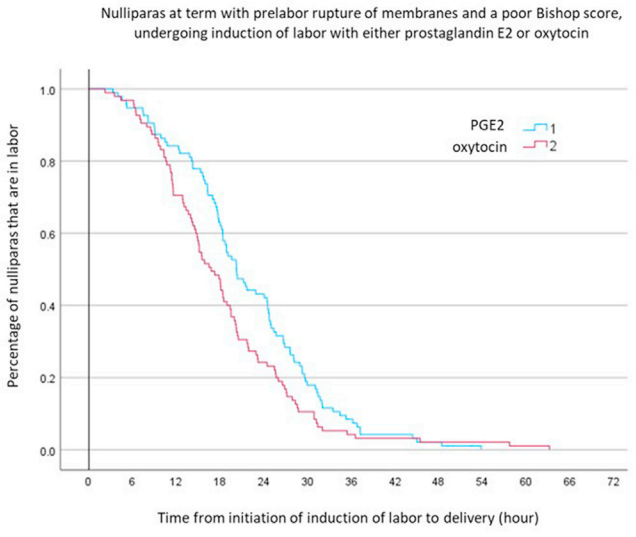
OBJECTIVE: To study whether the time from induction of labor (IOL) to delivery differs between nulliparas with premature rupture of membrane (PROM) and an unfavorable cervix induced by prostaglandins (PGE2) versus oxytocin.

STUDY DESIGN: A retrospective matched cases study. Data were extracted from a validated real-time computerized data base. All nulliparas with term PROM who underwent induction between January 2006 to April 2023 were identified. Cases induced by either PGE2 or oxytocin were matched on the following criteria (1) time

from PROM to IOL, (2) modified Bishop score defined by cervix dilatation and effacement prior to induction, (3) newborn birthweight, and (4) vertex position *Statistics*: Descriptive, means±SDs, medians+IQR. Comparisons: chi-square, independent samples T-test and Kaplan Mayer survival curve.

RESULTS: Ninety-five matched cases were identified. Maternal age (26±4.7 years old, p=0.203) and gestational age at delivery (38.6±0.6, p=0.701) were similar between the groups. Matched factors including modified Bishop score (2.0 versus 2.3, p=0.187), time from PROM to IOL (23.5 ± 19.2 versus 24.3 ± 21.4 p=0.780), birth weight of newborn (3111g versus 3101g, p=0.842) and occiput anterior position (present on 98% in both groups p=0.687) were also comparable . Time from IOL to delivery was significantly shorter by 3 hours and 36 minutes in the group induced by oxytocin compared to PGE2, (p=0.029). The Kaplan-Meier survival curve demonstrated a significant difference between time from IOL to delivery. Within 24 hours, 55(58%) of those induced with PGE2 delivered compared to 72(76%) of those induced by oxytocin, (p=0.033), see figure. Cesarean delivery rate [17(18%) versus 18(19%)], blood transfusion rates [3(3%) versus 2(2%)], and Apgar scores (8.9 versus 8.8) were similar between the groups, p≥0.387.

CONCLUSION: Among nulliparas with term PROM and an unfavorable cervix, induction with oxytocin results in a shorter time from IOL to delivery and a higher rate of vaginal delivery within 24 hours, with no elevated risk for cesarean delivery.



159 Amnion mesenchymal macrophages: characterization and response to infection

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OBJECTIVE: The primary organ of pregnancy, the placenta, exists as a maternal-fetal barrier and displays remarkable immunoactivity. However, the underlying mechanisms of immune regulation are not well understood. We previously identified the presence of CD14+ cells localized to the mesenchymal layer of the amnion, a distinct population of macrophages referred to as Amnion Mesenchymal Macrophages (AMMs). We hypothesize that these are regulated by the amnion and play a key role in pathogen clearance for *S. agalactiae* (GBS).

STUDY DESIGN: Fetal membranes were collected from cesarean sections in the absence of labor or inflammation. The amnion and chorion were cultured separately to generate conditioned media, and cytokine response was measured by ELISA. Sections of amnion were fixed for IF staining and imaged using a Nikon A1. Explants were infected using GBS and infectivity was quantified by CFUs.

RESULTS: Amnion explants have decreased colonization of GBS in comparison to chorion, intact fetal membrane, and chorionic villi. We found that the amnion secretes the cytokine IL-11 in greater abundance than chorion and chorionic villi. IL-11 secretion is responsive to TGFβ and colocalizes with AMMs. IL-11 secretion was reduced with treatment of cytochalasin D. Using conditioned media exposed to macrophages, we found that amnion conditioned macrophages (ACMs) have decreased infection with GBS suggesting that the secretory activity of the amnion regulates GBS clearance by macrophages. ACMs have decreased alpha-defensin and increased IL-11 production when exposed to GBS compared to chorion conditioned macrophages and chorionic villi conditioned macrophages.

CONCLUSION: AMMs produce IL-11 and restrict GBS at the maternal-fetal interface. ACMs also restrict GBS, suggesting that they may function as a model for AMMs *in vitro*. Our data suggest that macrophage function at the maternal fetal interface is spatially distinct and tightly regulated. Further work elucidating the functional regulation of AMMs may provide insight into vertical transmission of pathogens across fetal membranes.

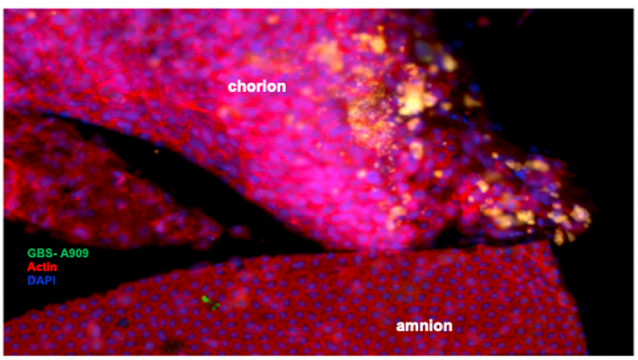

Figure 1. Immunofluorescence staining of human fetal membrane infected with GBS. GBS (green) shows increased colonization of the chorion compared to the amnion. Nuclei and cytoplasmic actin are stained with DAPI (blue) and phalloidin (red) respectively.

160 Blood pressure levels in pregnancy and adverse maternal metabolic health 10-14 years postpartum

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OBJECTIVE: Guideline changes from the American College of Cardiology/American Heart Association (ACC/AHA) have shown that

blood pressure (BP) < 140/90 increases the risk of adverse health in non-pregnant adults. We examined the associations between BP levels during pregnancy and long-term postpartum metabolic health.

STUDY DESIGN: A secondary analysis from the prospective Hyperglycemia and Adverse Pregnancy Outcome (HAPO) Follow-Up Study. The exposure was hypertension status in the early third trimester per ACC/AHA thresholds: normal BP < 120/80 mmHg (reference), elevated BP 120-129/< 80 mmHg, stage 1 hypertension 130-139/80-89 mmHg, and stage 2 hypertension ≥140/≥90 mmHg. Outcomes assessed 10-14 years after the index pregnancy were type 2 diabetes, prediabetes, metabolic syndrome, and measures of dyslipidemia. Modified Poisson models adjusted for baseline pregnancy covariates: field center, age, parity, BMI, height, family history of hypertension and diabetes, smoking and alcohol use, and OGTT summary z-score.

RESULTS: Among 4,697 pregnant individuals in the early third trimester, 70.0% (n=3,290) had normal BP, 8.5% (n=399) had elevated BP, 14.9% (n=701) had stage 1 hypertension, and 6.4% (n=302) had stage 2 hypertension. At a median follow-up of 11.6 years, individuals with elevated BP (4.7%; aRR: 2.06; 95% CI: 1.51, 2.61), stage 1 hypertension (5.7%; aRR: 2.65; 95% CI: 2.20, 3.10), and stage 2 hypertension (9.2%; aRR: 2.87; 95% CI: 2.35, 3.39) were at greater risk of developing type 2 diabetes compared with those with normal BP (1.5%). Similarly, individuals with elevated BP, stage 1 hypertension, and stage 2 hypertension were at greater risk of developing prediabetes and metabolic syndrome. There was no increased risk between increasing BP category and LDL cholesterol, HDL cholesterol, and triglycerides.

CONCLUSION: Pregnant individuals with elevated BP ≥120/80 are at increased risk of adverse metabolic health 10-14 years postpartum. BP categories with lower thresholds (AHA/ACC) than those currently used for hypertension in pregnancy may identify individuals at risk for adverse long-term metabolic health.

Table. Frequency and association between pregnancy blood pressure and adverse maternal metabolic health 10-14 years postpartum

	Outcome frequency (row percentage)	Unadjusted and adjusted analysis	
		Unadjusted risk ratio, RR (95% CI)	Adjusted risk ratio, aRR (95% CI)[1,2]
Type 2 diabetes			
Normal BP	49/3,243 (1.5)	Ref	Ref
Elevated BP	18/387 (4.7)	3.08 (1.81, 5.23)*	2.06 (1.51, 2.61)*
Stage 1 HTN	39/683 (5.7)	3.78 (2.50, 5.71)*	2.65 (2.20, 3.10)*
Stage 2 HTN	27/292 (9.2)	6.12 (3.89, 9.64)*	2.87 (2.35, 3.39)*
Pre-diabetes			
Normal BP	587/3,194 (18.4)	Ref	Ref
Elevated BP	114/369 (30.9)	1.68 (1.42, 1.99)*	1.47 (1.27, 1.67)*
Stage 1 HTN	211/644 (32.8)	1.78 (1.56, 2.04)*	1.57 (1.41, 1.73)*
Stage 2 HTN	91/265 (34.3)	1.87 (1.56, 2.24)*	1.59 (1.36, 1.82)*
Metabolic syndrome			
Normal BP	200/3,187 (6.3)	Ref	Ref
Elevated BP	59/379 (15.6)	1.09 (1.05, 1.12)*	1.06 (0.96, 1.16)
Stage 1 HTN	209/658 (31.8)	1.24 (1.21, 1.28)*	1.19 (1.11, 1.27)*
Stage 2 HTN	131/282 (46.5)	1.38 (1.32, 1.44)*	1.31 (1.20, 1.42)*
LDL cholesterol ≥ 130 mg/dl			
Normal BP	584/3,214 (18.2)	Ref	Ref
Elevated BP	100/380 (26.3)	1.07 (1.03, 1.11)*	1.04 (0.94, 1.14)
Stage 1 HTN	173/663 (26.1)	1.07 (1.04, 1.10)*	1.04 (0.96, 1.12)
Stage 2 HTN	92/285 (32.3)	1.12 (1.07, 1.17)*	1.08 (0.97, 1.19)
Total cholesterol ≥ 200 mg/dl			
Normal BP	888/3,218 (27.6)	Ref	Ref
Elevated BP	153/381 (40.2)	1.10 (1.06 , 1.14)*	1.07 (0.98, 1.16)
Stage 1 HTN	238/666 (35.7)	1.06 (1.03 , 1.10)*	1.04 (0.97, 1.11)
Stage 2 HTN	133/286 (46.5)	1.15 (1.10, 1.20)*	1.11 (1.01, 1.21)*
HDL cholesterol ≤ 40 mg/dl			
Normal BP	173/3,218 (5.4)	Ref	Ref
Elevated BP	28/381 (7.3)	1.02 (0.99, 1.05)	1.01 (0.91, 1.11)
Stage 1 HTN	60/666 (9.0)	1.03 (1.01, 1.06)*	1.03 (0.95, 1.11)
Stage 2 HTN	18/286 (6.3)	1.01 (0.98, 1.04)	0.99 (0.87, 1.11)
Triglycerides ≥ 200 mg/dl			
Normal BP	83/3,218 (2.6)	Ref	Ref
Elevated BP	26/381 (6.8)	1.04 (1.02, 1.07)*	1.03 (0.93, 1.13)
Stage 1 HTN	43/666 (6.5)	1.04 (1.02, 1.06)*	1.03 (0.95, 1.11)
Stage 2 HTN	32/286 (11.2)	1.08 (1.05, 1.12)*	1.07 (0.95, 1.19)

[1]Model adjusted for maternal variables at oral glucose tolerance test during pregnancy: study field center, age (continuous), BMI (continuous), height (continuous), family history of hypertension (yes/no), family history of diabetes, smoking status (yes/no), alcohol use (yes/no), and parity (0, >1), sum of glucose z-score (continuous).
[2]Imputation was performed for missing covariates in the adjusted model.
Abbreviations: 1) Normal blood pressure (BP), <120/80 mmHg; 2) Elevated BP, 120-129/<80 mmHg, 3) Stage 1 hypertension (HTN), 130-139/80-89 mmHg, and 4) Stage 2 HTN, ≥140 /≥90 mmHg.
N for each outcome model: Type 2 diabetes (N=4,609), prediabetes (N=4,475), metabolic syndrome (N=4,506), LDL cholesterol (N=4,545), total cholesterol (N=4,554), HDL cholesterol (N=4,554), and triglycerides (N=4,554).
*p<0.05.

161 Amniotic fluid sCD14, presepsin (sCD14-ST), intraamniotic infection/inflammation and early onset neonatal sepsis (EONS)

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OBJECTIVE: Soluble CD14 (sCD14) is a monocyte/macrophage activation marker and mediator of bacterial lipopolysaccharide (LPS) action. Presepsin (sCD14-ST) is a cleavage product of sCD14. Elevated cord blood (CB) presepsin were proposed as a biomarker for EONS. We aimed to determine if amniotic fluid (AF) presepsin is elevated in the context of IAI and could serve as a biomarker of EONS.

STUDY DESIGN: Presepsin and sCD14 were evaluated by ELISA in AF of 29 randomly selected singleton pregnancies who had transabdominal amniocentesis to rule out infection. Pregnancy outcomes were grouped as: 1) preterm birth (PTB) positive IAI (PTB+IAI, n=11, [mean±SE] GA: 26±1 wks]; 2) idiopathic PTB absent IAI [PTB-IAI, n=10, GA: 29±1 wks]; 3) term birth absent IAI [TB-IAI, n=8, GA: 29±1 wks). AF interleukin-6 (IL-6) and matrix metalloprotease-9 (MMP9) levels were measured as indicators of inflammation and proteolytic activity, respectively. Matched CB from fetuses with EONS and maternal blood (MB) samples were analyzed for a subset of PTB groups. We used parametric statistics (1-way ANOVA) after log transformation, correlation and regression analyses.

RESULTS: AF sCD14 was significantly elevated in the context of IAI [PTB+IAI: 1,090±255 ng/mL vs. PTB-IAI: 443±96 ng/mL, ANOVA p=.017; vs. TB-IAI 393±49 ng/mL, p=.013). Generally, presepsin was detectable in AF, at similar levels with MB, but at 10-fold lower than in CB. Following adjustment for GA and membrane status, AF presepsin did not differ among the groups [PTB+IAI: 5.3±1.6 ng/mL vs. PTB-IAI: 3.8±0.6 ng/mL, vs. TB-IAI 5.4±1.4 ng/mL, p >0.05 for all). AF sCD14 was positively correlated with AF IL-6 (r=0.619, p< .001) and AF MMP9 (r=0.714, p< .001) concentrations. There were no significant correlations of AF presepsin with sCD14, IL-6 or MMP-9.

CONCLUSION: sCD14 is significantly elevated in IAI. Yet, AF may carry inhibitory properties that neutralize cleavage of sCD14, thereby limiting the ability of AF presepsin to be used as biomarker of IAI or EONS.

162 Anxiety trends during pregnancy

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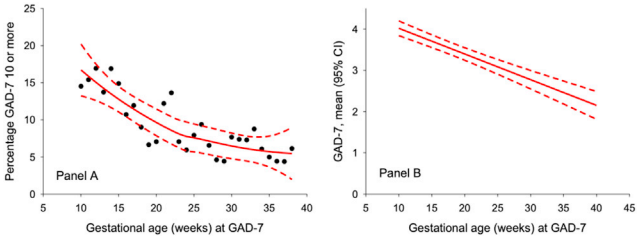
OBJECTIVE: National guidelines recommend that treatment for perinatal mood and anxiety disorders be equitably available to all pregnant individuals, however, the trend of anxiety symptomology across gestation is not known. Our aim was to examine trends in anxiety scores over time throughout pregnancy among underserved patients living in an urban community.

STUDY DESIGN: This was a secondary analysis of a prospective observational study of system-based Generalized Anxiety Disorder 7-

item screening questionnaire (GAD-7). The setting was a neighborhood-based community clinic in a large, urban health system that serves medically-indigent patients. GAD-7 screening was initiated at the first prenatal visit and repeated during prenatal care visits with those having two or more GAD-7 screens included in the analysis. Patients with multiple gestations, congenital anomalies, or those who established care after 34 weeks were excluded. To examine GAD-7 scores during gestation, linear regression was used for patients with multiple GAD-7 scores to calculate the direction of change over pregnancy course with $P < 0.05$ considered significant.

RESULTS: Between Sept 2020 and Dec 2022, a total of 1197 patients completed serial GAD-7 screens (range: 2-6) during the antepartum period. Mean GAD-7 scores were highest at the first prenatal visit, with an average score of 4.0 (CI 3.8, 4.2) at 10 weeks gestation. The highest percentage of GAD-7 scores ≥ 10 were observed at 14 weeks gestation (17.4%) as shown in Figure 1a. When evaluating the trend of GAD-7 over time, scores down-trended during pregnancy course as shown in Figure 1b (p-value for slope < 0.001).

CONCLUSION: Anxiety symptomatology is highest in the first trimester and down-trends over the pregnancy course. These findings support GAD-7 screening early in pregnancy.



163 Focused assessment with sonography for trauma associated with faster time to intervention for postpartum hemorrhage

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OBJECTIVE: We sought to identify if using Focused Assessment with Sonography for Trauma (FAST) exams during the evaluation of postpartum hemorrhage (PPH) following cesarean delivery affects the time to interventions.

STUDY DESIGN: This is a retrospective cohort study of cesarean deliveries (CD) between 2016-2020. Women ages 14-51 with a diagnosis of PPH were included. Patients with placenta accreta spectrum disorder identified at the time of CD were excluded. Demographic and outcome data were compared between those who had a FAST exam for PPH evaluation and those who did not. The primary outcome was the time to a composite of interventions, including intensive care unit admission, reoperation, and interventional radiology procedure within 48hrs of delivery. Group allocation and outcomes were determined through chart review. Survival Models were used to assess differences in time to intervention between the two groups, while adjusting for potential confounders.

RESULTS: A total of 1,128 women with PPH following CD were included in this analysis. 113 (10.0%) had a FAST exam as part of their evaluation for hypotension (18%), tachycardia (11%), dizziness (5%), abdominal pain (21%), larger than expected decrease in hemoglobin (23%), or bleeding from the vagina or incision (18%). 18% of FAST exams were positive for hemoperitoneum. The FAST group had a higher estimated blood loss (EBL) (1,952 mL vs 1,340 mL $p < 0.0001$) and more PPH related significant maternal morbidity (SMM). All other demographic variables were balanced between groups. The mean time to intervention was 8 hours shorter in the FAST group. FAST patients received interventions on average 39.2 hrs after delivery and non-FAST patients received interventions 47.2 hrs after delivery ($p < .0001$). After adjusting for age, EBL, multiple gestation, fibroids, reason for PPH, and PPH related SMM, the FAST group still received interventions on average 5.5 hrs faster than those who did not ($p < 0.0001$).

CONCLUSION: Providers should utilize FAST exams as a first-line approach in the evaluation of PPH to decrease time to interventions and reduce maternal morbidity.

Variables	Overall	Fast scan performed		P
		no	yes	
N (%)	1,128 (SD)	1,015	113	
Age, yrs	31.3 (5.8)	31.3 (5.7)	30.6 (6.7)	0.39
Gestattional age at Delivery (wks)	37.6 (3.3)	37.6 (3.3)	37.3 (3.0)	0.0417
Gravida	2.8 (1.9)	2.8 (1.9)	2.9 (1.8)	0.23
Parity	1.1 (1.3)	1.1 (1.3)	1.2 (1.3)	0.27
EBL	1401 (819.1)	1340 (662.4)	1951 (1562)	<0.0001
BMI	36.0 (7.7)	36.1 (7.6)	35.0 (8.9)	0.09
Race				0.22
Black/	392 (35)	345 (34)	47 (42)	
White	531 (47)	487 (48)	44 (39)	
Asian	75 (7)	66 (7)	9 (8)	
Others	130 (12)	117 (12)	13 (12)	
Ethnicity				0.86
non-hispanic	950 (84)	857 (84)	93 (82)	
hispanic	175 (16)	155 (15)	20 (18)	
unknown	3 (0)	3 (0)	0 (0)	
Primary C-section	724 (64)	654 (64)	70 (62)	0.53
Reepeat C-section	403 (36)	360 (35)	43 (38)	0.51
Multiple Gestations	80 (7)	68 (7)	12 (11)	0.24
Labor status				0.91
unlabored	933 (83)	842 (83)	91 (81)	
labored	195 (17)	173 (17)	22 (19)	
Chorioamnionitis	104 (9)	90 (9)	14 (12)	0.24
History of PPH	75 (7)	66 (7)	9 (8)	0.73
Fetal Macrosomia	101 (9)	94 (9)	7 (6)	0.83
Fibroids	49 (4)	42 (4)	7 (6)	0.51
Previa	25 (2)	24 (2)	1 (1)	0.8
Abruption	51 (5)	45 (4)	6 (5)	0.84
Polyhydramnios	38 (3)	36 (4)	2 (2)	0.61
SMM composite				<0.0001
0	785 (70)	756 (74)	29 (26)	
1	292 (26)	228 (22)	64 (57)	
2	38 (3)	24 (2)	14 (12)	
3	10 (1)	5 (0)	5 (4)	
4	3 (0)	2 (0)	1 (1)	

164 Adjunctive azithromycin for unscheduled cesarean delivery complicated by intraamniotic infection

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OBJECTIVE: Adjunctive azithromycin at the time of unscheduled cesarean delivery (CD) reduces postoperative infection. Patients with intraamniotic infection (IAI) were excluded in the original trial. We sought to determine if azithromycin is associated with reduced postoperative infection in this population.

STUDY DESIGN: Retrospective cohort study of patients with IAI and a singleton delivered by unscheduled CD at $\geq$24 weeks between 2017-2022 in one healthcare system. IAI was diagnosed using ICD10 codes. Exclusion criteria were PPROM or macrolide allergy. The primary exposure was administration of IV azithromycin 500mg at

delivery. The primary outcome was a composite of infection (ICD10 codes for endometritis, SSI, sepsis, or postoperative infection; or post-delivery positive blood, wound, respiratory, or urinary cultures within 6 weeks postpartum). Secondary outcomes included oral antibiotic use after delivery or any urgent (ED or readmission) visit for infection. Patients were matched on delivery BMI, failure to progress CD indication, smoking status, duration of rupture of membranes (h), and pregestational diabetes using coarsened exact matching. Weighted simple logistic regression was performed on matched patients.

RESULTS: During the study period, 1,366 patients with IAI delivered; 1,158 (84.8%) patients were matched. The overall rate of the primary outcome was 16.7%; 113 patients (9.8%) received oral antibiotics after delivery; and 11 (1.0%) had an urgent postpartum visit for infection (Table). Adjunctive azithromycin was not associated with a lower rate of the primary outcome (OR: 0.88, 95% CI 0.64 − 1.2, p=0.46). It was associated with decreased oral antibiotic use (OR: 0.50, 95% CI 0.39-0.65, p< 0.001) and fewer urgent postpartum visits (OR: 0.22, 95% CI 0.07 − 0.69, p=0.01).

CONCLUSION: Adjunctive azithromycin at the time of CD delivery among patients with IAI is not associated with lower rates of postpartum infection. However, it is associated with a reduction in oral antibiotic use, which may suggest a decrease in less severe postoperative infection rates.

Outcome*	No Azithromycin (n=761)	Azithromycin (n=397)	Post-Match OR [95% CI]†	p-value†
Primary Composite	111 (14.6)	58 (14.6)	0.88 [0.64, 1.2]	0.46
Endometritis	53 (7.0)	33 (8.3)		
Puerperal Sepsis	2 (0.3)	0 (0.0)		
Puerperal Infection	24 (3.2)	5 (1.3)		
Cesarean Disruption	9 (1.2)	4 (1.0)		
Urinary Tract Infection	22 (2.9)	5 (1.3)		
Cellulitis	11 (1.4)	0 (0.0)		
Post Operative Infection	8 (1.1)	2 (0.5)		
Pos Blood Culture	23 (3.0)	11 (2.8)		
Pos Wound Culture	13 (1.7)	8 (2.0)		
Pos Resp Culture	0 (0.0)	1 (0.3)		
Pos Genital Culture	0 (0.0)	1 (0.3)		
Antibiotics After Delivery	87 (12.5)	26 (6.5)	0.50 [0.39, 65]	<0.001
Urgent Visit Postpartum	10 (1.3)	1 (0.3)	0.22 [0.07, 0.69]	0.01

Data presented as n (%) unless otherwise specified. *Within 6 weeks postpartum. †Odds ratio reported for the matched, weighted regression analysis. P-values correspond to the logistic regression.

165 Machine learning for the prediction of surgical morbidity in placenta accreta spectrum

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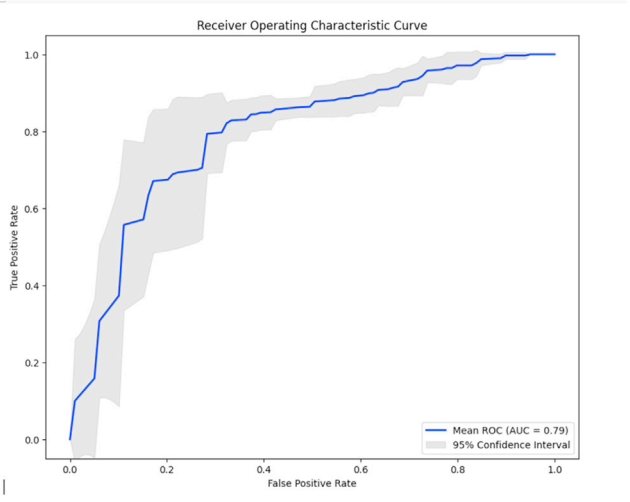
OBJECTIVE: We sought to create a machine learning (ML) model to identify variables that would aid in the prediction of surgical morbidity in cases of Placenta Accreta Spectrum (PAS).

STUDY DESIGN: A multicenter analysis including all cases of PAS across five tertiary care perinatal centers and members of the New York City Maternal Fetal Medicine research consortium, from 2013-2022. We developed models to predict operative morbidity using 213 variables including demographics, obstetrical information and limited imaging findings detailing placental location. Our primary outcome was prediction of a surgical morbidity composite defined as including any of the following: ICU admission, transfusion of >4 units of packed red blood cells, organ injury, vasopressor use, intubation or mechanical ventilation and maternal mortality. A nested, stratified, cross-validation approach was used to tune model hyperparameters and estimate generalizability. XGBoost classifiers models incorporated preprocessing steps of standard scaling for numerical variables and one-hot encoding for categorical variables. Model performance was evaluated using area under the receiver operating characteristic curve (AUC), positive and negative predictive values (PPV, NPV), and F1 score. Variable importance ranking was also determined.

RESULTS: Among 401 PAS cases, 326 (81%) underwent hysterectomy. Of the 401 cases of PAS, 309 (77%) had at least one event defined as surgical morbidity. Our predictive model had an AUC of 0.79 (95% CI: 0.69,0.89), PPV 0.79, NPV 0.76 and F1 score of 0.88.

The variables most predictive of surgical morbidity were completion of a hysterectomy, pre-pregnancy BMI, absence of a 2nd trimester ultrasound, SES zip code, BMI at delivery, number of prenatal visits and delivery time of day.

CONCLUSION: By identifying social and obstetrical characteristics that increase patients' risk, ML models are useful in predicting PAS-related surgical morbidity. Utilizing ML could serve as a foundation for risk and complexity stratification in cases of PAS to optimize surgical planning.



166 Planned hysterectomy vs. conservative management for placenta accreta spectrum − a systematic review meta analysis

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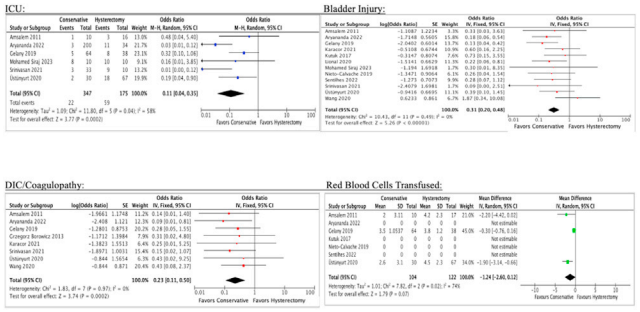
OBJECTIVE: In recent years, management of Placenta Accreta Spectrum (PAS) has fallen into two categories: planned hysterectomy vs. conservative management to preserve fertility. However, optimal management remains unclear. Therefore, we conducted a systematic review and meta-analysis comparing the two to evaluate which approach offers lower surgical morbidity.

STUDY DESIGN: Systematic review was conducted using PRISMA guideline. MEDLINE, Scopus, the Cochrane Library, and ClinicalTrials.gov were searched from inception to June 30, 2023 for trials comparing conservative management versus hysterectomy. Surgical morbidity was defined as rates of ICU admission, Disseminated Intravascular Coagulation (DIC)/coagulopathy, bladder injury and number of units of packed red blood cells transfused (pRBC). Odds ratios (OR) were computed with 95% confidence intervals (CI) using a fixed or random effects model.

RESULTS: Among 839 studies initially retrieved, 14 were included with a total of 1193 patients. Of these, 753 (63.1%) underwent conservative management and 440 (36.9%) underwent planned hysterectomy. Conservative management resulted lower rates of ICU admission (OR 0.11; 95% CI 0.04,0.35), lower rates of bladder injury (OR 0.31; 95% CI 0.2,0.48), and lower incidence of DIC or coagulopathy (OR 0.23; 95% CI 0.11,0.50). No difference was found in the total number of pRBC units transfused (OR -1.24; 95% CI -2.60-0.12).

CONCLUSION: Our findings suggest that conservative management of PAS may lead to reduced surgical morbidity. Further research is needed to better define those who are potential conservative management candidates for PAS.



167 Do recommended continuous glucose monitoring thresholds apply to type 2 and gestational diabetes in pregnancy?

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OBJECTIVE: Continuous glucose monitor (CGM) goals applied to pregnant people with type 1 diabetes include time-in-range (TIR) > 70%, time-above-range (TAR) < 25%, and glycemic variability (GV) ≤ 36%. Limited data support CGM use for gravidas with type 2 diabetes (T2DM) or gestational diabetes (GDM). We sought to determine risk of adverse perinatal outcomes (APOs) using various CGM thresholds in gravidas with T2DM/GDM.

STUDY DESIGN: In a retrospective analysis (2019-22) of gravidas at a single large center who used CGM for T2DM/GDM, we determined median 3rd trimester TAR, TIR, and GV in those with and without APOs using a target range 70-140 mg/dL. Generalized estimating equations determined odds ratios and 95% confidence intervals (CI) for hypertensive disorders of pregnancy (HDP), large-for-gestational age (LGA, birthweight ≥90%ile), neonatal intensive care unit (NICU) admission, neonatal hypoglycemia (NH, glucose ≤ 40 in first 24 hours), and jaundice (requiring phototherapy) at varying thresholds for each CGM metric in the 3rd trimester. Receiver operating characteristic analysis determined area under the curve (AUC) for varying thresholds for each metric.

RESULTS: Among 70 gravidas using CGM (T2DM: 48, GDM: 22), APOs occurred frequently (HDP, 43%; LGA, 13%; NICU admission, 29%; NH, 29%; and jaundice, 17%). For HDP, the TIR 90% (OR 3.3) and GV 20% (OR 5.3) thresholds were associated with the greatest odds of HDP. For LGA, TIR ≤ 75% (OR 7.2; AUC 0.73) and TAR ≥ 25% (OR 6.7; AUC 0.72) were associated with the greatest odds and discriminatory ability, while TIR 85% and TAR 15% had the greatest odds for NICU admission. Only TIR 75% was significantly associated with NH. Except for the aforementioned metrics for LGA, all other CGM metric thresholds had poor discriminatory ability for APOs (AUC < 0.7). GV thresholds were not associated with other APOs aside from HDP (GV > 20% vs. ≤ 20%: OR 5.3, CI 1.6-18.1).

CONCLUSION: In this cohort, recommended CGM thresholds for glycemic optimization during pregnancy had limited ability to distinguish risk of common APOs, beyond LGA, that complicate pregnancies with T2DM/GDM.

Table. Association of CGM thresholds with odds of perinatal outcomes

	n (%)	HDP	LGA	NICU	Neonatal Hypoglycemia	Neonatal Jaundice
3rd trimester		OR 95% CI	OR 95% CI	OR 95% CI	OR 95% CI	OR 95% CI
TIR ≥60% (ref)	56 (80)	2.1 (0.6, 6.8)	4.1 (0.9, 17.9)	3.3 (1.0, 11.2)	3.3 (1.0, 11.2)	1.4 (0.3, 6.1)
TIR <60%	14 (20)					
TIR ≥65% (ref)	52 (74.3)	2.0 (0.7, 5.9)	2.7 (0.6, 11.4)	1.9 (0.6, 5.9)	1.9 (0.6, 5.9)	1.6 (0.4, 6.0)
TIR <65%	18 (25.7)					
TIR ≥70% (ref)	48 (68.6)	2.0 (0.7, 5.6)	3.2 (0.8, 13.1)	2.3 (0.8, 6.9)	2.3 (0.8, 6.9)	1.1 (0.3, 4.2)
TIR <70%	22 (31.4)					
TIR ≥75% (ref)	43 (61.4)	1.8 (0.7, 4.8)	7.2 (1.4, 37.7)	3.5 (1.2, 10.3)	3.5 (1.2, 10.3)	2.7 (0.7, 9.5)
TIR <75%	27 (38.6)					
TIR ≥80% (ref)	36 (51.4)	1.8 (0.7, 4.6)	4.4 (0.8, 23.0)	3.5 (1.2, 10.6)	2.6 (0.9, 7.5)	4.0 (1.0, 16.2)
TIR <80%	34 (48.6)					
TIR ≥85% (ref)	28 (40)	2.1 (0.8, 5.7)	2.6 (0.5, 13.6)	3.7 (1.1, 12.6)	1.8 (0.6, 5.5)	2.3 (0.6, 9.3)
TIR <85%	42 (60)					
TIR ≥90% (ref)	21 (30)	3.3 (1.1, 10.5)	1.6 (0.3, 8.3)	3.2 (0.8, 12.4)	2.1 (0.6, 7.1)	1.3 (0.3, 5.6)
TIR <90%	49 (70)					
TAR <10% (ref)	23 (32.9)	3.0 (1.0, 8.8)	1.8 (0.4, 9.6)	2.5 (0.7, 8.4)	1.2 (0.4, 3.7)	2.8 (0.6, 14.2)
TAR ≥10%	47 (67.1)					
TAR <15% (ref)	30 (42.9)	2.0 (0.8, 5.3)	3.0 (0.6, 15.5)	4.3 (1.3, 14.8)	2.2 (0.7, 6.5)	4.7 (0.9, 23.2)
TAR ≥15%	40 (57.1)					
TAR <20% (ref)	37 (52.9)	2.0 (0.8, 5.1)	4.7 (0.9, 24.6)	2.8 (0.9, 8.2)	2.1 (0.7, 6.0)	2.6 (0.7, 9.8)
TAR ≥20%	33 (47.1)					
TAR <25% (ref)	42 (60)	1.3 (0.5, 3.3)	6.7 (1.3, 35.0)	2.4 (0.8, 6.8)	1.8 (0.6, 5.1)	1.6 (0.5, 5.7)
TAR ≥25%	28 (40)					
TAR <30% (ref)	48 (68.6)	2.0 (0.7, 5.6)	1.9 (0.5, 7.9)	1.7 (0.6, 5.1)	1.3 (0.4, 3.8)	1.7 (0.5, 6.2)
TAR ≥30%	22 (31.4)					
TAR <35% (ref)	48 (68.6)	2.0 (0.7, 5.6)	1.9 (0.5, 7.9)	1.7 (0.6, 5.1)	1.3 (0.4, 3.8)	1.7 (0.5, 6.2)
TAR ≥35%	22 (31.4)					

*CGM—continuous glucose monitoring, CI—confidence interval; HDP—hypertensive disorders of pregnancy, LGA—large-for-gestational age, NICU—neonatal intensive care unit, OR—odds ratio, ref—reference, TAR—time-above-range (*percentage of time with capillary blood glucose above 140 mg/dl), *TIR—time-in-range (*percentage of time with capillary blood glucose 70-140 mg/dl)*

Data for glycemic variability (the measurement of fluctuations of capillary blood glucose levels over 24 hours, assessed by the coefficient of variation for glucose) are not shown in the table.

168 Perinatal outcomes in pregnancies affected by early abnormal glucose tolerance

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OBJECTIVE: Abnormal glucose tolerance (AGT) in the third trimester, defined as 1 of 4 elevations on an oral glucose tolerance test (OGTT), is associated with increased risk for adverse pregnancy outcomes. Using universal rather than risk-based screening, we aimed to determine if AGT in early pregnancy was similarly associated with perinatal complications.

STUDY DESIGN: This study was a retrospective cohort study that reviewed 70,921patients with pregnancy data from three hospitals in

the greater Los Angeles area that employ universal gestational diabetes mellitus (GDM) screening in early pregnancy between the years 2010 and 2020. Per protocol, all patients are screened for GDM at the time of prenatal intake using the 2-step method. The primary outcome was large for gestational age (LGA) neonate. Secondary outcomes were a maternal composite and a neonatal composite.

RESULTS: 56,266 patients were identified who successfully completed the 1 hour 50-gram oral glucose challenge screening prior to 18 weeks gestational age. 6,294 patients met criteria for AGT on diagnostic evaluation with the 3 hour 100-gram OGTT using Carpenter-Coustan criteria. 6,294 matched controls with normal screening were identified. There were no significant differences in the primary outcome of LGA between groups (4% vs 4.1%, p=0.7186). Regression analyses revealed patients with early AGT were more likely to develop GDM compared to controls (29% vs 9.6%, OR 3.95 CI 3.55-4.40, p< 0.0001). There was also a significant difference in the rate of primary cesarean section for patients with early AGT (OR 1.11 CI 1.00-1.22, p=0.045).

CONCLUSION: Using universal GDM screening in early pregnancy, we found no association between early AGT and increased incidence of LGA newborns. However, early AGT was associated with an increased risk for GDM diagnosis in the third trimester as well as primary cesarean section. Further investigation into the use of risk based GDM screening in early pregnancy is warranted, as well as early implementation of healthy lifestyle counseling.

Adverse Perinatal Outcomes	Odds Ratio for Women with Early AGT	95% Confidence Intervals	*p* value
LGA	0.97	0.83-1.12	0.64
GDM	3.95	3.55-4.40	<0.0001
PIH	1.09	1.00-1.20	0.06
Chorioamnionitis	1.05	0.93-1.18	0.47
Shoulder dystocia	0.88	0.62-1.25	0.48
Operative VD	1.16	0.93-1.45	0.2
Primary CS	1.11	1.00-1.22	0.045
Repeat CS	1.01	0.91-1.12	0.84
Apgar 1 min	0.87	0.66-1.14	0.3
Apgar 5 min	1.07	0.77-1.48	0.68
Neonatal hypoglycemia	0.92	0.40-2.08	0.83
Neonatal RDS	0.79	0.61-1.02	0.07

AGT: abnormal glucose tolerance, LGA: large for gestational age (birth weight > 90%ile), GDM: gestational diabetes mellitus, PIH: pregnancy-induced hypertension, Operative VD: operative vaginal delivery including vacuum-assisted and forceps, primary CS: primary cesarean section, repeat CS: repeat cesarean section, neonatal RDS: neonatal respiratory distress syndrome

169 Curating the fetal genome: experience of the ClinGen prenatal gene curation expert panel (GCEP)

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OBJECTIVE: Prenatal genetic diagnosis now includes genomic sequencing. Interpretation of variants is more challenging prenatally than post-natally as fetal phenotypic information is limited to structural/growth abnormalities. Unique fetal phenotypes of genetic diseases and genotype-phenotype associations are underreported, leading to more genes of uncertain significance in the prenatal setting. This uncertainty negatively impacts confidence in reporting prenatal sequencing results by laboratories and the clinical management of pregnancies. To address the limited evidence for prenatal gene-disease associations, we assembled the ClinGen Prenatal GCEP.

STUDY DESIGN: The initial focus is on genes previously reported as associated with unique prenatal phenotypes: non-immune fetal hydrops (NIHF) and stillbirth (SB). All curators and experts trained in the standardized ClinGen tools to score genetic and functional evidence for gene-disease association. Paired curators and clinical experts focused on one assigned gene. Evidence was reviewed at weekly meetings and published on the ClinGen website.

RESULTS: Genes selected for curation include 151 implicated in NIHF and 221 implicated in SB; 34 overlap between these phenotypes. Pre-curation to assess initial evidence has been completed for 8 genes; primary curation has been completed for 5 genes associated with 7 phenotypes. These include *EPHB4*, *PIEZO1*, *FLT4*, *GRIP1*, and *TUBGCP6*, with confirmed causative evidence for hydrops, stillbirth, and prenatally observable fetal anomalies. A secondary curation has been completed for *TAFAZZIN*; primary curation was done by the Inborn Errors of Metabolism GCEP. Overall, this process has provided international prenatal providers with further clarity about unique fetal features of many genetic diseases, and will translate to more accurate prenatal diagnosis.

CONCLUSION: Our experience supports the importance of gene curation for prenatal phenotypes. The continuously updated data, which are publicly available online through ClinGen, will significantly facilitate uniformity in diagnostic prenatal sequencing and improve pregnancy management.

170 Successful trial of labor after cesarean prediction utilizing machine learning frameworks

Reetam Ganguli[1], Stephen M. Wagner[2]

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OBJECTIVE: Vaginal birth after cesarean section (VBAC) is associated with reduced maternal morbidity and improved outcomes in future pregnancies. Planned c-section leads to better outcomes over an unplanned c-section following failed TOLAC.

Recent literature has shown that clinicians overestimate the likelihood of successful VBAC (AUC=0.60). Identifying best candidates for TOLAC can guide clinical decision making and reduce emergency cesarean section. We aimed to develop and validate a machine learning framework utilizing non-invasive data to accurately predict successful VBAC.

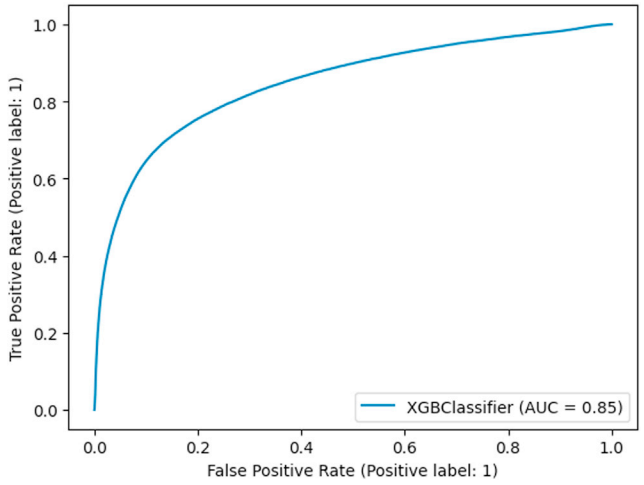
STUDY DESIGN: All patients from 2018-2020 in the National Vital Statistics System who had undergone a previous cesarean section met the inclusion criteria. Clinical variables studied included patient demographics, obstetric history, and clinical risk factors. The primary outcome predicted was successful VBAC. An extreme gradient boosting machine learning model was developed on the data. Weight scaling algorithms were utilized to improve representation of patients who underwent sucessful VBAC. The model was trained on all patients from 2018-2020, as well as VBAC patients from years 2014, 2016, and 2017 and was tested on a hold-out set of patients from the year 2021.

RESULTS: 43 variables across 1,948,912 obstetric patients were included in the training data, of which 453,085 successfully had a VBAC.

The model was tested on 561,717 patients from the 2021 year, of which 79,558 patients had a successful VBAC. The extreme gradient boosting model had an area under the receiver operating characteristic curve of 0.85, specificity of 0.89, with an accuracy of 85.4%, and F1 score of 0.85.

The highest weighted factors in the model were interval since last live birth, prepregnancy weight, and paternal age.

CONCLUSION: Machine learning models using routinely collected clinical data can accurately predict the probability of successful TOLAC. This could optimize counseling for pregnant patients considering TOLAC versus repeat cesarean delivery and have the potential to reduce unnecessary operative deliveries and associated costs for hospital systems.



171 Machine learning methods to identify severe postpartum hemmorrhage requiring transfusion prior to delivery

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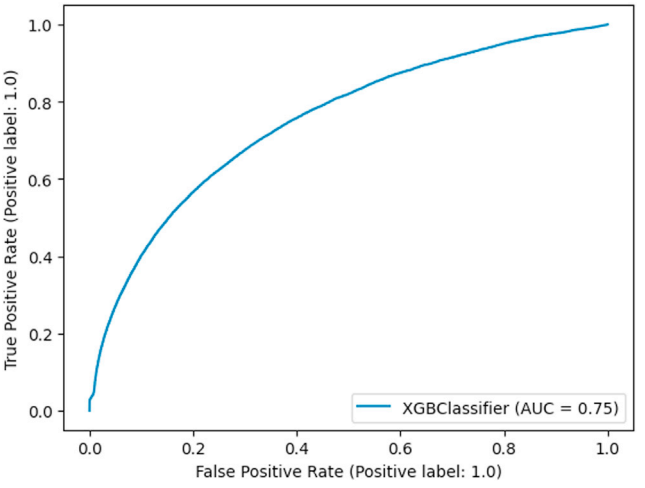
OBJECTIVE: Postpartum hemorrhage (PPH) is a leading cause of maternal mortality in the United States. The widely adopted PPH risk assessment tool developed by the California Maternal Quality Care Collaborative only classifes 22% of severe PPH patients as high risk and includes variables only accessible during the labor period. We developd a machine learning (ML) model to identify patients at risk for severe PPH requiring transfusion using data available prior to delivery. Early recognition could signal providers to schedule deliveries in higher-resourced hospital systems for patients in rural regions and enable earlier coordination with blood banks to prepare antigen matched blood prior to delivery.

STUDY DESIGN: We conducted a retrospective cohort study using the the Center for Disease Control's (CDC) Vital Statistics System. All patients from the 2018-2020 years as well as PPH patients from the 2014, 2016, and 2017 years without missing data for the PPH outcome were included. Variables with >50% missing data were omitted and training variables consisted of demographics, medical history, and prenatal data. An extreme gradient boosting ML algorithm was validated on CDC data from the 2021 year. Youden's J statistic value was calculated to set the classification threshold. The primary outcome was severe PPH requiring intrapartum maternal transfusion.

RESULTS: 7,728,892 patients were used to train the model. The incidence of severe PPH necessitating a transfusion was 1.2% (n=89,819). The gradient boosting model was trained across 39 variables and achieved an AUC of 0.75 with a 78.2% accuracy, and 0.78 F1 score. The sensitivity was 0.65 after setting the optimal threshold at 0.46. The highest weighted factors for the model were body mass index and maternal age.

CONCLUSION: ML methods can be utilized to identify patients at risk for severe PPH with nearly 3-fold greater high-risk sensitivity than the current PPH risk assessment system. Our model has the potential to improve care, avoid preventable PPH deaths, and reduce associated health services costs for PPH patients.



172 Continuous glucose monitoring in type 2 and gestational diabetes in pregnancy: better than hemoglobin A1c?

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OBJECTIVE: In gravidas with type 2 diabetes (T2DM) and gestational diabetes (GDM), we sought to determine the ability of continuous glucose monitoring (CGM) metrics (time-in-range, TIR; time-above-range, TAR; time-below-range, TBR; glycemic variability, GV) and hemoglobin A1c (HbA1c) to distinguish those at risk of adverse perinatal outcomes (APOs).

STUDY DESIGN: In a retrospective study (2019-22) of gravidas with T2DM/GDM who used CGM with target range 70-140 mg/dl, we assessed average 3rd trimester TIR, TAR, TBR, GV, and HbA1c in those with (vs. without) the following APOs: hypertensive disorders of pregnancy (HDP), large-for-gestational age neonate (LGA, birthweight $\geq$ 90%ile), neonatal intensive care unit (NICU) admission, neonatal hypoglycemia (NH, glucose $\leq$ 40 within 24 hours of birth), and jaundice (requiring phototherapy). For each outcome, the Mann-Whitney U test compared median CGM metrics and HbA1c, and receiver operating characteristic (ROC) analysis determined the optimal cut-point and area under the curve (AUC) for each metric.

RESULTS: Of 48 and 22 eligible gravidas with T2DM and GDM, respectively, lower TIR ($p \leq 0.03$) and higher TAR ($p \leq 0.04$) was associated with both HDP and NICU admission. HbA1c was higher in gravidas who had LGA infants and NICU admission ($p \leq 0.02$), and discriminatory ability of HbA1c exceeded that of all CGM metrics assessed (AUC for HbA1c: LGA 0.75, NICU 0.71). However, for HDP, a difference in HbA1c was not observed ($p=0.26$) and HbA1c had poor discriminatory ability (AUC 0.61). Neither HbA1c nor any of the CGM metrics differed among those with (vs. without) neonatal hypoglycemia or jaundice, and discriminatory ability of all metrics for these outcomes was poor (AUC $\leq$ 0.7).

CONCLUSION: In this cohort, HbA1c had superior discriminatory ability than CGM metrics for LGA and NICU admission among pregnancies affected by T2DM/GDM, but further investigation is warranted to identify the optimal measure of glycemic control that can prognosticate risk of other APOs in this population.

Table. Continuous glucose monitoring metrics and adverse perinatal outcomes

	Median		Cut-point	AUC
	No APO	*+APO*		
HDP (n, %)	40 (57.1)	30 (42.9)		
TIR	0.84	0.75*	0.79	0.44
TAR	0.13	0.20*	0.12	0.62
TBR	0.011	0.015	0.013	0.57
GV	0.21	0.24*	0.20	0.68
HbA1c	5.8	5.9	5.6	0.61
LGA (n, %)	61 (87.1)	9 (12.9)		
TIR	0.82	0.70	0.94	0.52
TAR	0.16	0.30	0.35	0.74
TBR	0.014	0.006	0.10	0.40
GV	0.22	0.25	0.22	0.64
HbA1c	5.8	6.4*	6.1	0.75
NICU (n, %)	50 (71.4)	20 (28.6)		
TIR	0.84	0.73*	0.69	0.44
TAR	0.12	0.27*	0.17	0.68
TBR	0.014	0.010	0.018	0.46
GV	0.22	0.24	0.23	0.62
HbA1c	5.7	6.3*	5.9	0.71
Neonatal hypoglycemia (n, %)	50 (71.4)	20 (28.6)		
TIR	0.73	0.84	0.89	0.50
TAR	0.13	0.25	0.23	0.65
TBR	0.015	0.009	0.026	0.54
GV	0.22	0.23	0.23	0.54
HbA1c	5.7	6.1	5.9	0.62
Neonatal jaundice (n, %)	58 (82.9)	12 (17.1)		
TIR	0.84	0.74	0.73	0.50
TAR	0.14	0.24	0.19	0.69
TBR	0.012	0.011	0.009	0.58
GV	0.22	0.25	0.24	0.67
HbA1c	5.7	6.0	5.9	0.70

AUC—area under the curve, GV—glycemic variability, HbA1c—hemoglobin A1c, HDP—hypertensive disorders of pregnancy, LGA—large-for-gestational age, NICU—neonatal intensive care unit, TAR—time-above-range,
TBR—time-below-range, TIR—time-in range
TIR: percentage of time with capillary blood glucose 70-140 mg/dl.
TAR: percentage of time with capillary blood glucose above 140 mg/dl.
TBR: percentage of time with capillary blood glucose below 70 mg/dl.
GV: the measurement of fluctuations of capillary blood glucose levels over 24 hours
HbA1c: average blood glucose level over the prior 3 months
Cut-point: blood glucose value whose sensitivity and specificity are the closest to the value of the area under a receiver operating characteristic curve, and the absolute value of the difference between the sensitivity and specificity values is minimum.
*Indicates significant p-value (< 0.05) for those with (vs. without) each APO for each exposure.

173 Accuracy of estimated fetal weight based on provider training level

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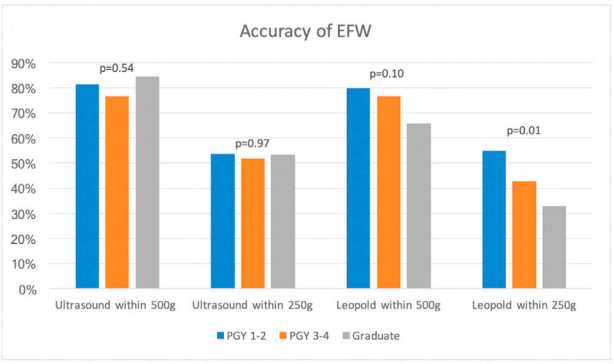
OBJECTIVE: Ultrasound (US) and clinical palpation can be used to determine an estimated fetal weight (EFW). We aimed to determine the accuracy of these measures performed by providers at various training levels.

STUDY DESIGN: This is a secondary analysis of a prospective cohort study of term singleton gravidas with obesity admitted for delivery. EFW was obtained with US-derived biometry and clinician palpation via Leopold's maneuvers. The primary outcome was prediction of birthweight within 500g. Secondary outcomes included accuracy within 250g and prediction of small-for-gestational age (SGA, < 10%ile) and large-for-gestational age (LGA, >90%ile) birthweight as measured by area under receiver-operating characteristic curves. (AUCs). These outcomes were compared by provider level of training: post-graduate years (PGY) 1-2, PGY 3-4, and post-residency (fellows and attendings).

RESULTS: Of 243 patients, 46.9% of EFW were performed by PGY 1-2, 23.0% by PGY 3-4, and 30.0% by post-residency providers. Baseline characteristics were similar. There was no difference in accuracy of US or palpation within 500g or US within 250g between the groups (Figure). However, the more junior providers were more likely to accurately predict birthweight within 250g by palpation (p=0.01). SGA was most likely to be accurately predicted by PGY3-4 providers via US (AUC 0.94 [0.90-0.99] vs 0.74 [0.50-0.98] for PGY1-2 and 0.66 [0.43-0.88] for post-residency, p=0.02) and by PGY1-2 providers by palpation (AUC 0.77 [0.53-1.00] vs 0.62 [0.37-0.86] for PGY3-4 and 0.49 [0.46-0.51] for post-residency, p=0.04). There was no difference in LGA prediction by training level.

CONCLUSION: Overall accuracy of EFW by US is similar across training levels, however accurate prediction of SGA by US is highest among PGY3-4 providers. By clinical palpation, PGY 1-2 providers are most likely to accurately assess fetal weight. This may suggest that as training progresses, US replaces palpation as preferred EFW method. Overall, trainees' estimates of fetal weight are similarly accurate to post-residency providers' and can be used to guide clinical management.

Figure: Accuracy of US- and palpation-derived estimated fetal weight by provider training level



174 Physical activity and sedentary behavior and spontaneous preterm birth (SPTB): Insights from Fitbit tracker data

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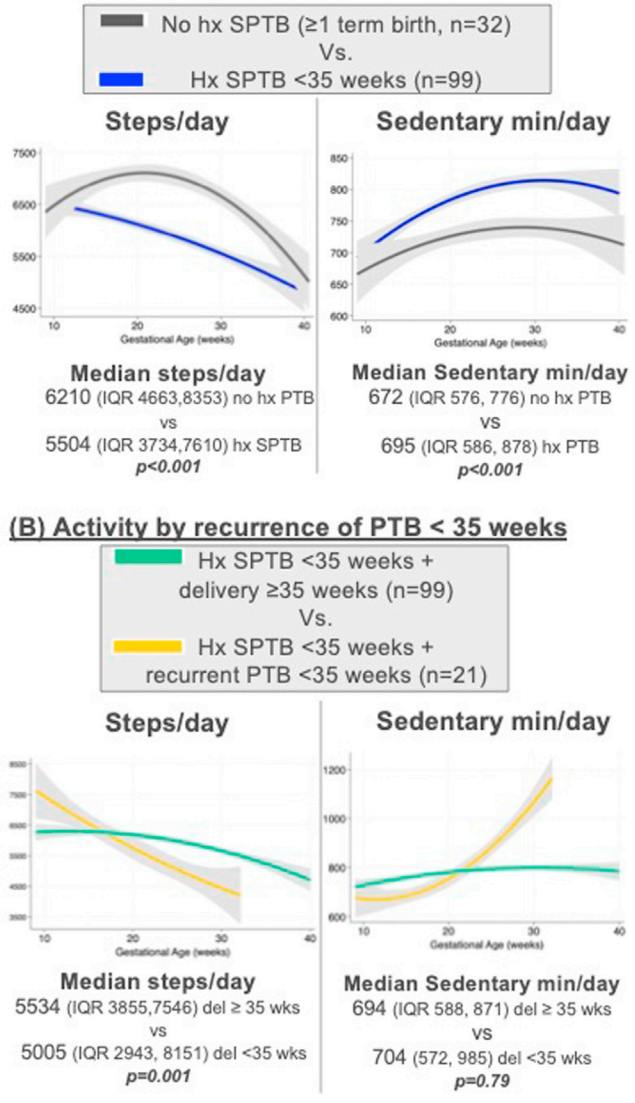
OBJECTIVE: We sought to assess if objectively quantified physical activity amount and intensity differ throughout gestation by history of SPTB and by recurrent PTB in the current pregnancy.

STUDY DESIGN: Primary analysis of a prospective observational cohort designed to identify factors associated with recurrent SPTB. Patients with singleton, non-anomalous gestations and ≥1 prior SPTB 16.0-34.9 wks (***hx SPTB***) and a smaller subset of individuals with ≥1 prior births ≥ 37 wks and no prior PTB (***no SPTB hx***) were recruited, 9.0-13.9 wks, 2017-2022. Physical activity was quantified using study-provided FitBit activity trackers. Subjects were instructed to maintain their 'usual activity.' Those with ≥7 valid monitoring days (FitBit recorded heart rate for ≥80% of the day) were included. Daily steps and activity intensity (sedentary, light, fairly/very active minutes) were compared by hx SPTB. For those with a hx SPTB, steps and activity intensity were also evaluated by recurrent PTB < 35 wks. Fixed-effects regression was used to account for varying numbers of obs/subject and adjust for confounders.

RESULTS: **131** patients met inclusion criteria. 99 (76%) had a hx SPTB < 35 wks; 18/99 (18%) had recurrent PTB < 35 wks (median 31.9 wks). All 32 patients with no hx SPTB delivered at term. The cohort was racially (37% Black) and ethnically (16% Hispanic) diverse. There were 9,401 Fitbit wear days (median 63 days/person). Those with hx PTB were less active and more sedentary than those with no hx SPTB (all p< 0.001), Figure Panel A. Among those with hx PTB, those with recurrent PTB < 35 wks were less active but not more sedentary than those with hx SPTB who delivered ≥ 35 wks, Figure Panel B. In separate adjusted models, median steps/day (β=-0.04, 95% CI -0.007, -0.001, p=0.003) and sedentary minutes (β=0.002, 95% CI 0.0006, p=0.009) were associated with recurrent PTB < 35 wks.

CONCLUSION: Patients with hx SPTB < 35 wks are less active and more sedentary than those with only prior term births. Fewer median steps per day and increased sedentary minutes are associated with recurrent PTB.

Figure. Physical activity across gestation, measured by FitBit activity tracker. Fitted values are shown. *Trends were similar for other activity intensities (data not shown due to space limitations).*



175 Physical activity guidelines are infrequently met during pregnancy, regardless of SPTB history or antepartum hospitalization

Emily Gascoigne[1], **Catherine Vladutiu**[2], **Abbie Smith-Ryan**[1], **Annie Dude**[3], **Tracy Manuck**[1]

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OBJECTIVE: National guidelines recommend pregnant persons obtain ≥ 150 min of ≥moderate intensity activity/week (~7,000-10,000 steps/day). We sought to quantify physical activity to assess adherence to recommended guidelines among pregnant outpatients (outpt) with and without a prior SPTB, and those cared for inpatient (inpt) on the antepartum unit.

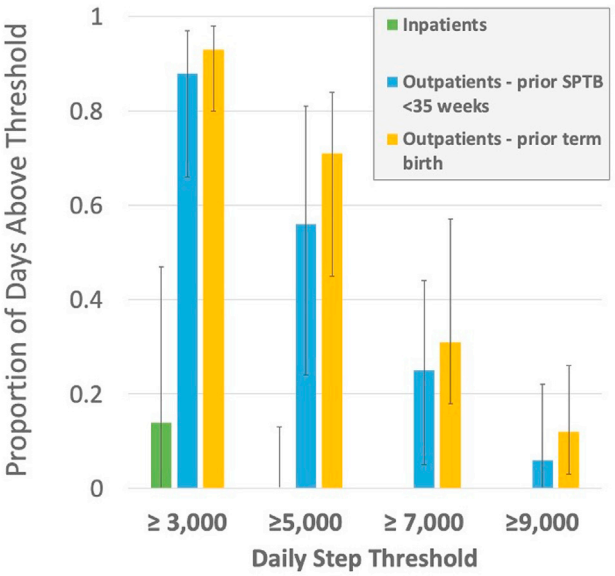
STUDY DESIGN: Analysis of 2 prospective observational cohorts. In study #1 (outpt), patients were recruited from OB clinics, 9-13 wks; most had a prior SPTB < 35 wks; a subset had ≥1 prior term delivery. In study #2 (inpt), patients were recruited while admitted to antepartum, 20-33 wks. Physical activity was quantified using study-provided FitBit activity trackers throughout pregnancy (study #1) or while inpt and undelivered (study #2). Subjects were instructed to maintain 'usual activity.' Those with ≥7 valid study days (FitBit recorded heart rate for ≥80% of the day) were included. The primary outcomes were the % of days each participant (a) took ≥7,000 steps/day; (b) had ≥ 21 minutes of ≥ moderate activity. Secondary outcomes were the % of days each participant took ≥ 3000, 5000, and 9000 steps. Data were analyzed by ANOVA, chi2, and t-test.

RESULTS: **201** patients met inclusion criteria, including 131 outpts (32 prior term birth, 99 prior PTB; median 63 days of monitoring) and 70 inpts (median 14 days of monitoring). There were 11,914 Fitbit wear days. 73/201 (36%) patients had no days with ≥ 7,000 steps recorded (14 outpts, 59 inpts). Inpts had a median of zero FitBit monitoring days with ≥ 7000 steps; only 11/70 inpts had ≥ 1 FitBit day with ≥7000 steps. Outpts with a hx of SPTB achieved each step threshold less frequently than outpts with only prior term births (Figure). Similarly, outpts with a hx of SPTB achieved ≥ 21 minutes of ≥ moderate activity a median of 5.3% of days (vs. 9.6% for those with only prior term deliveries, and 0% for inpts).

CONCLUSION: Pregnant persons infrequently achieve recommended national physical activity goals. Activity levels are lower in individuals with a prior SPTB, and lowest in those hospitalized on the antepartum service.

Figure. Proportion (%) of FitBit monitoring days with daily step count above the thresholds of ≥ 3000, 5000, 7000, and 9000 daily steps. Data are stratified by subject type; inpatients were the least likely to achieve each of the daily step thresholds.

Note: p<0.001 for all 3-way comparisons



176 Continuous glucose monitoring metrics and perinatal morbidity in pregnancies with type 1 diabetes

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OBJECTIVE: To examine the discriminatory ability of continuous glucose monitoring (CGM) metrics (time-in-range, TIR; time-above-range, TAR; time-below-range, TBR; glycemic variability, GV) across gestation and hemoglobin A1c (HbA1c), for adverse perinatal outcomes (APOs) in pregnant people with type 1 diabetes (T1DM).

STUDY DESIGN: This is a retrospective study (2019-22) of gravidas with T1DM using CGM with target range 70-140 mg/dl. Exposures were average TIR, TAR, TBR, GV, and HbA1c per trimester. Primary maternal and neonatal outcomes were hypertensive disorders of pregnancy (HDP) and large-for-gestational age neonate (LGA, birthweight $\geq$ 90%ile). Secondary neonatal outcomes were neonatal intensive care unit (NICU) admission, neonatal hypoglycemia (NH, glucose $\leq$ 40 mg/dl in first 24 hours), and jaundice (requiring phototherapy). The Mann-Whitney U test compared median CGM metrics and HbA1c by outcome each trimester. Receiver operating characteristic (ROC) analysis determined the optimal cut-point with the greatest sensitivity and specificity and area under the curve (AUC) for each metric.

RESULTS: Among 92 patients using CGM for T1DM, the majority were multiparous (58%) and used insulin pumps (60%). Pregnancies with HDP, NICU admission, and jaundice had lower TIR each trimester ($p \leq 0.01$); lower TIR was associated with LGA only in the first trimester (p=0.01). Pregnancies with (vs. without) HDP (41% vs. 28%), LGA (36% vs. 27%), NICU admission (46% vs. 30%), and jaundice (46% vs. 29%) had higher median TAR in the first trimester ($p \leq 0.01$), with similar findings in the 2nd and 3rd trimester ($p < 0.05$). Median HbA1c was also higher every trimester for those with HDP, LGA, NICU admission, and jaundice ($p < 0.05$). For NH, we did not identify a difference in CGM metrics or HbA1c. Among CGM metrics, TAR had the greatest discriminatory ability for APOs (AUC 0.63-0.90, Table), but its discriminatory ability was similar to that of HbA1c for HDP, LGA and NICU across gestation.

CONCLUSION: TIR is inversely associated with APOs in people with T1DM, but has poor discriminatory ability for APOs compared to TAR and HbA1c.

Table. Discriminatory ability of continuous glucose monitoring metrics for adverse perinatal outcomes

	HDP		LGA		NICU		Neonatal Hypoglycemia		Neonatal Jaundice	
n/N (%)	*30/92 (32.6)*		*29/92 (31.5)*		*20/92 (22.5)*		*33/89 (37.1)*		*16/89 (18.0)*	
	Cut-point	AUC	Cut-point	AUC	Cut-point	AUC	Cut-point	AUC	Cut-point	AUC
1st trimester										
TIR	64%	0.38	64%	0.38	77%	0.52	65%	0.53	-	-
TAR	38%	0.68	27%	0.70	40%	0.72	37%	0.58	39%	0.90
TBR	6.7%	0.49	6.0%	0.43	5.2%	0.52	6.7%	0.60	7.7%	0.59
GV	35%	0.65	35%	0.60	36%	0.64	34.6%	0.60	39%	0.75
HbA1c	6.0%	0.68	5.9%	0.67	6.1%	0.73	6.1%	0.52	6.2%	0.81
2nd trimester										
TIR	57%	0.43	57%	0.43	77%	0.51	70.3%	0.54	48%	0.40
TAR	27%	0.69	29%	0.63	35%	0.73	34.6%	0.73	33%	0.87
TBR	7.6%	0.47	9.0%	0.46	6.4%	0.49	9.8%	0.64	5.8%	0.56
GV	34%	0.67	33%	0.58	-	-	34%	0.63	34%	0.78
HbA1c	6.2%	0.68	5.8%	0.67	6.2%	0.76	6.2%	0.60	6.0%	0.79
3rd trimester										
TIR	62%	0.43	62%	0.43	78%	0.49	63%	0.49	82%	0.46
TAR	24%	0.71	24%	0.64	32%	0.73	32%	0.73	32%	0.88
TBR	4.1%	0.45	6.7%	0.47	4.6%	0.48	6.4%	0.63	6.1%	0.48
GV	32%	0.67	33%	0.56	32%	0.63	31%	0.61	33%	0.80
HbA1c	6.0%	0.75	5.9%	0.66	6.1%	0.74	6.1%	0.59	6.5%	0.79

AUC—area under the curve, GV—glycemic variability, HbA1c—hemoglobin A1c, HDP—hypertensive disorders of pregnancy, LGA—large-for-gestational age, NICU—neonatal intensive care unit, TAR—time-above-range, TBR—time-below-range, TIR—time-in range

TIR: percentage of time with capillary blood glucose 70-140 mg/dl. TAR: percentage of time with capillary blood glucose above 140 mg/dl.
TBR: percentage of time with capillary blood glucose below 70 mg/dl.
GV: the measurement of fluctuations of capillary blood glucose levels over 24 hours
HbA1c: average blood glucose level over the prior 3 months
Cut-point: blood glucose value whose sensitivity and specificity are the closest to the value of the area under a receiver operating characteristic curve, and the absolute value of the difference between the sensitivity and specificity values is minimum.

177 Value of "lethal" ultrasound markers identifying fetuses with lethal skeletal dysplasia before/after 28 weeks

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OBJECTIVE: Several ultrasound markers have been proposed to identify fetuses with lethal skeletal dysplasia. We sought to determine their utility in fetuses < vs >= 28 weeks.

STUDY DESIGN: Single-center retrospective review of pregnancies with suspected fetal skeletal dysplasia from 2013-2023. Ultrasound was performed with attention to measurements predictive of lethality, including thoracic circumference/abdominal circumference (TC/AC)< 0.6, femur length/abdominal circumference (FL/AC)< 0.16, and thoracic circumference (TC)< 2.5%ile. Fetuses were grouped based on gestational age at diagnosis. Demographic information, imaging, genetic testing, and outcome were collected. Statistical analysis included Fisher's exact test and calculation of sensitivity, specificity, positive predictive value, and negative predictive value.

RESULTS: 122 fetuses had a prenatal ultrasound consistent with a skeletal dysplasia between 16-38 weeks. Of those, 88 (72%) were < 28 weeks and 34 (28%) were >= 28 weeks. Outcomes are detailed in Table 1. Complete outcome data was available for 96 patients. In the cohort diagnosed at < 28 weeks, FL/AC ratio < 0.16 and TC < 2.5% ile were associated with death or a lethal genetic diagnosis (p< 0.001; p< 0.001) while TC/AC < 0.6 was not (p=0.280) (Table 2). In the cohort diagnosed at >= 28 weeks, only TC < 2.5%ile was associated with death or a lethal genetic diagnosis (p=0.006) (Table 2). The positive predictive value of one, two and three "lethal" ultrasound markers for predicting death or a lethal genetic diagnosis went from 58%, 90%, and 100% at < 28 weeks to 27%, 43%, and 100% at >= 28 weeks, respectively. The negative predictive value of no lethal markers was 91% in both groups.

CONCLUSION: In our cohort, the positive predictive value of one or two "lethal" ultrasound markers was lower in fetuses diagnosed at >= 28 weeks compared to those diagnosed earlier in pregnancy. This highlights the importance of thorough ultrasound examination, genetic testing, and balanced parental counseling particularly in patients presenting later in gestation.

Fetal diagnosis < 28 weeks n=65			
	Alive or non-lethal genetic diagnosis N=25	Deceased or lethal genetic diagnosis N=40	p-value
TC/AC < 0.6	0	3 (7.5%)	0.28
FL/AC < 0.16	13 (52.0%)	37 (92.5%)	**<0.001**
TC < 2.5%ile	2 (8.0%)	21 (52.5%)	**<0.001**
Number of lethal US markers			**<0.001**
0	10 (40.0%)	1 (2.5%)	
1	13 (52.0%)	18 (45.0%)	
2	2 (8.0%)	18 (45.0%)	
3	0	3 (7.5%)	
Fetal diagnosis >= 28 weeks n=31			
	Alive or non-lethal genetic diagnosis N=22	Deceased or lethal genetic diagnosis N=9	
TC/AC < 0.6	0	2 (22.2%)	0.078
FL/AC < 0.16	7 (31.8%)	4 (44.4%)	0.683
TC < 2.5%ile	7 (31.8%)	8 (88.9%)	**0.006**
Number of lethal US markers			0.057
0	10 (45.5%)	1 (11.1%)	
1	8 (36.4%)	3 (33.3%)	
2	4 (18.2%)	3 (33.3%)	
3	0	2 (22.2%)	

Table 2: Ultrasound markers of lethality based on outcome in those diagnosed before and after 28 weeks (FL/AC=femur length/abdominal circumference; TC=thoracic circumference; TC/AC=thoracic circumference/abdominal circumference; US=ultrasound)

178 Comparative transcriptomic analysis of the ectopic vs. physiologically implanted trophoblast

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OBJECTIVE: Eutherian development needs complex molecular dialogs between trophoblast and maternal decidua/endometrium. The ancestrally invasive phenotypic trophoblastic behavior is likely dependent on intra-uterine or extra-uterine epithelium differentiation. Our transcriptomic comparison of normally vs extra-uterine implanted human trophoblast aimed to discover differentially and similarly expressed genes that are likely to underlie distinct features of human placentation based on implantation environment.

STUDY DESIGN: RNAseq was performed on surgically excised ectopic pregnancy (EP) chorionic villi (n=6, GA:5.6±0.4 w). As reference tissues we used trophoblast obtained from early intrauterine pregnancies (IUP) via surgical abortion (n=5, GA:8.2±3.2 w), chorionic villus sampling (CVS, n=5, GA:12.6±1.1w), idiopathic preterm birth placentas (iPTB, n=7, GA:25.9±1.6 w) and term placentas (n=5, GA:39±1w). Differential abundance was calculated using DESeq2. Computational deconvolution on a dataset (PRJEB33665, n=8) estimated relative decidual composition in tissue isolates. Analyzed samples had a decidual transcriptional program < 12%. Data were compared to an existing independent EP vs IUP RNAseq dataset (GSE183319, n=10). ClusterProfiler for pathway enrichment and Therapeutic Target Database identified pharmacologically relevant tissue effectors.

RESULTS: Controlling for embryologic sex, 4,632 differentially abundant transcripts (2,130 increased, FDR< 0.05) were identified in EP vs IUP, of which 641 were common with the external cohort (Fig A). EP trophoblast was enriched for inflammatory and metabolic pathways and deficient in cell adhesion pathways (Fig B). The 404 transcripts commonly increased in EP vs IUP in both cohorts included sero-diagnostic markers and 101 cancer-related druggable targets.

CONCLUSION: EP chorionic villi transcriptome is remarkably different from that of the IUP trophoblast. Our data reveal for the first time that aberrant implantation triggers robust trophoblast inflammation and cell adhesion downregulation which could be therapeutically targeted to prevent EP or enhance IUP implantation.

179 A novel and modern VBAC calculator for use prior to labor

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OBJECTIVE: To develop a prediction model for individualized risks and benefits of a trial of labor after cesarean using modern mathematical techniques.

STUDY DESIGN: This was a secondary analysis of the Cesarean Registry database. Primary outcome: prediction of success of vaginal birth after cesarean (VBAC). Secondary outcomes: prediction of uterine rupture, maternal complications, neonatal complications. Inclusion criteria: term, singletons, cephalic presentation, one prior low transverse cesarean delivery. Exclusion criteria: intrauterine fetal demise, planned cesarean, prior myomectomy. Univariate comparisons identified variables that were independently associated with VBAC. An optimal decision tree was used to create a prediction model. A test set was withheld for validation. A risk calculator tool was developed for prediction of successful VBAC and adverse perinatal outcomes. Adverse maternal outcomes: uterine dehiscence, hysterectomy, postpartum hemorrhage, endometritis, intensive care unit admission, thromboembolic event, readmission, organ injury. Adverse neonatal outcomes: hypoxic ischemic encephalopathy, respiratory distress, seizures, apnea, respirator use, death, cord blood ph < 7.1.

RESULTS: The study population included 73262 deliveries; 12942 patients met inclusion and exclusion criteria. After removing cases for the test set, the included patients were 8078 patients, of which 5970 people had a successful VBAC (73.9%). Parity, number of years since prior cesarean delivery, pre-pregnancy body mass index (BMI), delivery BMI, maternal age, previous VBAC were associated with successful VBAC. A risk predictor calculator was created, and a ROC curve was developed with AN AUC was 0.72. The tool was also developed to identify a person's risk of uterine rupture, composite maternal morbidity and neonatal morbidity.

CONCLUSION: VBAC for patients with term, cephalic, singleton gestations were associated with several variables. This advanced calculator tool will facilitate shared decision making about the value of a TOLAC regarding the personalized risks of maternal and neonatal morbidity.

Table: Case examples using calculator tool

	Case 1	Case 2	Case 3	Case 4
○ Parity	1	1	3	4
○ Pre-pregnancy BMI	20	50	29	22
○ Delivery BMI	25	56	36	28
○ Maternal Age	22	40	30	35
○ Interval since prior cesarean (years)	1	3	11	3
○ Prior VBAC	No	No	Yes	Yes
✓ VBAC probability	76%	24%	78%	95%
✓ Uterine rupture probability	0%	3%	1%	0%
✓ Adverse maternal outcome probability	2%	3%	12%	2%
✓ Adverse neonatal outcome probability	7%	10%	9%	5%

Abbreviations: VBAC (vaginal birth after cesarean), BMI (body mass index)

○ Calculator Input

✓ Calculator Output

Red = < 50% chance of VBAC, or ≥ 10% or higher risk of morbidity

Green = ≥ 50% chance of VBAC, or < 10% chance of morbidity

180 Personalized approach to predict twin mode of delivery

Alexis C. Gimovsky[1], Silas Monje[2], Jack Dunn[3], Jordan Levine[4]

[1]Women & Infants Hospital of Rhode Island, Warren Alpert Medical School of Brown University, Providence, RI, [2]Alpert Medical School of Brown University, Providence, RI, [3]Interpretable AI, Cambridge, MA, [4]Dynamic Sky, Providence, RI

OBJECTIVE: The reported incidence of combined twin delivery (vaginal delivery of twin A followed by cesarean of twin B) ranges between 5% and 10%. These estimates can be useful overall, but personalized predictions are more clinically valuable for patient centered counseling. We aimed to develop a model that predicts the chance of successful vaginal delivery of twins based on pre-labor patient characteristics for an individual patient using a modern machine learning approach.

STUDY DESIGN: Secondary analysis of the Consortium for Safe Labor data set. Women with non-anomalous, diamniotic twins with a cephalic presenting twin between 32 0/7 and 38 6/7 weeks gestation were included. Only women attempting vaginal birth of twins were analyzed. We performed a retrospective cohort study, using optimal classification trees to predict twin mode of delivery (both vaginal, both cesarean or combined vaginal/cesarean). Pre-labor patient characteristics were examined to identify variables significantly associated with the success or failure of twin vaginl birth.

RESULTS: 830 patients met were analyzed after removing test set patients. Pre-labor characteristics associated with delivery mode included parity, pre-pregnancy body mass index, maternal age, history of prior cesarean and presentation of baby B. Using these characteristics, a predictive model was developed. A test set was withheld and then utilized to create a receiver operator curve. Accuracy was assessed with an area under the curve of AUC of 0.65.

CONCLUSION: We report the successful development of a predictive calculator for delivery mode in diamniotic twin pregnancy. This tool will be useful in patient counseling regarding mode of delivery.

Table: Case examples using calculator tool

	Case 1	Case 2	Case 3	Case 4
○ Parity	0	0	1	3
○ Pre pregnancy BMI	24	30	23	25
○ Maternal age	32	35	27	36
○ Prior cesarean	No	No	No	Yes
○ Presentation of baby B	Transverse	Cephalic	Breech	Cephalic
✓ Vaginal delivery of both twins probability	70.7%	26.3%	55.6%	28.6%
✓ Cesarean delivery of both twins probability	25.5%	71.3%	32.3%	64.3%
✓ Combined vaginal/cesarean probability	3.8%	2.5%	12.1%	7.1%

Abbreviations: BMI (body mass index)

○ Calculator Input

• Calculator Output

Red = < 50% chance of vaginal birth, or ≥ 5% chance of combined delivery

Green = >50% chance of vaginal birth, or < 5% chance of combined delivery

181 An association between advanced maternal age at first delivery and long-term risk for gynecological cancer

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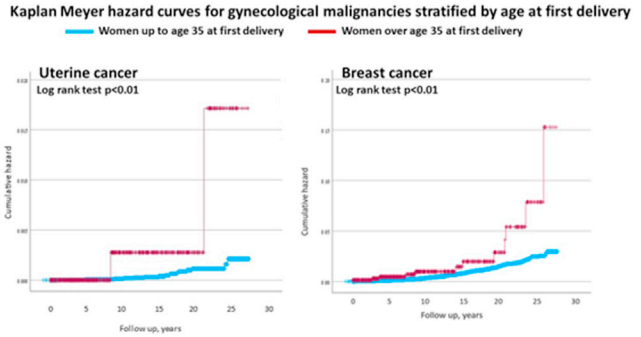
OBJECTIVE: Global trends indicate women increasingly delaying childbirth. This study aims to assess the impact of advanced maternal age at first delivery on the long-term incidence of gynecological cancers.

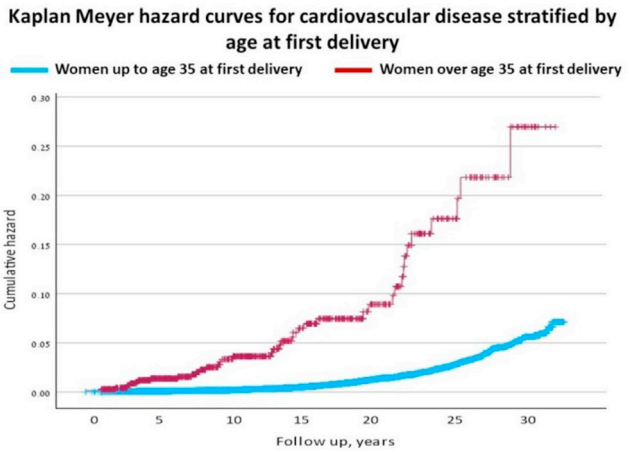
STUDY DESIGN: A population-based cohort study including all primigravida delivering between the years 1991-2019, stratified by age (up to vs. over 35 years at delivery). Data were collected retrospectively from medical records according to pre-defined ICD-9 codes. The incidence of gynecological cancers were compared and analyzed. Kaplan-Meier survival curves compared malignant morbidity controlling for time, and a Cox regression model controlled for confounders.

RESULTS: Among 44,230 first deliveries, 71.8%88 () were in elderly primigravida who were more likely to have undergone fertility treatment (29.1%vs. 3.1%, p< 0.01) as well as higher prevalence of diabetes (18.4% vs. 3.8%, p< 0.01), hypertension (16.6% vs. 6.9%, p<0.01), and pre-pregnancy obesity (2.3% vs. 0.9%, p< 0.01). The overall incidence of gynecological malignancies was higher in elderly primigravida (1.8% vs. 0.8%, p=0.003) and specifically, breast and endometrial (1.5% vs. 0.7%, p=0.003 and 0.3% vs. 0.0%, p=0.004 respectively). No differences were noted in the incidence of cervical and ovarian cancer. Kaplan-Meier survival curves reiterated these findings (Figure, log-rank test p< 0.01 for endometrial and breast cancers).

Multivariate analysis controlling for other risk factors such as hypertension, pre-eclampsia, diabetes and fertility treatment showed that elderly primigravida had an adjusted HR of 1.792 (95%CI 1.030-3.118, p=0.001) for composite malignancy, 3.398 (95%CI 0.700-16.504, p=0.129) for uterine cancer and 1.905 (95%CI 1.045-3.470, p=0.035) for breast cancer.

CONCLUSION: First pregnancy at advanced age is associated with increased lifetime risk for breast and endometrial malignancies, an additional factor to consider in family planning decisions.





182 Advanced maternal age among primigravida as a risk factor for long-term cardiovascular disease

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OBJECTIVE: The rising global trend of women delaying childbirth has prompted investigation into the impact of advanced maternal age at first delivery on long-term maternal health. This study focuses on the influence on maternal cardiovascular diseases.

STUDY DESIGN: A retrospective population-based cohort study including all primigravida between the years 1991-2019, stratified by age (up to vs. over 35 years at delivery) was conducted. Women with cardiovascular disease prior to delivery were excluded as were those with preeclampsia. Data were collected from medical records according to pre-defined ICD-9 codes. The incidence of cardiovascular outcomes were compared and analyzed according to maternal age. Kaplan-Meier survival curves compared cardiovascular morbidity, and a Cox regression model controlled for confounders.

RESULTS: Of 43,344 first deliveries, 749 (1.7%) were over age 35. Elderly primigravida suffered from a higher incidence of hypertension (5.7% vs 1.0%, p< 0.01) as well as ischemic heart disease (IHD, 0.6% vs. 0.2%, p=0.024) and composite cardiovascular diseases (5.8% vs 1.1%, p< 0.01). The Kaplan-Meier survival curves confirmed an increased risk of cardiovascular disease among elderly primigravida (Figure, log-rank test p< 0.01). Multivariate analysis, controlling for gestational hypertension, preeclampsia, diabetes, and fertility treatment showed that elderly primigravida had an adjusted hazard ratio (aHR) of 4.935 (95%CI 3.443-7.073, P< 0.001) for long-term cardiovascular disease compared to those up to age 35 at first delivery.

CONCLUSION: Our study highlights that elderly primigravida face an elevated lifetime risk of cardiovascular disease, specifically hypertension and IHD. These findings underscore the importance of family planning decisions in relation to long-term health.

183 Is preeclampsia with low sodium levels associated with preterm birth?

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OBJECTIVE: Preeclampsia (PEC) complicates 5-10% of all pregnancies. Preeclampsia and low sodium (PALS) has been previously reported; however, additional risks of low sodium levels in these patients is not well understood. We hypothesize PALS is associated with preterm birth (PTB).

STUDY DESIGN: Single center retrospective cohort of patients with PEC and a documented sodium level during delivery admission at Mount Sinai Hospital between 2013 and 2021. Demographic, obstetric, and neonatal outcomes of patients with and without low sodium, defined as sodium < 135 mmol/L, were compared. Primary outcome was PTB < 37 weeks. Secondary outcomes include gestational age at delivery, NICU admission, neonatal hyponatremia, mode of delivery, and indication for delivery. Primary and secondary outcomes were assessed using multivariable regression models, adjusting for history of preeclampsia in prior pregnancies, chronic hypertension, multiple gestation, aspirin use, history of PTB, and subtype of PEC.

RESULTS: Patients with PALS were more likely to be nulliparous (p=0.002), have a history of PEC (p=0.04), history of PTB (p=0.048), and history of prior cesarean delivery (CD) (p=0.01). The odds of PTB < 37 weeks among individuals with PALS is 1.76 times the odds among individuals with normal sodium levels (95% CI 1.09 − 2.83, Table 1). The odds of PTB < 34 weeks is 2.09 times the odds among individuals with low sodium levels compared to individuals with normal sodium levels (95% CI 1.17 − 3.75, Table 1). A trend towards earlier gestational age at delivery (36.9 vs 37.7 weeks, p=0.06) and higher rate of NICU admission (p=0.06) was noted in the hyponatremia group compared to the normal sodium group, although these associations were not statistically significant. Patients with PALS experienced higher rates of CD (p=0.03). Neonates born to patients with PALS experienced higher odds of hyponatremia (p=0.0009).

CONCLUSION: Hyponatremia in patients with preeclampsia is associated with preterm birth < 37 weeks. These findings may prompt closer attention to sodium levels in the identification and management of patients with preeclampsia.

Table 1. Univariable and Multivariable Logistic Regression Analyses

	PEC with Normal Sodium (n=398)	PEC with Hyponatremia (n=103)	Crude* Odds Ratio (Hyponatremia vs Normal) (95% CI)	Crude* P value	Adjusted** Odds Ratio (Hyponatremia vs Normal) (95% CI)	Adjusted** P value
Primary Outcome Variable:						
Preterm birth <37 Weeks—no. (%)	161 (40.5)	53 (51.5)	1.56 (1.01, 2.41)	0.045	1.76 (1.09, 2.83)	0.02
Preterm birth <34 weeks—no. (%)	55 (13.8)	23 (22.3)	1.79 (1.04, 3.09)	0.04	2.09 (1.17, 3.75)	0.01
Preterm birth <32 weeks—no. (%)	24 (6.0)	10 (9.7)	1.68 (0.77, 3.63)	0.19	--	--
Preterm birth <28 weeks—no. (%)	3 (0.8)	3 (2.9)	3.95 (0.79, 19.87)	0.10	--	--
Secondary Outcome Variable:						
Cesarean delivery (yes vs no)—no. (%)	207 (52.0)	65 (63.1)	1.58 (1.01, 2.47)	0.045	1.67 (1.06, 2.65)	0.03
NICU admission—no. (%)	143 (35.9)	47 (45.6)	1.50 (0.97, 2.32)	0.07	1.57(0.98, 2.52)	0.06
Neonatal hyponatremia –no. (%)	56 (14.1)	30 (29.1)	2.51 (1.51, 4.18)	0.0004	2.52 (1.46, 4.35)	0.0009

*Non-adjusted odds ratio estimated with the use of a simple logistic regression model.
**The final models for Preterm Delivery was adjusted by history of preeclampsia in prior pregnancies, aspirin use in pregnancy, multiple gestations (twins, triplets, etc.), chronic hypertension, history of preterm delivery in previous pregnancy, and subtype of PEC (preeclampsia with severe features, preeclampsia without severe features, and superimposed preeclampsia). There were not enough preterm infants <28 and <32 weeks to allow for multivariable regression using proposed confounders.

184 Risk factors for postpartum refractory hypertension and consequent pregnancy outcomes

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OBJECTIVE: To identify risk factors for refractory postpartum hypertension (RPHTN) in women with gestational hypertension (GH) and preeclampsia (PE), and to report outcomes of subsequent pregnancies.

STUDY DESIGN: A retrospective cohort study of singleton pregnancies diagnosed with GH or PE between 2006-2022, at a single tertiary care center. We compared pregnancy outcomes between RPHTN patients (requiring >1 antihypertensive treatment) and those with an adequate response. The primary outcome was the rate of severe preeclampsia in subsequent pregnancies. The secondary outcomes included subsequent pregnancy cesarean delivery (CD) rate, gestational age at delivery, and birthweight. Chi-square or fisher exact test were used to analyzed categorical variables, and student's t-test or Mann-Whiteny test were used for continuous variables. $p< 0.05$ was considered statistically significant.

RESULTS: A total of 3,735 gravidas were included in our study, 3457 in the non-RPHTN group and 278 in the RPHTN group. Women with RPHTN were more likely to be older than 35 years (31.7% vs. 24.6%, p=0.009), had a lower rate of BMI > 30 (56.8% vs. 68.7%, $p < 0.008$), and a higher rate of severe preeclampsia (54.3% vs. 12.4%, $p< 0.001$) compared with women with non RPHTN. At the subsequent pregnancy the rate of severe preeclampsia, and cesarean delivery were higher in the RPHTN group (12.2% vs. 4.3%, $p< 0.001$; 66.1% vs. 36.1%, $p< 0.001$, respectively) compared with the non RPHTN group. Birth weight was lower in the RPHTN group (3,028+682 vs. 3,216+592 grams, $p< 0.001$) compared with the non RPHTN group.

CONCLUSION: RPHTN is associated with advanced maternal age, severe preeclampsia, and low BMI. Subsequent pregnancies in RPHTN patients are linked to higher rates of severe preeclampsia, CD, and low birthweights. Vigilant monitoring in subsequent pregnancies is recommended

Table 1. Comparison of baseline demographic characteristics and pregnancy outcomes of women with non-refractory versus refractory hypertension.

		Variable	Non-Refractory HTN n= 3548	Refractory HTN n= 284	P-Value
Baseline Characteristics		Maternal age ≥ 35 years, n (%)	849 (24.6)	88 (31.7)	0.009
		Body Mass Index >30, n (%)	951 (68.7)	67 (56.8)	0.008
		Nulliparous, n (%)	1912 (56.3)	154 (55.8)	0.86
		In vitro fertilization, n (%)	169 (4.9)	16 (5.8)	0.52
		Gestational HTN, n (%)	2129 (61.6)	84 (30.2)	
		Mild Preeclampsia, n (%)	900 (26.0)	43 (15.5)	<0.001
		Severe Preeclampsia, n (%)	428 (12.4)	151 (54.3)	
		Gestational diabetes mellitus, n (%)	499 (14.4)	37 (13.3)	0.61
Pregnancy Outcomes		Cesarean delivery, n (%)	1346 (39.2)	201 (72.6)	<0.001
		Placental abruption, n (%)	58 (1.7)	10 (3.6)	0.02
		Gestational age at delivery, weeks, mean +/- SD	38.28±2.49	36.05±3.85	<0.001
		Birthweight at delivery, grams, mean +/- SD	3057±698	2451±925	<0.001
Subsequent Pregnancy	Pregnancy Complications	No Hypertension, n (%)	950 (65.1)	58 (50.4)	
		Chronic HTN, n (%)	35 (2.4)	6 (5.2)	
		Gestational HTN, n (%)	284 (19.5)	25 (21.7)	<0.001
		Mild Preeclampsia, n (%)	130 (8.9)	12 (10.4)	
		Severe Preeclampsia, n (%)	61 (4.2)	14 (12.2)	
		IUGR, n (%)	60 (4.1)	11 (9.6)	0.007
	Pregnancy Outcomes	Cesarean delivery, n (%)	526 (36.1)	76 (66.1)	<0.001
		Placental abruption, n (%)	19 (1.3)	1 (0.9)	0.69
		Gestational age at delivery, weeks, mean +/- SD	38.6±1.98	37.9±2.42	<0.001
		Gestational age at delivery <37 weeks, n (%)	131 (9.0)	19 (16.7)	0.008
		Birthweight at delivery, grams, mean +/- SD	3218±592	3028±682	<0.001
		SD, standard deviation; n, number. P < 0.05 was considered significant.			

185 A novel, validated calculator for predicting chorioamnionitis in laboring patients

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OBJECTIVE: Chorioamnionitis is associated with neonatal morbidity and infection-related mortality, but our ability to predict intrapartum infection is limited. We sought to derive and validate a prediction model for chorioamnionitis among patients presenting to labor and delivery at term.

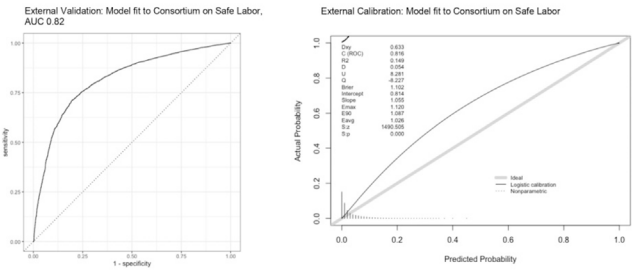
STUDY DESIGN: This was a planned secondary analysis of a large cohort study from 2014 through 2018 at an academic tertiary care center. To derive a prediction model for chorioamnionitis, we limited our analysis to full-term (≥37 weeks) patients with a singleton gestation undergoing labor induction. Both nulliparous and multiparous patients were included. Patients with a planned cesarean delivery, fever on admission, or missing data were excluded. The model was derived using multivariable logistic regression. Refinement of the prediction model with internal calibration was performed. External validation was performed utilizing a publicly available database (Consortium on Safe Labor) and applying the same inclusion and exclusion criteria.

The discriminative power of each model was assessed using a bootstrap, bias-corrected area under the curve.

RESULTS: The chorioamnionitis rates in the derivation and external validation groups were: 5% (1,005/19,966) and 5.8% (n = 3,005/52,171), respectively. In multivariable modeling, maternal age, nulliparity, gestational age, smoking status, group B streptococcus colonization, hours ruptured, number of cervical exams, length of labor, epidural use, internal monitoring, and meconium were significantly associated with infection. A calculator was created and externally validated with an area under the curve of 0.82 (95% confidence interval, 0.81-0.82). External validity was further confirmed with a calibration intercept of 0.81.

CONCLUSION: This is the first infection calculator created and validated for the prediction of developing chorioamnionitis in patients undergoing induction of labor at term. This calculator can be used to augment patient counseling and guide intrapartum infection surveillance in laboring patients.

Figure 1: Receiver Operating Curve of Internal and External Validation to Predict Intrapartum Chorioamnionitis



186 A randomized trial of spaced versus massed simulation in forceps assisted vaginal deliveries

Andrew Greene[1], Matthew Zuber[1], Joshua F. Nitsche[1], Mark Newman[1], Brian C. Brost[2]

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OBJECTIVE: We tested the effects of clustered versus spaced training sessions to teach trainees forceps assisted vaginal delivery (FAVD) and hypothesized that spaced training sessions would lead to superior retention of skill. We used a commercially available pelvic trainer (Lucy's Mum, MODEL-med®) and measured objective structured assessment of technical skills (OSATS) scores at >1 month post-intervention.

STUDY DESIGN: This was a randomized controlled trial of clustered versus spaced FAVD simulation sessions. Thirty-five (n=35) participant enrollment gave 80% power to detect a difference of OSATS score of 6. Trainees and medical providers who do not independently perform FAVD were randomized in blocks to a single learning session (30 minutes of hands-on teaching with a model; n=17) or three individual learning sessions (10 minutes each x3; n=18) spaced one week apart. Participants completed an online module introducing FAVD and completed skillset questionnaires pre- and post- simulation. We used a chest-mounted GoPro™ camera to capture point-of-view technique in order to blind expert adjudicators to participants' identities and blinded footage was used to grade average OSATS scores.

RESULTS: Both clustered and spaced simulation training led to improved FAVD OSATS score post-intervention (4.8 vs. 5.9), however the median change was not different between randomization group (Wilcoxon Rank Sum p= 0.78). Both simulation groups had higher confidence to apply forceps, perform safety checks, and independently/safely perform FAVD (t test p< 0.05).

CONCLUSION: We describe a novel use of point-of care video and simulator application to improve FAVD simulation training. OSATS scores and provider self-assessment of training improved regardless of clustered vs. spaced simulation sessions.

Provider Confidence (Likert Scale: 0-10)

	1 Session			3 Sessions		
	Pre (mean score)	Post (mean score)	p Value (t test)	Pre (mean score)	Post (mean score)	p Value (t test)
Identify Vertex	8	9	0.19	7.3	7.9	0.42
List indications/ contraindications	7.4	8.2	0.32	5.5	7.9	**0.005**
Describe RBA	8	8.2	0.80	7.2	8.2	0.13
Apply forceps and perform checks	5.3	7.2	**0.03**	4.0	7.9	**0.0000**
Ability to perform FAVD	3.7	6.4	**0.0004**	3.1	6.5	**0.0001**

187 Development of predictive model for preterm dirth using machine learning with US CDC data

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OBJECTIVE: This study aims to create a prognostic model for predicting preterm birth using automated machine learning algorithms.

STUDY DESIGN: Using US CDC natality data (2016-2019), a multiple regression analysis identified significant risk factors for preterm birth. These factors included gestational diabetes, gestational hypertension, pre- and during pregnancy smoking status, maternal age, multifetal gestation, BMI, prepregnancy hypertension, maternal race, prepregnancy diabetes, previous preterm births, interpregnancy interval, insurance type, and maternal presence of STIs. Using 756,288 randomly selected individuals from 2018-2019, two sets of multiple logistic regression (LR) and decision tree (DT) models were generated to predict preterm birth: early screening (in first trimester) and late screening (in third trimester). The early screening model excluded risk factors that had a later onset in pregnancy. For the LR models, we set the threshold to 10% probability, reflecting the national preterm birth rate. An 80-20 train-test split was performed to validate the model.

RESULTS: The DT and LR models performed similarly with accuracies of > 75%. However, the LR models had greater predictive power with F1 (harmonic mean of positive predictive value and sensitivity) scores of 0.333 for early and 0.304 for late screening compared to 0.229 and 0.237, respectively, for the DTs (Table 1). The early screening LR model (threshold = 0.1) had an accuracy of 83.5% and the late screening LR model (threshold = 0.1) had an accuracy of 75.1%. The LR models can also calculate an individual probability percentage for preterm birth based on the risk factors inputted.

CONCLUSION: The prognostic models were trained on a large, diverse national dataset, affirming their strength. Their high negative predictive value, high specificity and accuracy, and the LR models' ability to output a probability for preterm birth support that the

models can complement physician expertise in determining risk for preterm birth. Their limitations include low sensitivity and low positive predictive value, necessitating further model development.

Early Screening Decision Tree Model	Late Screening Decision Tree Model	Early Screening LR Model (threshold: 0.1)	Late Screening LR Model (threshold: 0.1)
F1 Score: 0.229	**F1 Score:** 0.239	**F1 Score:** 0.333	**F1 Score:** 0.304
AUC Score: 0.570	**AUC Score:** 0.577	**AUC Score:** 0.645	**AUC Score:** 0.655
Specificity: 0.923	**Specificity:** 0.919	**Specificity:** 0.884	**Specificity:** 0.776
Sensitivity: 0.218	**Sensitivity:** 0.234	**Sensitivity:** 0.405	**Sensitivity:** 0.533
Positive Predictive Value: 0.241	**Positive Predictive Value:** 0.244	**Positive Predictive Value:** 0.282	**Positive Predictive Value:** 0.212
Negative Predictive Value: 0.913	**Negative Predictive Value:** 0.915	**Negative Predictive Value:** 0.929	**Negative Predictive Value:** 0.936
Accuracy: 0.852	**Accuracy: 0.851**	**Accuracy: 0.835**	**Accuracy: 0.751**

Table 1: Summary of automated machine learning algorithm results.

188 Adverse pregnancy outcomes associated with hepatitis C in pregnancy: a population-based study

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OBJECTIVE: The prevalence of hepatitis C virus (HCV) infection during pregnancy in the United States (US) continues to increase at an alarming rate. Data regarding the association of HCV with adverse pregnancy outcomes are limited. Therefore, we set out to evaluate adverse pregnancy outcomes associated with HCV during pregnancy in a current US population.

STUDY DESIGN: Retrospective analysis of the US Centers for Disease Control and Prevention Natality Live Birth database (2016-2021). All live births were eligible for inclusion. Deliveries with missing data on HCV were excluded. The rates of several adverse pregnancy and neonatal outcomes were compared between two groups: pregnancies complicated by maternal HCV infection and those without HCV. Multivariable logistic regression was performed to adjust outcomes for potential confounders. Data were presented as adjusted odds ratios (aOR) with 95% confidence intervals (95% CI) and statistical significance set at $P < 0.05$.

RESULTS: Of the 22,604,938 included, 107,761 (0.48%) were complicated by maternal HCV infection. Adverse pregnancy and neonatal outcomes associated with HCV during pregnancy are presented in the Table.

CONCLUSION: Based on this large US population cohort, HCV infection during pregnancy is associated with an increased risk of several adverse pregnancy outcomes and neonatal complications. Specifically, the risk of preterm birth, congenital malformations, low birthweight, NICU admission, low Apgar score, need for ventilation, and antibiotics for suspected neonatal sepsis were significantly higher in pregnancies complicated by HCV. Understanding the impact of HCV on pregnancy outcomes in a current US population is important to better manage and optimize care for these pregnancies.

Table. Adverse pregnancy and neonatal outcomes associated with HCV during pregnancy.

	HCV Group (n=107,761)	No HCV Group (n=22,497,177)	aOR (95% CI)
Preterm birth < 37 weeks	20,406 (18.9)	2,250,590 (10.0)	1.99 (1.96-2.03)
Preterm birth < 32 weeks	4,058 (3.8)	459,893 (2.0)	1.86 (1.80-1.93)
Hypertensive disorders of pregnancy	7,334 (6.8)	1,442,413 (6.4)	1.07 (1.04-1.09)
Gestational diabetes	5,928 (5.5)	1,589,770 (7.1)	0.93 (0.90-0.95)
Congenital malformations	688 (0.6)	77,274 (0.3)	1.67 (1.53-1.81)
Low birthweight	18,725 (17.4)	1,848,423 (8.2)	2.40 (2.35-2.44)
5-minute Apgar < 7	3,703 (3.4)	458,360 (2.0)	1.67 (1.61-1.73)
NICU admission	25,752 (23.9)	2,041,241 (9.1)	3.06 (3.01-3.11)
Immediate ventilation	11,214 (10.4)	1,049,418 (4.7)	2.08 (2.04-2.13)
Prolonged ventilation	4,729 (4.4)	360,002 (1.6)	2.35 (2.27-2.43)
Administration of antibiotics for suspected neonatal sepsis	6,256 (5.8)	471,499 (2.1)	2.56 (2.48-2.63)

Data presented as n (%).
Models adjusted for maternal age, body mass index, race or ethnic group, history of preterm birth, chronic hypertension, and pregestational diabetes.

189 Pre-labor sonographic assessment of fetal station as a predictor of cesarean delivery

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OBJECTIVE: This study aims to determine if sonographic evaluation of fetal station before the onset of labor has an association with mode of delivery.

STUDY DESIGN: This prospective cohort study enrolled pregnant patients who are nulliparous, singleton, with vertex presentation and no contraindication to labor. IRB approval was obtained. Transperineal sonography was performed after 36 weeks before the onset of labor with patients' written consent. We measured angle of progression (angle between the long axis of pubic bone and fetal skull) and distance (distance between perineum and fetal skull). Additional data included in the analysis were maternal age, height, prepregnancy weight, weight gain, BMI, birth weight, and mode of delivery. Multivariate and univariate logistic regression analyses were run on SPSS. A decision tree model with a train-test split of 0.5 was created using python machine learning algorithms.

RESULTS: The study enrolled 220 patients, but 4 Cesarean deliveries (CD) were excluded due to fetal status prior to labor. 216 patients remained, with 18 CD, 149 spontaneous vaginal deliveries, 46 forceps assisted deliveries, and 2 vacuum assisted deliveries. Multivariate logistic regression showed distance was the most significant factor in determining CD ($p = 0.013$), followed by birth weight ($p = 0.031$) and height ($p = 0.034$). The decision tree model created using these three variables had an accuracy of ~90% with a specificity of 98% and sensitivity of 11%. Figure 1 displays the correlation between distance and CD.

CONCLUSION: Short distance was strongly associated with vaginal delivery, consistent with a lower station of the fetal head in the pelvis, indicating low risk of inlet or mid-pelvis dystocia. The CD rate in this study is lower than the national average. However, since most CDs in this series were due to arrest disorder, this data may be better suited to characterize the effect of distance on mode of delivery. This measurement could provide clinically useful information to physicians. A larger dataset can further validate this analysis and allow for a more precise predictive model.

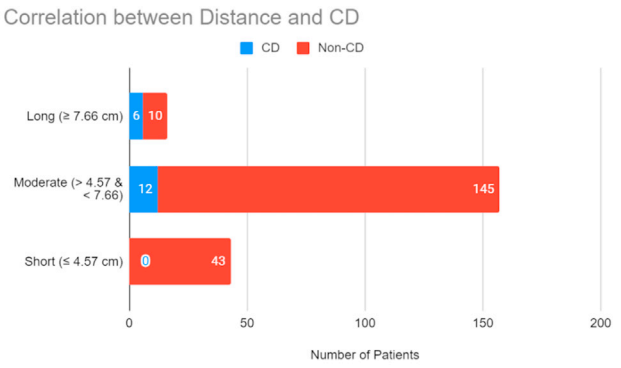


Figure 1: Zero of 43 patients with a distance less than 4.57 cm had CD, 12 out of 157 patients with a distance between 4.57 and 7.66 cm had CD, six out of 16 patients with a distance more than 7.66 cm had CD. There is a positive correlation between distance and proportion of CDs.

190 Modulation of dysbiotic vaginal complications by cervical mucus revealed in linked human-vagina and cervix-chips

Ola Gutzeit, Aakanksha GULATI, Zohreh IZADIFAR, Anna STEJSKALOVA, Hassan RHBINY, Justin COTTON, Bogdan BUDNIK, Sanjid SHAHRIAR, Girija GOYAL, Abidemi JUNAID, Donald INGBER

Wyss Institute, Harvard Medical School, Boston, MA; on behalf of the Bill and Melinda Gates Foundation and the Wyss Institute for Biologically Inspired Engineering

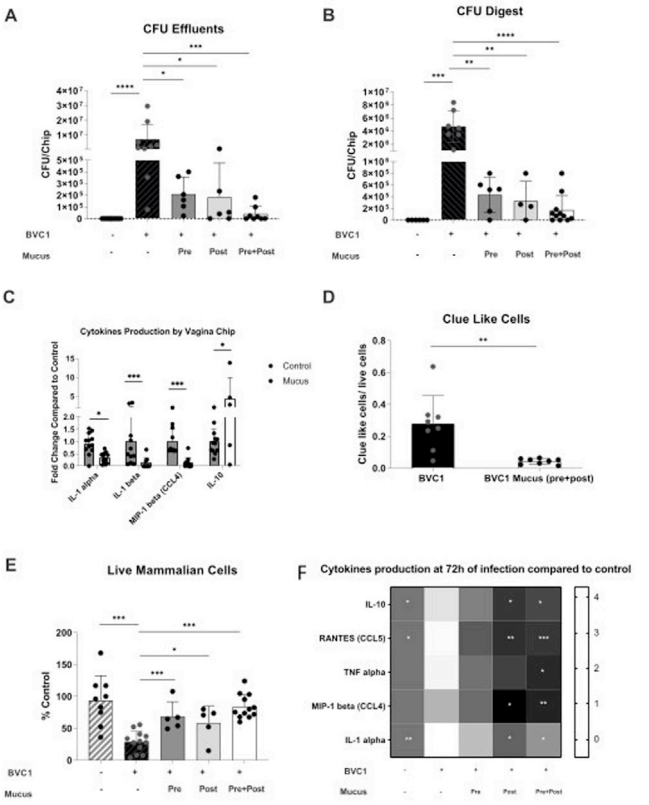
OBJECTIVE: Background: The cervicovaginal mucus that coats the upper surface of the vaginal epithelium is thought to serve as a selective barrier that helps to clear pathogens, however, its role in modulating the physiology and pathophysiology of the human vagina is poorly understood. Bacterial vaginosis (BV), a common disease of the female reproductive tract that increases susceptibility to sexually transmitted infections, pelvic inflammatory disease, infertility, preterm birth, and both maternal and neonatal infections is characterized by the presence of a wide array of strict and facultative anaerobes, often including *Gardnerella vaginalis*.

OBJECTIVE: To assess the role of cervical mucus in preventing dysbiosis-associated complications and preserving vaginal health.

STUDY DESIGN: To better understand the role of cervicovaginal mucus in vaginal health, we used human organ-on-a-chip (Organ Chip) microfluidic culture technology to analyze the effects of cervical mucus produced in a human Cervix Chip when transferred to a human Vagina Chip BV model. Both chips are lined by primary human organ-specific (cervical or vaginal) epithelium interfaced with organ-specific stromal fibroblasts.

RESULTS: Our data show that mucus-containing effluents from Cervix Chips protect Vagina Chips from inflammation and epithelial cell injury caused by co-culture with dysbiotic microbiome containing *G. vaginalis*. Proteomic analysis of proteins produced by the Vagina Chip following treatment with the Cervix Chip mucus also revealed a collection of differentially abundant proteins that may contribute to the vaginal response to dysbiotic microbiome, which could represent potential diagnostic biomarkers or therapeutic targets for management of BV.

CONCLUSION: This study highlights the importance of cervical mucus in control of human vaginal physiology and pathophysiology, and demonstrates the potential value of Organ Chip technology for studies focused on health and diseases of the female reproductive tract.



191 Intersectionality of individual- and neighborhood-level adverse social determinants of health in pregnancy

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OBJECTIVE: Individual- and neighborhood-level social determinants of health (SDOH) typically have been assessed separately in pregnancy, and their relationship to one another remains uncertain. We examined the intersectionality of individual- and neighborhood-level SDOH in early pregnancy.

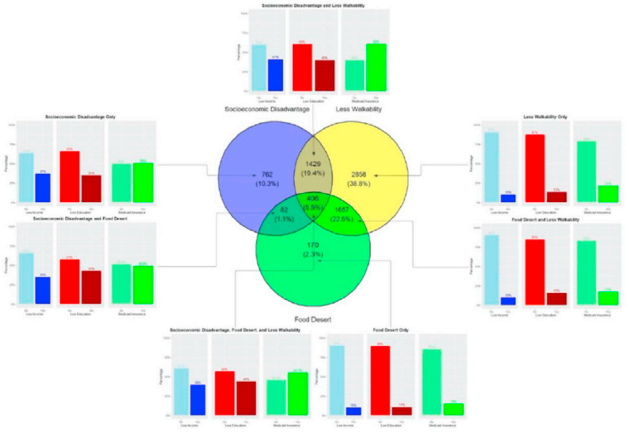
STUDY DESIGN: A secondary analysis from the prospective cohort Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-To-Be. Participant home addresses in the first trimester were geocoded at the census-tract level. We compared the overlap in frequency of three individual-level adverse SDOH (low income, low education, and Medicaid insurance) with three validated neighborhood-level adverse SDOH measures (socioeconomic disadvantage per the highest tertile by the 2015 Area Deprivation Index, food desert by the USDA *Food Access Research Atlas*, and less walkability by the EPA National Walkability Score).

RESULTS: Of 9,588 nulliparous individuals, individual-level adverse SDOH (low income, low education, and Medicaid insurance) were more prevalent among the 6% (406/7,282) of individuals who lived in a neighborhood with all three adverse SDOH (socioeconomic disadvantage, food desert, and less walkability) (low income: 39%;

low education: 44%; Medicaid: 55%) compared with the individuals who lived in neighborhoods with either two (43% of the population: low income: 22%; low education: 27%; Medicaid: 37%) or one adverse neighborhood SDOH (51% of the population: low income: 14%; low education: 17%; Medicaid: 27%) ($p< 0.001$ for all).

CONCLUSION: Among nulliparous individuals, individual-level adverse SDOH factors increased in frequency as individuals lived in neighborhoods with a greater number of neighborhood-level adverse SDOH. Approaches that identify both individual- and neighborhood-level adverse SDOH and relate these to pregnancy outcomes are needed.

Figure. Venn diagram of the relationship between individual- and neighborhood-level adverse social determinants of health in pregnancy



192 Labor length differences with 30cc versus 60cc Foley inflation when combination ripening methods are utilized

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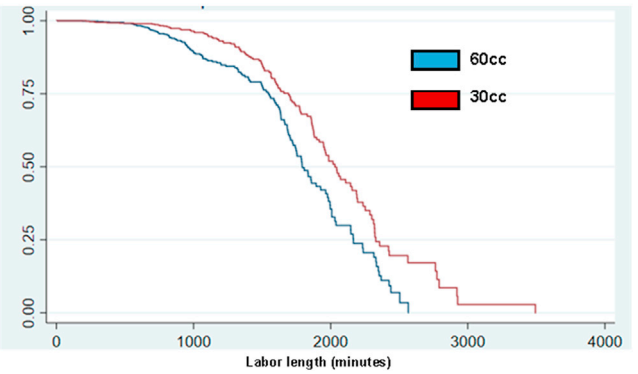
OBJECTIVE: Data supports shorter time to delivery with 60cc vs. 30cc Foley inflation for labor induction (IOL). Similarly, combination cervical ripening has a shorter time to delivery compared to single-agents. To date, no study has evaluated incremental benefit of higher Foley volume in the setting of combination ripening methods.

STUDY DESIGN: This is a secondary analysis of a prospective cohort study evaluating standardized IOL management at 2 sites. Any cervical ripening method could be used. Site#1 used 60cc Foley inflation, while Site#2 used 30cc. For this analysis, patients were included if they underwent a term ($\geq$37 week) IOL from 2020-2022 with a singleton, intact membranes, and received combination methods of Foley and misoprostol or oxytocin. Standardized IOL included regular cervical exams, amniotomy if $\geq$4cm, and active management of dystocia. 1:1 propensity score matching balanced baseline parameters (age, race/ethnicity, insurance, BMI, parity, and IOL indication). Time-to-event regression analyses for labor length, censored for CD, was modeled with a Cox proportional hazard model. Secondary outcomes included CD and maternal/neonatal morbidity.

RESULTS: Of 4295 inductions, 2117 (49.3%) utilized combined cervical ripening methods. After propensity score matching, 1480 were included. Even in the context of combined ripening and standardized IOL, Foley inflation to 60cc was associated with 3-hour shorter labor than 30cc (14.6h[10.4-21.3] v. 17.7h[12.4-24.4], $p< 0.001$). When censored for CD, patients who received 60cc Foley inflation delivered 70% faster than those who received 30cc (Hazard Ratio, HR 1.73[1.36-2.21]). 60cc inflation was also associated with reduced time to amniotomy (6.6h[4.5-9.8] v. 9.1h[6.4-12.4], $p< 0.001$). There was no difference in CD (18.9% v. 17.7%, $p=0.55$), maternal morbidity (15.5% v. 18.0%, $p=0.21$), or neonatal morbidity (3.4% v. 2.6%, $p=0.36$).

CONCLUSION: Even when using combined cervical ripening methods, 60cc Foley inflation is associated with reduced time to delivery as compared to 30cc without increasing morbidity, and should be considered to optimize labor length.

Figure: Kaplan-Meier curve of labor length by Foley inflation volume, censored for cesarean



193 Implementation of a standardized protocol for labor induction: a type I hybrid effectiveness-implementation trial

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OBJECTIVE: Retrospective data have shown standardization of induction of labor (IOL) may reduce cesarean delivery (CD). Here, we evaluated the impact of prospectively implementing a standardized IOL protocol on obstetric outcomes.

STUDY DESIGN: This type I hybrid effectiveness-implementation trial compared 2 years before (PRE) and 2 years after (POST) implementation of a standardized IOL protocol at 2 sites (2018-2022). The protocol had 8 components and recommended active management of labor, frequent cervical exams, and amniotomy by first exam >=4cm. All singletons $\geq$37 weeks with intact membranes requiring cervical ripening were eligible; prior CD was excluded. The primary effectiveness outcome was CD. Secondary effectiveness outcomes included labor length, chorioamnionitis, and maternal/neonatal morbidity. Poisson regression with robust error variance was used to calculate adjusted relative risks (aRR), with planned stratified analyses by site and parity. Implementation outcomes included fidelity to each protocol component. Feedback on protocol fidelity was distributed to site clinicians POST-implementation every 3 months.

RESULTS: 8509 patients were included (PRE: n=4214, POST: n=4295). Patients in the POST group had higher BMI and age, more hypertension, less favorable cervices, and differed in IOL indication.

There was no difference in CD (PRE: 21.6% v. POST: 21.8%, p=0.85), even when controlling for confounders (aRR 0.99 95%CI [0.90-1.09]; Table). There were no differences in labor length, chorioamnionitis, or neonatal morbidity. Maternal morbidity decreased PRE to POST (21.1% v. 18.0%, p< 0.001; aRR 0.83 95%CI[0.76-0.92]). Stratified results were similar. POST-implementation, fidelity to 4 of 8 protocol components increased significantly, evidenced by more frequent cervical exams, earlier dilation at amniotomy, higher oxytocin doses, and increased IUPC use.

CONCLUSION: Despite increasing standardization of active IOL management, no significant difference in CD was found. The observed decrease in maternal morbidity was unlikely to be a result of the IOL protocol without a change in CD or labor length.

Table: Demographic characteristics and outcomes compared pre- to post-implementation of a standardized labor induction protocol at 2 labor and delivery sites (2018-2022)

		PRE N(%)	POST N(%)	p-value	aRR (95%CI)
Demographics					
Site	#1	2117 (50.2)	2172 (50.6)	0.76	-
	#2	2097 (49.8)	2123 (49.4)		-
Black, Indigenous, People of Color (BIPOC)		2501 (60.0)	2472 (58.6)	0.18	-
Body Mass Index (BMI) at delivery[a]		31.5 [27.8-36.9]	31.8 [28.1-37.1]	0.048	-
Maternal age[a]		31 [26-34]	31 [27-35]	<0.001	-
Nulliparity		2762 (65.5)	2781 (64.7)	0.44	-
Indication for IOL	Maternal	1460 (34.7)	1587 (37.0)	0.03	-
	Fetal	870 (20.7)	747 (17.4)	<0.001	-
	Elective/Post-dates	1356 (32.2)	1351 (31.5)	0.47	-
	Other	528 (12.5)	610 (14.2)	0.02	-
Cervical ripening agent	Single-agent	786 (18.7)	882 (20.5)	0.02	
	Combined	2199 (52.2)	2117 (49.3)		
	Sequential	1229 (29.2)	1296 (30.2)		
Modified Bishop score at delivery[b]		2.15+/-1.69	1.97+/-1.59	<0.001	-
Gestational age at delivery[a]		39.5 [38.6-40.4]	39.5 [38.6-40.3]	0.85	-
Pregestational/gestational diabetes		399 (9.5)	445 (10.4)	0.17	-
Chronic hypertension (CHTN)		337 (8.0)	401 (9.3)	0.03	-
Effectiveness Outcomes					
Cesarean delivery		912 (21.6)	937 (21.8)	0.85	0.99 (0.90-1.09)[e]
Labor length (hours)[a]		17.4 [11.8-25.1]	18.0 [12.0-26.4]	0.01	Not Significant
Clinical chorioamnionitis		478 (11.3)	425 (10.1)	0.07	0.90 (0.79-1.02)[f]
Maternal morbidity[c]		890 (21.1)	774 (18.0)	<0.001	0.83 (0.76-0.92)[g]
Neonatal morbidity[d]		100 (2.4)	130 (3.0)	0.06	1.28 (0.98-1.66)[h]

[a]Median [IQR] [b]Mean +/-SD [c]Any one of the following: endometritis, EBL>=1L, blood transfusion, wound infection/separation, venous thromboembolism, unplanned hysterectomy, intensive care unit admission, readmission, or maternal death within 30 days of delivery [d]Any one of the following: severe respiratory distress syndrome or neonatal sepsis [e]Controling for: BMI, diabetes, CHTN, indication for IOL, modified Bishop, maternal age, and cervical ripening agent [f]Controling for: indication for IOL, modified Bishop, maternal age, and cervical ripening agent [g]Controlling for: BMI, indication for IOL, modified Bishop, maternal age, and cervical ripening agent [h]Controlling for: diabetes, CHTN, maternal age, and cervical ripening agent

194 Fetal fraction amplification dramatically increases PPV for 22q11.2 deletion syndrome in prenatal cell-free DNA screening

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OBJECTIVE: 22q11.2 deletion syndrome occurs in approximately 1 in 2,000-4,000 births. Prenatal cell-free DNA screening (pcfDNA) can detect fetuses affected by deletions as small as 2.5 Mb. Fetal fraction amplification (FFA), which has been shown to yield an average fetal fraction (FF) in excess of 20%, may further enhance pcfDNA detection of these deletions. Positive predictive values (PPV) of pcfDNA screening for 22q11.2 microdeletion have been reported between 20%-50%. Here, we sought to describe the impact of FFA on the PPV of 22q11.2 microdeletion screening using a whole-genome sequencing (WGS)-based pcfDNA platform.

STUDY DESIGN: We retrospectively analyzed data from patients who underwent WGS-based pcfDNA screening with FFA (Prequel™, Myriad Genetics, Inc.) between 8/20-10/22. For screen-positive cases, pregnancy outcome data were requested via a routine HIPAA-compliant process. All samples with diagnostic confirmation were used to calculate PPV, defined as: true positives/(true positives + false positives). Confidence interval (CI) was estimated using the Exact Binomial Test.

RESULTS: Complete outcomes were obtained for 54 cases that screened positive for 22q11.2 microdeletion; 21 underwent molecular diagnostic testing. All 21 were confirmed as true positives, for a PPV of 100% (21/21; 95% CI 83.9%-100%). Among the 33 cases that declined molecular confirmation, 17 had ultrasound findings that are either strongly or moderately associated with 22q11.2 deletion syndrome (e.g., cardiac defects, polyhydramnios, skeletal defects, intrauterine growth restriction). The average FF of true positive samples was 23.0%. For screen-positive patients who declined diagnostic testing, the average FF was 21.6%.

CONCLUSION: The increased FF levels conferred by FFA yield a PPV for 22q11.2 microdeletion higher than any previous studies have reported, and comparable to that for common autosomal trisomies. Because respective FF levels were comparable in patients with and without diagnostic confirmation, PPV is likely to be comparable in patients with and without diagnostic confirmation.

195 Endocannabinoid effects on myometrial expression of contraction associated proteins

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OBJECTIVE: The endocannabinoid system (ECS) is an endogenous cell-signaling system that plays a significant role in embryo development, implantation, and early pregnancy maintenance. Animal models indicate a potential role of the ECS in the initiation of labor. The endogenous cannabinoid, anandamide, rises in human plasma prior to the onset of labor. The objective of this study was to evaluate the effects of anandamide on the myometrial expression of the contraction associated proteins connexin-43 (Cx 43) and oxytocin receptor (OTR).

STUDY DESIGN: Using an immortalized myometrial cell line derived from term human pregnancy myometrium (PHM1-41), the effects of anandamide treatment on Cx 43 and OTR expression were determined. Cells were treated with methanandamide, a more stable analogue of anandamide, for various time intervals ranging from 0 to 20 hours. Cellular expression of Cx 43 and OTR was determined using western blot and real-time quantitative polymerase chain reaction (qPCR). Experiments were repeated using a cannabinoid type 1 receptor (CB_1R) antagonist to determine receptor selectivity.

RESULTS: A significant increase in Cx 43 mRNA was detected after 8 (p=0.01), 12 (p=< 0.01), 16 (p=< 0.01), and 20 (p=< 0.01) hours of methanandamide exposure when compared to the no-treatment control. With the addition of a CB_1R inhibitor (SR141716A), a significant increase in Cx 43 mRNA was still detected after 12 (p=< 0.01), 16 (p=< 0.01), and 20 (p=< 0.01) hours of methanandamide treatment. There was no significant difference in OTR mRNA with methanandamide treatment. There was no significant difference in the protein expression of Cx 43 or OTR using western blot.

CONCLUSION: Methanandamide treatment of myometrial cells results in an increase in Cx 43 mRNA expression. Surprisingly, this effect does not appear to be CB_1R mediated. Additional studies are needed to examine the potential signaling pathways through which this occurs.

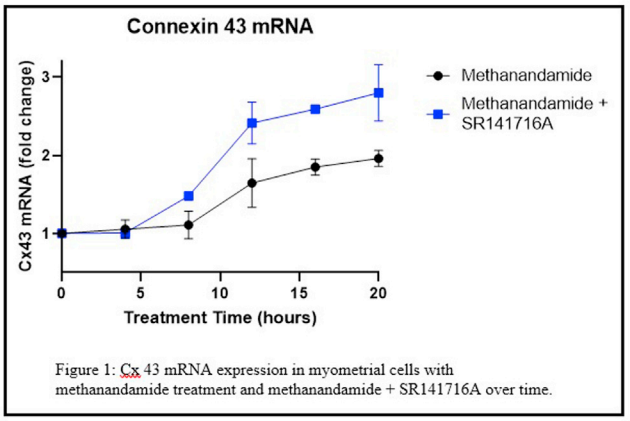

Figure 1: Cx 43 mRNA expression in myometrial cells with methanandamide treatment and methanandamide + SR141716A over time.

196 Association between trunk muscle mass and persistent postpartum low back and pelvic pain

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OBJECTIVE: Low back and pelvic pain (LBPP) is commonly experienced during pregnancy and the postpartum period, accounting for 15% of chronic lumbar pain in women unrelated to pregnancy. Although the association of LBPP with reduced trunk muscle mass (TMM) are considered out of pregnancy, few studies have examined this association in relation to pregnancy and the postpartum period, especially regarding persistent postpartum LBPP. The aim of the study was to investigate whether early postpartum TMM was associated with LBPP four months after delivery.

STUDY DESIGN: This prospective observational study recruited singleton pregnant women with LBPP at 35 weeks' gestation and measured their TMM using a body composition analyzer (Tanita MC780A-N) four weeks after delivery. Women who still experienced LBPP at four months postpartum were defined as having persistent postpartum (pp)-LBPP. Risk factors associated with pp-LBPP were identified among baseline and perinatal characteristics, including age, parity, body mass index, pre-pregnancy history of LBPP and physical activity, delivery methods, and breastfeeding. We investigated whether TMM was associated with pp-LBPP after adjusting these risk factors.

RESULTS: Among 209 women with LBPP during pregnancy, 101 women (48%) had pp-LBPP. In a multivariate analysis, age (adjusted odds ratio 1.10/year [95% confidence interval 1.03-1.17/year]), primipara (2.40 [1.21-4.75]), cesarean section (3.39 [1.51-7.64]), and the lack of pre-pregnancy athletic activity (2.04 [1.01-4.12]) were identified as independent risk factors associated with pp-LBPP. TMM was significantly higher in women with pp-LBPP than in women without pp-LBPP (19.5±1.2 vs 19.1±1.1 kg, $p < .001$), and was not found to be associated with pp-LBPP in the multivariate model.

CONCLUSION: In this prospective study, women with traditional risk factors, including older age, primiparity, lack of pre-pregnancy athletic activity, and cesarean section appear to be at high risk for developing pp-LBPP. However, no association was found between early postpartum TMM and pp-LBPP.

197 Is umbilical artery Doppler improvement following steroid administration associated with improved fetal growth?

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OBJECTIVE: Betamethasone (BMZ) is given for fetal growth restriction (FGR) with abnormal umbilical artery Doppler (UAD) velocimetry. Improvement of UAD can be seen after BMZ, but the impact on fetal growth and other outcomes is unclear. We tested the hypothesis that UAD improvement after BMZ is associated with improved fetal growth.

STUDY DESIGN: This was a retrospective cohort study of pregnancies with FGR from 2014 to 2020 with abnormal UAD between 240-336 weeks gestational age (GA). Abnormal UAD included elevated (pulsatility index >95%ile), absent end diastolic flow (EDF), or reversed EDF. We included patients who received BMZ within 1 week of abnormal UAD and had growth assessments performed before and after BMZ administration. Improvement was defined as any improvement in a category of UAD within 2 weeks of BMZ. The primary outcome was small-for-GA (SGA) at birth. Secondary outcomes included growth trends, GA at delivery, and birthweight. Outcomes were compared between patients with and without UAD improvement after BMZ. Sensitivity analyses among those with sustained and non-sustained UAD improvement and subgroup analysis of absent or reversed EDF were performed.

RESULTS: Of 102 pregnancies, UAD improved in 58 (59.1%) after BMZ. There was no difference in SGA between the two groups. The initial growth velocity (rate of change in fetal weight (EFW) immediately before and after BMZ administration) was higher in patients with UAD improvement; however there was no difference in final growth velocity (rate of change in EFW from BMZ administration to birth) between groups. Patients with improved UAD delivered at a significantly later GA with higher birthweight. The rate of SGA was similar between those with sustained vs non-sustained UAD improvement and in patients with absent or reversed EDF.

CONCLUSION: UAD improved in more than half of FGR cases after BMZ and was associated with initial improvement in growth velocity, but this improvement was not sustained over pregnancy. While UAD improvement after BMZ appears to be associated with improved pregnancy outcomes, the impact on growth patterns seems transient.

All patients			
Outcomes	UAD improved (n=58)	UAD not improved (n=44)	P-value
SGA	31 (53.5)	27 (61.4)	0.81
Initial growth velocity (g/wk)	**132 [89, 165]**	**101 [66, 136]**	**0.01**
Final growth velocity (g/wk)	135 [109, 168]	126 [75, 165]	0.09
Any improvement in growth percentile	21 (36.2)	12 (27.3)	0.34
Resolved FGR	8 (13.8)	4 (9.1)	0.47
GA at del (w)	**37.0 [34.3, 37.3]**	**34.3 [32.4, 37.0]**	**<0.01**
Birthweight	**2080 [1640, 2460]**	**1655 [1183, 2238]**	**0.02**

Data presented at n (%) or median [IQR]

198 Impact of pregnancy on ceftriaxone pharmacokinetics and treatment of syphilis: physiologic-based population PK modeling approach

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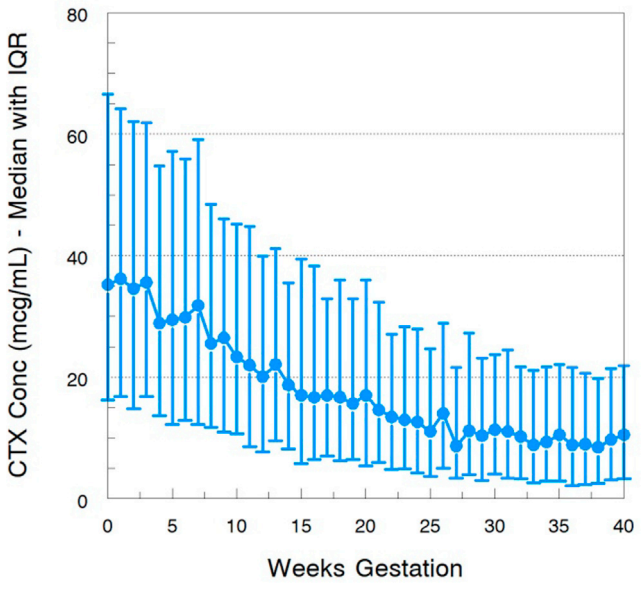
OBJECTIVE: Cases of congenital syphilis are rapidly rising. For pregnant women, penicillin G benzathine is the only endorsed treatment option; however, global shortages of penicillin are restricting supply to critical populations. Ceftriaxone (CTX) is a WHO alternative treatment, with limited data on pharmacokinetics (PK) and optimal dosing in pregnancy. Our objective was to characterize expected CTX PK changes during pregnancy using a physiologic-based population PK (PopPK) model to optimize CTX dosing for syphilis treatment.

STUDY DESIGN: A PopPK CTX model was developed for simulations from existing literature (Pollack 1982, Garot 2011). These limited CTX PK data in pregnancy were leveraged (Bourget 1993, Poavic 2007) with established PopPK pregnancy models that utilize a large repository of anatomic, physiologic, and biologic parameters that change with gestational age, e.g., plasma volume, GFR (Dallmann 2018). Steady-state CTX exposures were predicted in pregnant and non-pregnant persons with different dosing strategies (1g vs 2g IV/IM; q24h, q48h, vs q72h).

RESULTS: With all dosing strategies, concentrations were highly variable with lower CTX concentrations in the 3rd trimester compared to non-pregnant persons. Following a 1g IM q24h regimen, as gestation increased, the CTX trough decreased by 58% to 11.7 mcg/mL, 5.9-21.5 (median, IQR) at 40 wks gestation (Figure). The predicted concentration of unbound CTX trough also decreased quicker than in non-pregnancy to < 1% of non-pregnant adult levels due to non-linear binding. Cord blood troughs were predicted to be only 22% of non-pregnant plasma trough levels. Increasing the CTX dose to 2g did not compensate for the changes between pregnant and nonpregnant states nor allow for infrequent dosing.

CONCLUSION: There is a significant decrease in CTX exposure to the mother and fetus in the 3rd trimester regardless of dosing strategy. Currently, effective CTX dosing in vivo is unknown against T. *pallidum* in pregnancy, however late pregnancy may require different dosing approaches than non-pregnant persons to maintain adequate concentration in the mother and fetus.



199 Preterm low segment transverse cesarean delivery and the risk of uterine rupture in subsequent delivery

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OBJECTIVE: Background: Preterm cesarean delivery (CD) is a common mode of preterm delivery and most often recorded as a low segment transverse uterine section. We hypothesized that the reduced uterine size, non-vertex presentation and absence of labor process are associated with a poorly developed lower uterine segment, leading to misidentification of the lower segment, and thus posing an increased risk for uterine rupture (UR) in subsequent delivery. The literature is conflicting regarding this question, and there is need for further research.

STUDY DESIGN: Methods: A retrospective cohort study. Women after a previous primary preterm low segment CD (pCD) between 24-32 weeks with subsequent delivery were compared with women who had primary term low segment cesarean section LSTCS with subsequent delivery. Primary outcome: UR, defined as full thickness uterine wall defect. Secondary outcomes: severe maternal, fetal, and neonatal morbidities. Statistics: Descriptive, means±SDs, medians+IQR. Comparisons: chi-square, Fisher's exact test, Mann-Whitney Test.

RESULTS: Study cohort included 5340 women, 186 women in the pCD group and 5145 in the control group. The average gestational age at the first delivery was 28 weeks in pCD compared to 39 weeks in the control group. Women in the pCD group had more hypertensive disorders during their first delivery (20.4% vs. 2.5%; p< 0.001). There were no significant differences in the incidence of uterine rupture at subsequent delivery between groups (0% vs 0.5% p NS). At the subsequent delivery There were more preterm deliveries in the pCD group (19.9% vs. 4.7%; p< 0.01) and more successful vaginal deliveries (86.1% vs 77.3%; p=0.015).

CONCLUSION: Women with a previous preterm LSTCS delivery, did not exhibit an increased risk of uterine rupture in subsequent delivery. Considering these results, it might be reasonable to offer trial of labor to these patients.

201 Digital health utilization during pregnancy and the likelihood of preterm birth

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OBJECTIVE: Research suggests interventions to reduce rates of preterm birth should be multifaceted. Maven, a comprehensive digital platform for women's and family health, offers continuous access to virtual providers, patient education, and care coordination. This analysis explored the association between Maven use and odds of preterm birth among a sample of nulliparous, low-risk individuals.

STUDY DESIGN: Data for this retrospective analysis came from 3491 low-risk pregnant Maven users who gave birth between 1/1/2020 and 9/19/2022. The sample excluded parous users, and users pregnant with multiple gestation, conceived with fertility treatment, or reported cigarette, drug, or alcohol use during pregnancy. Chi-square and Fisher's exact tests compared characteristics between users who developed gestational conditions and users who did not. Adjusted multivariable logistic regression models estimated the association between the number of hours of Maven use and odds of preterm birth, stratified by presence of gestational conditions.

RESULTS: Compared to those without gestational conditions, individuals who developed gestational conditions were more likely to have a preterm birth (8.7% vs. 3.4%; p< 0.001). For every 1 hour of Maven use, users experienced a 2% reduction in their odds of experiencing a preterm birth [AOR (95% CI) = 0.98 (0.95, 0.998), p = 0.043]. Adjusted models revealed that among individuals who developed gestational conditions, every 1 hour increase in Maven use was associated with a 5% reduction in the odds of experiencing a preterm birth [AOR (95% CI) = 0.95 (0.91, 0.99), p = 0.037] (Table 1). Among individuals who did not develop gestational conditions, there was no statistically significant association between use and preterm birth.

CONCLUSION: Among those who developed gestational conditions, increased use of a digital health platform was associated with a decreased likelihood of preterm birth. A digital health platform that provides continuous care coordination, access to providers, and educational information has the potential to support disease management and reduce preterm births.

Table 1. Adjusted association between digital health utilization (hours) and likelihood of preterm birth among Maven users, stratified by presence of gestational conditions (N=3326)[a]

	Overall (N=3326)		No gestational conditions (N=1936)		≥1 gestational conditions (N=1390)[b]	
	Adjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Digital health utilization (hours)	0.98 (0.95, 0.998)	0.043	0.99 (0.96, 1.01)	0.31	0.95 (0.91, 0.99)	0.037

[a]All models were adjusted for maternal age, race and ethnicity, presence of chronic medical conditions, history of anxiety or depression, mode of delivery, and the number of days enrolled in the Maven Clinic

[b]Gestational conditions include diagnosis of high blood pressure (diagnosed during pregnancy), gestational diabetes, problems with the placenta, Preeclampsia, Eclampsia, or HELLP, vaginal blood loss (excluding labor), infant large for gestational age, excess or diminished amniotic fluid, issues with the cervix, intrauterine growth restriction, perinatal mood disorder, and cholestasis.

202 Neonatal and maternal outcomes after betamethasone administration for late-preterm premature rupture of membranes (PROM).

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OBJECTIVE: Assess the impact of betamethasone administration in the management of late-preterm premature rupture of membranes (PROM).

STUDY DESIGN: Retrospective review of singleton pregnancies with PROM delivering at 34 to 36 weeks gestation within a health maintenance organization, 2017 to 2019. Treatment with one or two doses of betamethasone prior to delivery was compared with no treatment. The primary outcome was a composite of neonatal respiratory complications of one or more: respiratory distress syndrome, respiratory arrest, transient tachypnea, use of CPAP or HFNC. Statistical analysis utilized Chi-square and multivariate logistic regression.

RESULTS: The primary composite outcome occurred in 44 of 328 (13.4%) in the betamethasone group versus 122 of 699 (17.5%) in the control group (relative risk 0.77; 95% CI, 0.5 to 1.1; P=0.1). The primary outcome occurred more often following cesarean than spontaneous vaginal delivery (OR 2.5; 95% CI, 1.7 to 3.7, p < .001). The mean gestational age (35.4 wks) and median time from ROM to delivery (17 hours), did not differ between groups, indicating immediate delivery management. The rate of chorioamnionitis was lower in the betamethasone group, 3.4% versus 6.6%, (relative risk 0.51; 95% CI 0.2 to 0.97, p=0.04). Endometritis following delivery did not differ between groups. Neonatal sepsis occurred more often in the betamethasone group, 1.5 % versus 0.3%, (relative risk 5.3; 95% CI, 1 to 27, p=0.04). A higher rate of neonatal hypoglycemia was also observed in the betamethasone group (15.5% vs. 10.7%; relative risk 1.4, 95% CI, 1.0 to 2.0; p=0.03).

CONCLUSION: Betamethasone administration with immediate delivery management for late-preterm PROM was associated with a reduction in the rate of neonatal respiratory complications, although not

statistically significant. Maternal infectious morbidity was not increased, although higher rates of neonatal sepsis and hypoglycemia were observed following betamethasone exposure. Cesarean delivery remains a significant risk factor for neonatal respiratory morbidity in the late preterm, regardless of steroid administration.

Table 1: Maternal and neonatal outcomes after delivery

Outcome	Betamethasone (N=328)	Control (N=699)	p-value[†]
Primary outcome:			0.1
Composite of neonatal respiratory disorders[*]			
0 or none	284 (86.6%)	577 (82.6%)	
1, 2 or 3 present	44(13.4%)	122(17.4%)	
Mode of delivery:			**0.04**
Cesarean delivery	44 (13.4%)	134 (19.1%)	
Operative vaginal delivery	10 (3.0%)	13 (1.8%)	
Spontaneous vaginal delivery	274 (83.5%)	552 (78.9%)	
Maternal secondary outcomes:			
Presence of chorioamnionitis	11 (3.4%)	46 (6.6%)	**0.03**
Endometritis following delivery	1 (0.3%)	6 (0.9%)	0.31
Neonatal secondary outcomes:			
NICU admission	64 (19.2%)	134 (19.5%)	0.89
Hypoglycemia	51 (15.5%)	75 (10.7%)	**0.02**
Hyperbilirubinemia	157 (48.0%)	314 (44.9%)	0.37
Necrotizing enterocolitis	0 (0.0%)	1 (0.1%)	0.46
Intraventricular hemorrhage	1 (0.3%)	3 (0.4%)	0.76
Hypothermia	4 (2.1%)	15 (1.2%)	0.30
Sepsis	5 (1.5%)	2 (0.3%)	**0.02**

*Composite of neonatal respiratory disorders include having one or more of the following: respiratory distress syndrome, respiratory arrest of the newborn, transient tachypnea of the newborn, and the use of CPAP or HFNC
Data are n (%)
[†]p-value from Chi-square

203 Predicting prolonged pushers: risk factors for prolonged second stage at the time of full dilation

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OBJECTIVE: A prolonged second stage of labor is associated with increased maternal and neonatal morbidity. Identifying patients at the start of the second stage at high risk for a prolonged second stage may help inform targeted clinical management strategies.

STUDY DESIGN: Retrospective cohort of 1000 nulliparous patients with an epidural who reached full dilation at a single academic hospital in 2022. Patient characteristics were collected and charts reviewed to identify intrapartum factors. Active labor was considered protracted if time from the first exam at >/=6 cm to full dilation was > the 95% per contemporary labor nomograms. Contractions were considered adequate if at least every 3 minutes, lasting 1 minute and moderate or strong. Station was considered high if < +1/5. Head position was determined by documentation at delivery accounting for earlier documentation of spontaneous/manual rotation. Statistical analysis performed in STATA; p< 0.05 used for statistical significance.

RESULTS: The median length of the second stage was 1.5 hours (IQR 0.7-3.0). 132 patients (13.2%) had a prolonged second stage (>4 hours), which was associated with higher rates of chorioamnionitis (28% vs. 11%), postpartum hemorrhage (16% vs. 5%), and NICU evaluation (39% vs. 18%) [p< 0.01 all]. Several factors were independently associated with prolonged second stage: birthweight > 4000g (aOR 2.2; 95%CI 1.2-4.1), protracted active labor (aOR 1.7 [1.2-2.6]), inadequate contractions (aOR 2.0 [1.3-3.0]), high station (aOR 2.4 [1.4-4.0]) and OP position (aOR 4.4 [2.8-7.0]). Using these factors, the risk of a prolonged second stage ranged from 5 to 83% in our cohort with 10% of patients at >30% risk.

CONCLUSION: Risk factors known at the start of the second stage (OP position, protracted labor, LGA, inadequate contractions, and high station) can identify patients at the highest risk for a prolonged second stage which may allow for targeted management strategies, such as active coaching, manual rotation, oxytocin titration, or an earlier threshold for operative delivery in high risk patients to reduce maternal/neonatal morbidity.

		Second Stage Length <4 Hours N=868	Second Stage Length >4 Hours N=132	P-Value
Baseline Characteristics	Maternal age in years, mean (SD)	30.8 (4.9)	32.1 (4.4)	<0.01
	Maternal BMI in kg/m2, mean (SD)	24.9 (5.9)	25.2 (6.3)	0.66
	Birthweight in grams, mean (SD)	3298 (439)	3527 (403)	<0.01
Intrapartum Factors Known at Full Dilation	Chorioamnionitis in first stage	4%	5%	0.58
	Protracted active labor	27%	45%	<0.01
	Adequate contractions	78%	63%	<0.01
	Pitocin use	66%	67%	0.67
	OP Position	9%	34%	<0.01
	Station at Full Dilation < +1/5	9%	21%	<0.01
Labor Outcomes	Mode of Delivery			<0.01
	Spontaneous Vaginal	83%	29%	
	Cesarean	4%	48%	
	Vacuum	9%	10%	
	Forceps	4%	13%	
	Postpartum hemorrhage	5%	16%	<0.01
	Severe perineal laceration	7%	11%	0.23
	Chorioamnionitis at any time	11%	27%	<0.01
	NICU Admission / Evaluation	18%	39%	<0.01
	5-Minute Apgar < 7	1%	2%	0.36

204 Symphysiolysis in pregnancy: Is there an impact on obstetric outcomes?

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OBJECTIVE: Symphysiolysis commonly induces significant pain and intermittent anxiety during pregnancy. However, there is a scarcity of information regarding the impact of this condition on labor outcomes and birth outcomes. We aimed to compare obstetrical and neonatal outcomes, in affected women compared to women without this condition.

STUDY DESIGN: This retrospective cohort study included women with a singleton pregnancy, no prior cesarean delivery (CD), who attempted vaginal delivery at 37 weeks or later in a tertiary medical center between 2013 and 2021. The cohort comprised nulliparous and multiparous, each further divided into two groups: those diagnosed with symphysiolysis during pregnancy and a control group.- Maternal and delivery characteristics, as well as obstetric and neonatal adverse outcomes, were compared between the two groups.Adjusted odds ratios (aOR) with 95% confidence intervals (95%CI) were calculated, controlling for confounding variables.

RESULTS: A total of 15,557 nulliparous and 27,477 multiparous women were included in the study, among whom 233(1.5%) nulliparous and 515(1.9%) multiparous were diagnosed with symphysiolysis. As compared to controls, both nulliparous and multiparous women with symphysiolysis were younger (27.5±4.4 vs. 28.5±5.0, p=0.002 for nulliparous,31.1±4.9 vs. 32.2±4.8, p=0.000 for multiparous), had a higher body mass index (BMI) prior to pregnancy (25.0±5.2 vs. 23.5±5.0,p=0.000 and 25.3±5.5 vs. 25.3±5.5,p=0.000 respectively), and had a higher prevalence of smoking during pregnancy (7.3% vs. 4.4%, P=0.036 and 9.3% vs. 4.7%,P=0.000, respectively).No differences were found between both groups in obstetric outcomes such the rate of vacuum extractions, CDs or perineal lacerations (see Table 1). Moreover, there were no significant differences observed between the groups in rates of low Apgar scores (< 7) at 5 minutes, low arterial pH (< 7.1), or admissions to the neonatal intensive care unit.

CONCLUSION: Women who are diagnosed with symphysiolysis during pregnancy, along with their fetuses, do not have an increased risk of obstetrical or neonatal complications during labor.

Table 1: Comparison of Obstetric and Neonatal Adverse Outcomes in Parous and Nulliparous Women With and Without Symphysiolysis

	Nulliparous				Multiparous			
Characteristic	Control Group (N=15,324)	Symphysiolisis (N=233)	Relative Risk* (5%-95% CI)	P.value*	Control Group (N=26,962)	Symphysiolisis (N=515)	Relative Risk (5%-95% CI)**	P.value**
Vaginal delivery	10301 (67.2%)	160 (68.7%)	1.2(0.8-1.7)	0.440	25569 (94.8%)	489 (95%)	0.9(0.3-1.0)	0.303
Operative delivery	2973 (19.4%)	44 (18.9%)	0.8(0.5-1.3)	0.351	785 (2.9%)	16 (3.1%)	1.1 (0.3-1.7)	0.447
Indications operative delivery								
NRFHR	2200 (73.9%)	31 (73.8%)			696 (91.2%)	14 (87.5%)		
Prolonged second stage	742 (24.9%)	11 (26.2%)			61 (8%)	2 (12.5%)		
Maternal indication/Maternal Exhaustion	36 (1.2%)	0 (0%)			6 (0.8%)	0 (0%)		
				0.765				0.762
Cesarean delivery	2050 (16.4%)	29 (12.4%)	0.7(0.5-1.3)	0.977	604 (2.2%)	10 (1.9%)	0.9(0.3-1.0)	0.303
Indications cesarean delivery								
NRFHR	1214 (65%)	13 (50%)			381 (63.1%)	8 (80%)		
Arrested descent	380 (18.5%)	6 (20.7%)			70 (11.5%)	1 (10%)		
Arrested dilatation	271 (24.9%)	7 (24.1%)			16 (2.6%)	0 (0%)		
Other (chorioamnionitis, pre-eclampsia…)	185 (9%)	3 (10.3%)			137 (22.7%)	1 (10%)		
				0.309				0.928
2nd degree tear	3576 (23.3%)	49 (21%)	0.8 (0.6-1.2)	0.896	4272 (15.8%)	78 (15.1%)	0.9 (0.7-1.3)	0.667
3rd +4th degree tear	160 (1%)	3 (1.3%)	1.2(0.4-3.9)	0.738	69 (0.3%)	0 (0%)	0.981 (0.98-0.983)	0.642
5 min Apgar score < 7	100 (0.7%)	1 (0.4%)	0.7(0.09-4.7)	1.000	68 (0.3%)	0 (0%)	0.98(0.980-0.983)	0.641
PH<7	59 (1%)	1 (1.1%)	1.1 (0.1-8.4)	0.59	35 (1.1%)	0 (0%)	1.0 (0.97-0.98)	1.000
NICU	162 (1.1%)	5 (2.1%)	2.1 (0.8-5)	0.11	89 (0.3%)	3 (0.6%)	1.8 (0.6-5.6)	0.248

Continuous variables are presented as mean ±SD and categorical variables as n (%). NRFHR, non-reassuring fetal heart rate

*Adjusted for smoking, maternal age, BMI

**Adjusted for smoking, maternal age, BMI, augmentation with Pitocin, induction and use of epidural

205 Predicting miscarriage risk in individuals with chronic illnesses

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OBJECTIVE: This study aimed to predict the risk of spontaneous abortion associated with pre-existing chronic illnesses and other known risk factors before pregnancy.

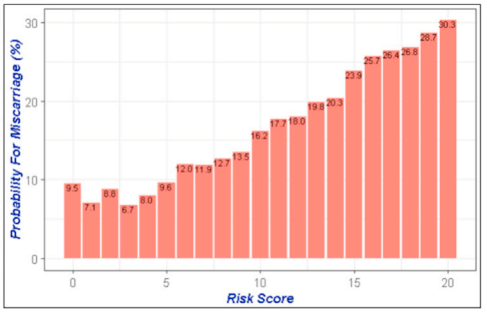
STUDY DESIGN: We conducted an observational retrospective study using extensive data from all live births and abortions between the years 2010 to 2019 in a big health maintenance organization (HMO). By analyzing diagnostic codes from patient registries, we identified 18 chronic diseases relevant only if diagnosed before the pregnancy of interest. Miscarriage risk according to underlying diseases and other risk factors were estimated using odds ratios (ORs) using logistic regression adjusting for woman's age, BMI, socioeconomic status, and smoking. Based on the ORs, we created a risk score ranging from 0 to 20.

RESULTS: During the study period, a total of 359,983 live births and 39,475 abortions were included. We observed an increased risk of miscarriage among women with diabetes type 2 (OR 1.23, 95% CI 1.12 to 1.35), neurology diseases (OR 2.38, 95% CI 1.79 to 3.14), depression (OR 1.43, 95% CI 1.33 to 1.54), polycystic ovary syndrome (OR 1.4, 95% CI 1.27 to 1.54), rheumatology diseases (OR 1.48, 95% CI 1.3 to 1.67), hypothyroidism (OR 1.31, 95% CI 1.28 to 1.33), hyperthyroidism & parathyroid diseases (OR 1.25, 95% CI 1.06 to 1.47), and cardiac diseases (OR 1.39, 95% CI 1.31 to 1.47). Additionally, we identified other known risk factors. The final multivariate model, as presented in Figure 1, exhibits a strong predictive ability with a mean-squared error (MSE) of 0.088. According to this model, a 37-year-old IVF patient with a BMI of 39 and two chronic diseases is subject to a 26.4% risk of abortion. In contrast, a 22-year-old woman with a BMI of 18 and no underlying chronic conditions has a significantly lower abortion risk at 8.8%.

CONCLUSION: We have identified several chronic diseases and other risk factors associated with spontaneous abortion and developed a highly predictive model. However, validation of the model in an independent population is required.

Figure 1: Predictive Risk Score for Spontaneous Abortions using risk factors and number of chronic diseases

Risk factor	Coefficient
Age 16-20	3
Age 21-25	2
Age 26-30	2
Age 36-40	4
Age 41-45	4
BMI <18.5	1
BMI 18.5-25	2
BMI 26-30	2
BMI 36-40	3
BMI > 40	3
Smoking	3
IVF	5
One chronic disease	4
Two chronic diseases	5
Three chronic diseases	5



206 Fetal malformations in women with overt diabetes mellitus based on pre-pregnancy fasting blood sugar levels

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OBJECTIVE: The aim of our study is to evaluate both the overall and organ-specific teratogenic risk in pregnant women with overt diabetes mellitus based on their pre-pregnancy fasting blood sugar (FBS) levels.

STUDY DESIGN: In this a national population-based retrospective cohort study, we included women diagnosed with diabetes before pregnancy who underwent health examinations and had FBS measurements within one year before conception. The participants were grouped based on FBS levels into well-controlled (FBS $<$ 100 mg/dL), less-controlled (FBS: 100-125 mg/dL), and poorly-controlled (FBS $\geq$ 126 mg/dL) groups. Additionally, the well-controlled group was further subdivided into four subgroups based on FBS levels (table). Using the reference group, the relative risk of overall fetal malformations and organ-specific malformations was calculated for the other groups using multivariable analysis.

RESULTS: A total of 5,687 women were included in this study. The well-controlled group had a 10% overall rate of fetal malformations,

while the less controlled group had a 13.6% overall rate, and the poorly controlled group had an 18.6% overall rate of fetal malformations ($p< 0.001$). In the subgroups with FBS levels < 100 mg/dL, there was no significant increase in the overall or organ-specific teratogenic risk compared to the reference group. However, the overall teratogenic risk was 1.3 times higher in the less controlled group and 1.8 times higher in the poorly controlled group than in the reference group (table). Specifically, the risk of cardiac malformations was 2.5 times higher, and the risk of skeletal malformations was 3.3 times higher than reference group.

CONCLUSION: Our national population-based study demonstrates that when FBS levels are ≥ 100 mg/dL during the pre-conceptional period in women with pre-gestational diabetes, there is an elevated risk of fetal malformations, particularly concerning cardiac and skeletal malformations. However, some changes of FBS within 100 mg/dL during the pre-conceptional period may not increase the teratogenic risk during pregnancy (grant number: HC23C0124).

Table. Teratogenic risk based on the pre-pregnancy FBS in women with overt DM

	Overall malformation		Cardiac malformation		Skeletal malformation	
	Unadjusted OR	Adjusted OR*	Unadjusted OR	Adjusted OR*	Unadjusted OR	Adjusted OR*
Reference group (FBS ≤83 mg/dL)	(REF)	(REF)	(REF)	(REF)	(REF)	(REF)
Sub-group 1 (FBS 84-89 mg/dL)	1.03 (0.77-1.37)	1.05 (0.78-1.40)	0.82 (0.51-1.32)	0.85 (0.52-1.37)	2.36 (0.82-6.81)	2.36 (0.81-6.82)
Sub-group 2 (FBS 90-94 mg/dL)	0.91 (0.67-1.23)	0.89 (0.65-1.22)	0.77 (0.47-1.29)	0.74 (0.44-1.23)	1.50 (0.46-4.93)	1.53 (0.46-5.03)
Sub-group 3 (FBS 85-99mg/dL)	1.01 (0.73-1.41)	0.99 (0.71-1.38)	1.15 (0.70-1.89)	1.08 (0.65-1.79)	2.38 (0.75-7.52)	2.42 (0.76-7.69)
Less controlled group (FBS 100-125 mg/dL)	**1.41 (1.09-1.84)**	**1.31 (1.00-1.73)**	**1.75 (1.18-2.59)**	1.43 (0.95-2.16)	2.37 (0.84-6.68)	2.46 (0.86-7.07)
Poorly controlled group (FBS ≥126 mg/dL)	**2.05 (1.59-2.65)**	**1.84 (1.39-2.43)**	**3.38 (2.34-4.88)**	**2.50 (1.67-3.74)**	**3.08 (1.11-8.49)**	**3.29 (1.12-9.66)**

*Adjusted for maternal age, BMI, nulliparity, chronic hypertension, gestational hypertension, systolic blood pressure, diastolic blood pressure, fetal sex, and prematurity

207 An assessment of the relation between first trimester placental microcalcifications and adverse pregnancy outcomes

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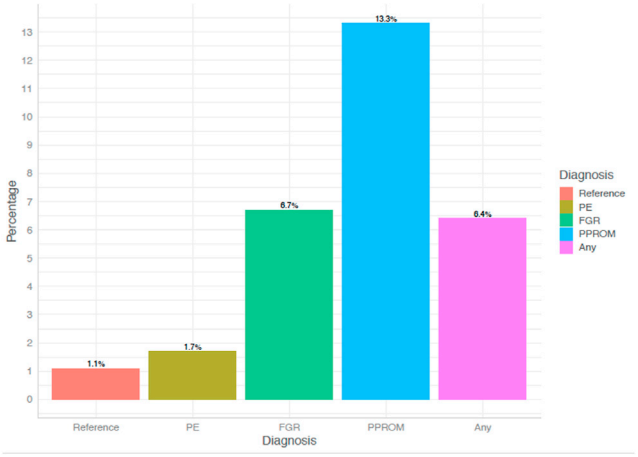
OBJECTIVE: To evaluate the relation between placental microcalcifications in early pregnancy and subsequent adverse pregnancy outcomes.

STUDY DESIGN: Patients with non-anomalous pregnancies at < 13+6 weeks gestation without umbilical cord or placental abnormalities were enrolled in a longitudinal cohort study to evaluate the relation between placental novel sonographic markers and pregnancy outcomes. Ultrasounds were performed and data were ascertained by certified and trained sonographers and research coordinators. Micropure ultrasound technology was used to assess the presence of placental microcalcifications on first trimester ultrasound. Data was compared between patients who developed subsequent adverse pregnancy complications including preterm prelabor rupture of membranes (PPROM), fetal growth restriction (FGR) or preeclampsia (cases) and normal low risk patients (controls aged 18-35 years, with a body mass index (BMI) < 30, without existing comorbidities, who conceived spontaneously and had an uncomplicated pregnancy, with delivery >37 weeks' gestation). Multinominal logistic regression tests were used for statistical analysis, with $p < 0.05$ used to denote statistical significance (R for Statistical Computing v.4.2.0).

RESULTS: Amongst the 610 included pregnancies, 125 patients (20.5%) developed one of our adverse pregnancy outcomes: PPROM (n=30), preeclampsia (n=60) and FGR (n=45). Microcalcifications on first trimester ultrasound were noted in 13.3% (4/30) of patients who developed PPROM (OR 12.1, 95% CI 1.59-341.7, p=0.003), 6.7% (3/45) patients who developed FGR (OR 5.77, 95% CI 0.65-168.9, p=0.072) and 1.7% (1/60) of patients who developed preeclampsia (OR 1.5, 95% CI 0.04-59.4, p=0.771) compared to 1.1% (1/90) in the control group.

CONCLUSION: Compared to normal pregnancies, placentas in pregnancies who ultimately develop PPROM are more likely to demonstrate the presence of placental microcalcifications in early pregnancy.



208 Next generation sequencing application in congenital fetal anomalies

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OBJECTIVE: The purpose of this study is to investigate the diagnostic yiled of the application of NGS for fetuses with congenital anomalies.

STUDY DESIGN: Retrosective review of 32 fetuses with congenital anomalies with normal karyotype and negative chromosomal microarray results underwent NGS. The detected variants were classified as pathogenic, likely pathogenic, of uncertain significance, likely benign or benign, following the guidelines recommended by the American College of Medical Genetics and Genomics.

RESULTS: The detection rates of targeted NGS for pathogenic and likely pathogenic variations were 14.2% and 4.3%, respectively. The turnaround time of the test was 4 weeks. The likely pathogenic variation was detected on JAG1, which is associated with tetralogy of Fallot and Alagille syndrome. Variations of uncertain significance were detected in 78.2% of cases.

CONCLUSION: NGS in fetuses with congenital anomalies achieved a high diagnostic yield, with an acceptable turnaround time for the prenatal setting.

209 Validation of calculator for cesarean delivery during induction of labor

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OBJECTIVE: We aimed to validate a published risk calculator to predict cesarean delivery (CD) among people undergoing induction of labor (IOL; Rossi, et al. PMID: 32028500) in an external cohort, and to evaluate if a higher predicted CD risk score was associated with a higher likelihood of cesarean or a composite maternal adverse outcome (CMAO).

STUDY DESIGN: Our retrospective cohort study included consecutive singleton IOL from 3/2020 to 9/2020. A predicted CD score was calculated using the coefficients of the calculator developed by Rossi et al. External validation of the calculator was assessed by the discriminative power of the model using area under the receiver operating characteristic curve (AUC), and by graphically displaying a calibration curve. The predicted CD score was further categorized as $< 20\%$, 20-40%, and $\geq 40\%$. The primary outcome was CD, the secondary outcomes was CMAO. Multivariable Poisson regression models with robust error variance estimated the association; adjusted relative risk (aRR) with 95% confidence interval (CI) was calculated.

RESULTS: Among 548 IOL, 159 (29%) had CD. External validation noted the AUC was 0.77 (95% CI 0.73-0.81) and calibration curve and its 95% confidence band had good calibration (Fig 1A-B). Overall, 277 (50%), 177 (33%), and 94 (17%) had a predicted CD score of $< 20\%$, 20-40%, and $\geq 40\%$, respectively. After adjustment, compared to individuals with a CD score of $< 20\%$, the likelihood of having a CD was higher in those with a score between 20-40% (aRR 2.40, 95% CI 1.68-3.34) and with a score $\geq 40\%$ (aRR 4.36, 95% CI 3.12-6.10). Compared to those who had a score $< 20\%$, the risk of the CMAO was higher in those with a score $\geq 40\%$ (aRR 1.62, 95% CI 1.10-2.40).

CONCLUSION: Our external validation suggests that the use of a calculator for predicting CD is feasible. There was a direct correlation between the score and likelihood of CD. A higher CD score was also associated with an increased likelihood of CMAO.

Fig 1A. Receiver-operating characteristic curve

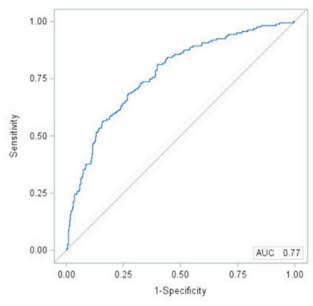

Fig 1A. Receiver operating characteristic curve of the prediction model. The area under the receiver operating characteristic curve (AUC) was 0.77 (95% confidence interval=0.73-0.81)

Fig 1B. Calibration cure

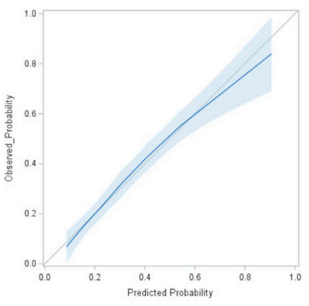

Fig 1B. Calibration curve (with 95% confidence interval) of model validation. The grey straight line is the line of perfect calibration. The blue line is the calibration curve generated by the prediction model, which is surrounded by light blue area that represent the 95% confidence band of the calibration curve.

210 Association of maternal serum insulin-like growth factor-1 and fetal fractional thigh volume

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OBJECTIVE: Insulin-like growth factor-1 (IGF-1) is one of the growth factors that promote protein and carbohydrate metabolism, and consequently affects birth weight. Fetal fractional thigh volume has been proposed as a useful parameter for predicting birth weight and quantifying fetal soft tissue development. However, the association between maternal serum IGF-1 and fetal fractional thigh volume remains unclear. This study aimed to investigate the association of maternal serum insulin-like growth factor-1 and fetal fractional thigh volume.

STUDY DESIGN: A prospective study was conducted in a cohort of 24 singleton pregnancies. Maternal blood sample was obtained at 24 weeks' gestation, and fetal ultrasonography was performed at 24-, 30-, and 36-weeks' gestation. Fractional thigh volume was assessed as cylindrical limb volumes based on 50% of the fetal total diaphysis length using 3D ultrasonography. The association between maternal serum IGF-1 and fetal fractional thigh volume was examined using Pearson product moment correlations.

RESULTS: Maternal serum IGF-1 at 24 weeks was 140.0±5.7 ng/ml (mean±S.E.). Maternal IGF-1 was not associated with fetal fractional thigh volume at 24 weeks ($r = 0.016$, $p = 0.930$) and 30 weeks ($r = 0.229$, $p = 0.216$). Maternal IGF-1 significantly correlated with fetal fractional thigh volume at 36 weeks ($r = 0.475$, $p = 0.019$).

CONCLUSION: Maternal serum IGF-1 at 24 weeks significantly correlated with fetal fractional thigh volume in late gestation. Maternal serum IGF-1 in mid-gestation could be a marker for predicting fetal growth in late gestation.

211 Artificial intelligence-driven precision pathology identifies distinct placental findings in severe fetal growth restriction or hypertension

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OBJECTIVE: To leverage artificial intelligence (AI)-driven precision pathology to quantify the effects of severe FGR, pregnancy-related HTN, or their interaction on placental villus and vascular properties. We hypothesize that while only villi are affected in HTN, both villous and vascular structures are diminished in severe FGR with no additional effect of concomitant HTN.

STUDY DESIGN: In this retrospective cohort study, paraffin-embedded placental sections were obtained from four groups: [1] Severe FGR with HTN (n=11) [2] Severe FGR with normotension (n=14) [3] Appropriately grown, gestational age (GA)-matched pregnancies with HTN (n=12) and [4] Appropriately grown, GA-matched pregnancies with normotension (n=14). These underwent immunodetection for cytokeratin-7 (trophoblast) and CD34 (endothelium) followed by AI-driven image analyses. Number of villi and placental vessels, total villous area and total vascular area were quantified. Outcomes were normally distributed, and quantitative analyses were modeled with linear regression models.

RESULTS: Pregnancies with HTN exhibited significantly less stem villi ($p< 0.01$), stem villous area ($p< 0.01$), and stem villous vessels ($p< 0.01$), with no difference in vascular area. In contrast, abnormalities in severe FGR were limited to terminal villi, with fewer villi and vessels ($p< 0.01$) and decreased villous area ($p< 0.01$) and vascular area ($p=0.02$). No significant effects were found with the interaction of HTN and severe FGR.

CONCLUSION: Pregnancy-related HTN and severe FGR are associated with stem and terminal villus anomalies, respectively, suggesting that perturbations in placental development may be occurring at different gestational periods for each condition.

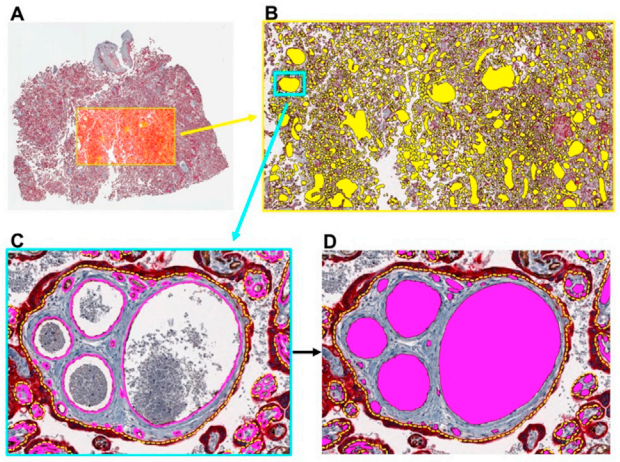

Figure 1. Identification and quantification of placental villi and vasculature. (A) The annotated ROI (yellow box) was scanned, and this annotation area was calculated. **(B)** Placental villi were recognized and outlined (yellow labels) using a series of designed protocols within the Visiopharm™ platform. The number of villi (3647 total villi within this representative ROI) and areas of each individual villus were calculated. **(C)** Magnification of the cyan box within the overall ROI shows individual villi outlined by yellow lines. Within each villus, fetoplacental blood vessels were identified and delineated by the magenta line using a separate series of designed protocols in Visiopharm™. **(D)** Blood vessels were separated using yet another series of designed protocols in Visiopharm™. Number of blood vessels and total blood vessel area in each villus was calculated.

212 Implication of cervical microbiomes including DNA Viromes in patients with cervical insufficiency

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OBJECTIVE: Cervical microbiomes and viromes have been associated with cervical insufficiency (CI) and pregnancy maintenance. These factors are incompletely understood. This study aimed to investigate them in pregnant women, with a specific focus on patients with CI.

STUDY DESIGN: A total of 232 cervical swab samples from 116 pregnant women were collected from the endocervix and exocervix. The location of the endocervix is around the internal cervical os and the exocervix is near the vaginal fornix. The participants were categorized into three groups: normal, prophylactic cerclage, and cervical insufficiency (CI) groups. DNA shotgun sequencing and two analytical approaches, Kraken2 and *de novo* assembly, were applied to reveal a comprehensive overview of cervical microbiomes and viromes in pregnant women.

RESULTS: Our results indicated significant differences in evenness and richness for alpha diversity between the endocervix and exocervix, as well as between the normal and CI groups, suggesting the influence of different cervical regions and the potential impact of CI on microbiome diversity. Beta-diversity analysis further elucidated the significance of cervical location and patient groups. (Figure 1). The utilization of both Kraken2 and *de novo* assembly approaches allowed us to characterize a diverse range of bacterial and viral species present in the cervix. Notably, *de novo* assembly revealed the presence of several DNA viruses, including bacteriophages, human papillomaviruses, and human herpesviruses. Furthermore, we annotated *de novo* assembled contigs according to KEGG, COG, and Pfam databases, revealing enriched functions regulated by different groups of microbiomes.

CONCLUSION: In conclusion, our study provides the data for cervical microbiomes and DNA viromes in pregnant women, especially for patients with CI. We focus on these factors to aid in the comprehensive understanding and therapeutic modulation of local microbial composition for enhancing safer and healthier pregnancies.

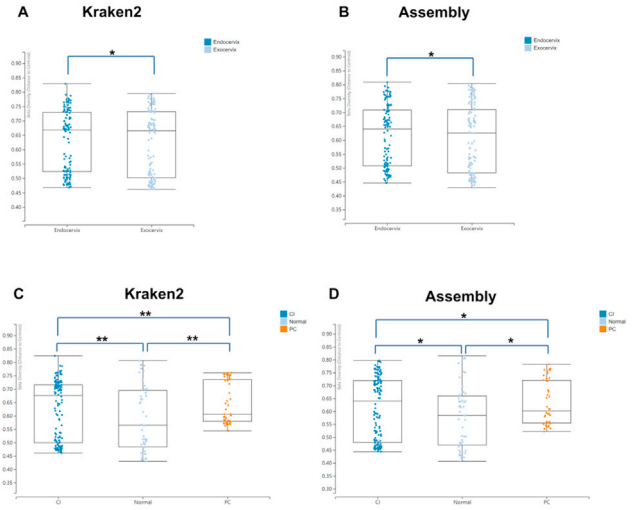

Figure 1. Comparison of beta diversity analysis using Kraken2 and *de novo* assembly. Plots for **A,** comparison of endocervix and exocervix samples obtained from data processed with Kraken2; **B,** comparison of endocervix and exocervix samples obtained from data processed with *de novo* assembly; **C,** comparison of normal, prophylactic cerclage, and CI (cervical insufficiency) groups derived from data processed with Kraken2; **D,** comparison of normal, prophylactic cerclage, and CI groups derived from data processed with *de novo* assembly.
Statistical significance is denoted by * ($p < 0.05$) and ** ($p < 0.01$) indicating the significance levels between the respective groups.

213 Maternal lactobacillus crispatus abundance in early gestation associated with decreased incidence of preterm birth

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OBJECTIVE: Although *Lactobacillus spp.* are prevalent members of the vaginal and gut microbiomes, their role in birth outcomes has received little attention. Recently, *L. crispatus* has been associated with decreased risk of spontaneous PTB. *Lactoplantibacillus plantarum* has also been implicated in attenuating the somatotropic axis, indicating a potential role in PTB outcomes. We sought to determine the role of the six most prevalent *Lactobacilli spp.* of the microbiome on birth outcomes in a large, prospective, longitudinal cohort (BaBs, Bacteria and Birth study).

STUDY DESIGN: The BaBs study prospectively enrolled gravidae (n=585) at risk for preterm birth at 11-19 6/7 wks, and longitudinally sampled maternal and applicable neonatal infant sites to 1mo

postpartum. Sampling timepoints included enrollment, early 3rd trimester (27-28wks), delivery (term or preterm), and within 6wks postpartum. A total of 52116 maternal and 14350 neonatal/infant samples were collected and subjected to metagenomics sequencing (MGS) and rigorous bioinformatics analysis for delineation of species via taxonomic classification of human filtered read counts using kraken2, TaxonKit, and bitTools.

RESULTS: A total of n= 328 subjects delivered at term, and n= 78 preterm, and n=179 were lost to followup/ dropout. Comparisons across timepoints revealed a statistically significant higher relative abundance of *L.crispatus* was present as early as 11 weeks in births destined to deliver at term (>37 weeks), but not preterm. This was true for the number of *L.crispatus* MGS reads in not only the vaginal posterior from the initial visit (11-20 weeks) & early 3rd trimester (27-29wks), but in the oral microbiome and stool (Figure); these findings persistent post-partum.

CONCLUSION: In the largest longitudinal microbiome in pregnancy study to date, *L. crispatus* dominated microbiome communities in the vagina, oral and gut, from the first trimester were protective and predicted term birth. This was unique to *Lactobacillus crispatus,* indicating a likely functional role for this beneficial microbe in early gestation and successful gestation to term.

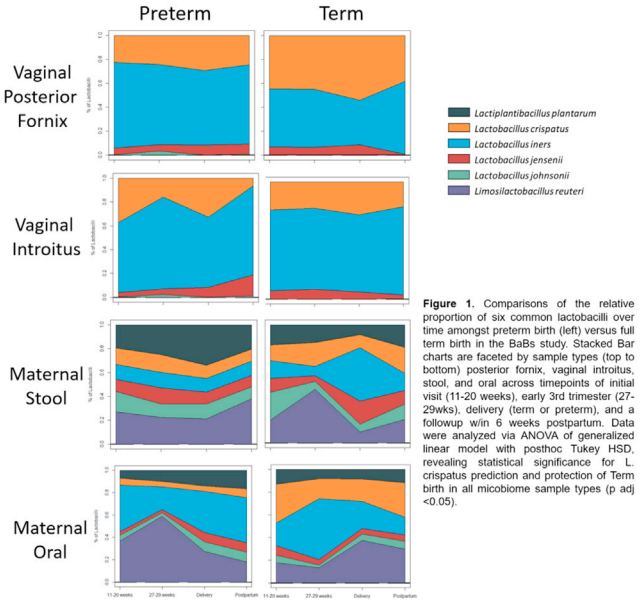

Figure 1. Comparisons of the relative proportion of six common lactobacilli over time amongst preterm birth (left) versus full term birth in the BaBs study. Stacked Bar charts are faceted by sample types (top to bottom) posterior fornix, vaginal introitus, stool, and oral across timepoints of initial visit (11-20 weeks), early 3rd trimester (27-29wks), delivery (term or preterm), and a followup w/in 6 weeks postpartum. Data were analyzed via ANOVA of generalized linear model with posthoc Tukey HSD, revealing statistical significance for L. crispatus prediction and protection of Term birth in all micobiome sample types (p adj <0.05).

214 Newborn anthropometric alternations are associated with second-trimester exposure to low-levels air pollution

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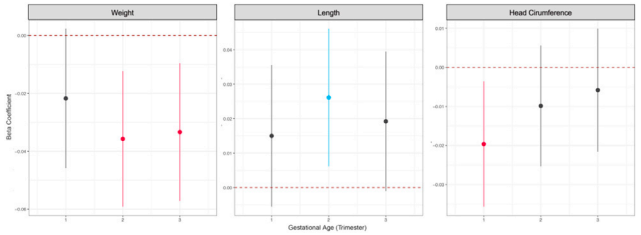
OBJECTIVE: Accumulating evidence suggests that prenatal exposure to fine particulate matter ($PM_{2.5}$) is largely associated with adverse newborn's health outcomes. However, the relevant timing of exposures varies between studies and is yet unclear. Hence, we examined the association of several anthropometric measures with weekly $PM_{2.5}$ exposure throughout weeks of gestation.

STUDY DESIGN: We recruited 1060 mother-infant pairs from two major hospitals in Israel. Data regarding daily $PM_{2.5}$ predictions were estimated on a $1_{km}X1_{km}$ grid from satellite-based models, geocoded and overlaid geographically per each mother using ArcGIS. We conducted Linear Mixed-Effects Models to examine the association between birth weight, length, and head circumference and trimestral as well as weekly exposures to $PM_{2.5}$ from the last menstrual period to the day of delivery.

RESULTS: Comparing to $PM_{2.5}$ exposure levels measured worldwide in a global analysis of air pollution conducted by the WHO, our study showed relatively moderate levels of daily mean PM2.5 concentrations (18.34 $\pm$1.45 $\mu g/m^3$). Prenatal exposure to $PM_{2.5}$ throughout the 2nd and 3rd trimesters (Figure 1) was significantly associated with decreased birthweight ($\beta_{trimester1}$= -0.021, CI: -0.046 to 0.002; $\beta_{trimester2}$= -0.035, CI: -0.059 to -0.012; β =-0.033$_{trimester3}$, CI:-0.057 to -0.0095 respectively), with the most noticeable effect between the 15th to the 35th gestational weeks. While head circumference was negatively associated with exposure to $PM_{2.5}$ in the first trimester (β= -0.019, CI:-0.035 to -0.0036), birth length was positively associated with exposures during the second trimester (β=0.026, CI:0.006-0.046).

CONCLUSION: Our findings suggest that $PM_{2.5}$ is significantly associated with a reduction in birth weight, with higher susceptibility between the 15th to the 35th gestational weeks. This critical window should be carefully assessed and could be the grounds for future clinical interventions. The trimestral associations of $PM_{2.5}$ with decreased head circumference and increased length could shed light on uncovered biological mechanisms that should be further studied.



215 Experience, training, tools: A mixed-methods study of decision-making for obstetric transport in New Mexico

Madhurima Keerthy, Bailee Miller, Payton Sandoval-Belt, juhee Patel, Avalon Yi, Trevor Quiner

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OBJECTIVE: New Mexico relies heavily on emergency obstetric transport due to the widely separated rural communities and limited centers for providing advanced maternal, fetal, and neonatal care. Emergency transport requires careful decision-making and efficient use of resources. This study aims to evaluate perceived adequacy with respect to training, experience, and resources for obstetricians who make transport decisions.

STUDY DESIGN: An interview guide and survey questions were developed to evaluate the perception of different aspects of emergency obstetric transport in New Mexico. Interviews were performed

with OB/GYN providers who participate in emergency obstetric transport, both sending and receiving, throughout the state of New Mexico in both rural and urban communities. Interviews were recorded, transcribed, and coded for qualitative analysis.

RESULTS: The majority (75%) of participating providers had no formal training in emergency transport during their medical education and there was a common sentiment that targeted training in obstetric transports would be beneficial. However, providers who reported being uncomfortable in making transport decisions at the beginning of their current positions reported quickly gaining the experience needed to feel comfortable. While tools to assess preterm labor are extremely limited in some settings (transvaginal cervical length available to only 40% of interviewees), all providers felt that they had the necessary tools to make transport decisions.

CONCLUSION: Obstetric transport is essential in rural obstetric care. While experience is an excellent teacher, obstetric training is generally lacking in transport focused education. Development of obstetric transport-centered training may improve the comfort level of providers in new settings.

Table 1. Perinatal Outcomes Among Patients with SUD and Co-Occurring Psychiatric Comorbidities

	Total (N=466)	With co-occurring psychiatric disorder N=410 (88)	Without co-occurring psychiatric disorder N=56 (12)	p-value
	N (%)	N (%)	N (%)	
Maternal Composite	294 (63.1)	260 (63.4)	34 (60.7)	0.69
Antepartum relapse	269 (58.7	236 (58.7)	33 (58.9)	0.97
Antepartum overdose	8 (1.8)	8 (2.0)	0 (0.0)	0.47
Postpartum relapse	71 (16.0)	65 (16.6)	6 (11.5)	0.41
Postpartum overdose	3 (0.7)	2 (0.5)	1 (2.0)	0.34
SMM event	20 (4.7)	19 (5.0)	1 (2.0)	0.49
Neonatal Composite	189 (40.6)	169 (41.2)	20 (35.7)	0.43
NAS requiring pharmacologic treatment	84 (26.4)	73 (25.9)	11 (30.6)	0.65
Length of NICU stay >7 days	122 (26.2)	108 (26.3)	14 (25.0)	0.83
SGA at birth	71 (17.1)	65 (91.5)	303 (88.1)	0.40
Neonatal demise	8 (1.9)	8 (2.1)	0 (0.0)	0.57

Statistical significance is defined as p≤0.05.
NAS = neonatal abstinence syndrome

216 Perinatal substance use programming: impact on maternal and neonatal outcomes among women with psychiatric comorbidities

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OBJECTIVE: The objective of this study was to evaluate the impact of participation in a comprehensive perinatal substance use disorder (SUD) program on maternal and neonatal outcomes among women with SUD and co-occurring psychiatric diagnoses.

STUDY DESIGN: We conducted a retrospective cohort study of women receiving prenatal care through a specialized perinatal SUD program at an academic tertiary center from December 2019 to March 2023. Demographic characteristics, substance use patterns, maternal and neonatal outcomes were abstracted from electronic records and compared across 2 groups — women with SUD with and without co-occurring psychiatric disorders. Our study outcomes were — an adverse maternal composite, including antepartum and postpartum — relapse, overdose and severe maternal morbidity (SMM), and an adverse neonatal composite including Neonatal Abstinence Syndrome (NAS) requiring pharmacologic treatment, NICU stay >7 days, SGA at birth and neonatal demise. Student's t-test and chi^2/Fisher's exact tests were used to compare continuous and categorical data, respectively. Statistical significance was set at $p \leq .05$.

RESULTS: Of the 466 pregnant women with a DSM-V defined SUD, 410 (88%) had co-occurring psychiatric disorder(s) and 56 (12%) did not. Those with co-occurring psychiatric disorders were more likely to be white (P< .01), married (p=.02), had higher rates of history of IV drug use (p< .01), participation in inpatient rehabilitation (p< .01), prior overdose (p< .01), history of sexual trauma (p=0.04) and prior arrest/incarceration (p=.02). While Opioid use disorder (OUD) was the predominant SUD in 85% (n=396) of the overall cohort, the subset with psychiatric comorbidities had higher rates of benzodiazepine (p=.04) and amphetamine use disorder (p< .01). Gestational age at care initiation, number of prenatal visits as well as rates of adverse maternal and neonatal composite outcomes were similar across both groups.

CONCLUSION: Participation in a comprehensive prenatal substance use recovery program can potentially improve clinical outcomes for women with SUD and co-occurring psychiatric diagnoses.

217 Assessing healthcare worker stigma toward pregnant persons with opioid use disorder

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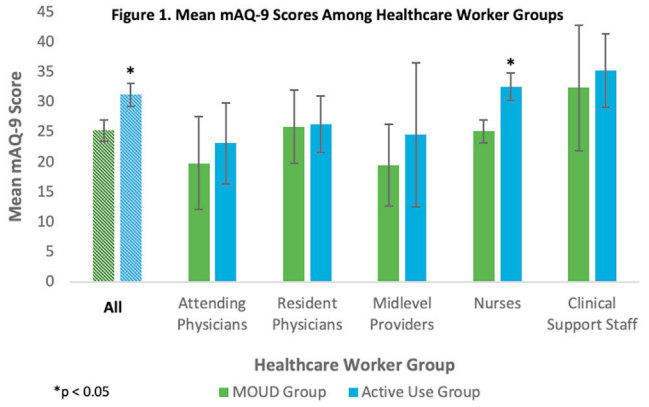
OBJECTIVE: Stigma toward pregnant people with opioid use disorder (OUD) is a significant barrier to treatment and quality care. We aimed to assess the degree of stigma that exists among healthcare workers who care for these families in hospital settings.

STUDY DESIGN: This is a cross-sectional analysis of survey responses from healthcare workers at a single tertiary care center. We collected participant demographics as well as responses to the modified Attribution Questionnaire 9 (mAQ-9) to assess stigma toward pregnant people with OUD. Participants were randomized to two versions of the mAQ-9: a pregnant person with OUD receiving methadone ("MOUD") or a pregnant person with continued, active heroin use ("Active Use"). The questionnaire assesses 9 stereotypes using a nine Likert scale items of agreement, such that higher scores indicate more stigma. Mean mAQ-9 scores were compared between groups using a two-sided t-test. A p-value of < 0.05 was considered significant.

RESULTS: A total of 294 participants completed the survey, with 144 in the "MOUD" group and 150 in the "Active Use" group. The mean mAQ-9 score for all participants was 28.3 (range of scores 9-72). Mean mAQ-9 score was higher for the Active Use group compared to the MOUD group among all participants (31.2 vs. 25.3, p< 0.001) and among nurse participants (32.5 vs. 25.1, p< 0.001). Clinical Support Staff had the highest mean scores for both groups whereas mid-level providers had the lowest mean scores. Healthcare workers in pediatric units had higher mean mAQ-9 scores compared to those in obstetric units (29.6 vs 25.8, p=0.006). Pity was the stereotype most implicated in stigma toward pregnant people with OUD. Of all respondents, 22% felt a pregnant person with OUD should be forced into treatment.

CONCLUSION: Healthcare workers hold stigma toward pregnant people with OUD, especially toward those with active opioid use in pregnancy. Stigma is greatest among clinical support staff and nurses, and workers in pediatric units have higher degrees of stigma. This supports a role for anti-stigma efforts to improve care for pregnant people with OUD.



218 Preeclampsia in kidney transplant recipients during pregnancy and its impact on graft survival

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OBJECTIVE: Preeclampsia affects ≥ 25% of kidney transplant recipients during pregnancy, but its impact on longitudinal graft survival are unclear. We aim to characterize longitudinal graft survival from the time of delivery and investigate maternal and neonatal outcomes in kidney transplant recipients who experienced preeclampsia.

STUDY DESIGN: Retrospective cohort study of kidney transplant recipients enrolled in an international transplant registry with a pregnancy of ≥ 20 weeks' gestation between 1967-2019. Primary outcome was graft loss after delivery. Secondary outcomes included severe maternal and neonatal composite morbidity. Univariate, Kaplan-Meier curves, and Cox proportional-hazards models were constructed for statistical analysis using Rstudio v.2023.06.1.

RESULTS: There were 2,106 kidney transplant recipients, of which 1,574 pregnancies and 1,641 neonates met inclusion criteria. Preeclampsia was reported in 447 (28.4%) of pregnancies. Recipients with preeclampsia were more likely to be nulliparous, self-identify as white, report tacrolimus use during pregnancy, have cesarean births, and have a multiple gestation. Preeclampsia was associated with higher creatinine during pregnancy ($p< 0.01$) and after pregnancy ($p=0.02$), but there was no difference in pre-pregnancy creatinine ($p=0.80$). Severe maternal morbidity was higher in those with preeclampsia (4.7% vs 2.5%, $p=0.02$). Preeclampsia was associated with higher neonatal composite morbidity (23.5% vs 9.6%, $p< 0.01$), as well as higher rates of NICU stays (33% vs 16%, $p< 0.01$). Preeclampsia was associated with a shorter interval to graft loss after delivery (8.9, vs 14.4 years, $p< 0.01$); however, on survival analysis there was no increased risk of graft loss from delivery (aHR: 1.22, [0.99, 1.49]) after adjusting for covariates.

CONCLUSION: In kidney transplant recipients who developed preeclampsia during pregnancy, a shorter time to graft loss and increased severe maternal and neonatal composite morbidity was observed. There was no difference in kidney graft survival based on a history of preeclampsia in a post-transplant pregnancy.

Table 1: Demographics, graft, and pregnancy outcomes by preeclampsia in kidney transplant

	No Preeclampsia (n=1127)	*Preeclampsia (n=447)*	*P-value*
Demographics			
Age, median (IQR), y	30.1 (26.1, 33.7)	30.0 (26.6, 33.6)	0.86
BMI, median (IQR), kg/m²	23.0 (21.0, 27.0)	24.0 (21.0, 29.0)	0.01
Race			
Asian	64 (5.7%)	28 (6.3%)	<0.01
Black or African American	72 (6.4%)	20 (4.5%)	
White	760 (67.4%)	328 (73.4%)	
Other	90 (8.0%)	43 (9.6%)	
Unknown	141 (12.5%)	28 (6.3%)	
Year of conception, median (IQR), y	1997 (1990, 2007)	1999 (1993, 2010)	<0.01
Nulliparity	624 (55.4%)	275 (61.5%)	0.03
Multiples	35 (3.1%)	22 (4.9%)	0.02
Aspirin during pregnancy	71 (6.4%)	40 (9.0%)	0.08
Prednisone during pregnancy	988 (89.7%)	383 (86.3%)	0.05
Tacrolimus during pregnancy	326 (28.9%)	175 (39.1%)	<0.01
Graft and morbidity outcomes			
Transplant-conception interval, median (IQR), y	4.5 (2.3, 7.8)	4.2 (2.3, 7.7)	0.82
Creatinine before pregnancy, median (IQR), mg/dL	1.1 (1.0, 1.4)	1.2 (1.0, 1.5)	0.80
Creatinine during pregnancy median (IQR), mg/dL	1.1 (0.9, 1.5)	1.2 (1.0, 1.7)	<0.01
Creatinine after pregnancy median (IQR), mg/dL	1.2 (1.0, 1.5)	1.3 (1.0, 1.7)	0.02
Graft loss	396 (37.3%)	161 (36.3%)	0.74
Graft loss interval, median (IQR), y	14.4 (8.9, 20.7)	8.9 (0, 15.9)	<0.01
Severe maternal morbidity	28 (2.5%)	21 (4.7%)	0.02
Pregnancy outcome	*No Preeclampsia (n=1166)*	*Preeclampsia (n=475)*	*P-value*
Livebirth	1124 (96.4%)	469 (98.7%)	0.13
Stillbirth	32 (2.7%)	5 (1.1%)	
Miscarriage	4 (0.3%)	1 (0.2%)	
Termination	6 (0.5%)	0 (0%)	
Neonatal outcome (Livebirths)	*No Preeclampsia (n=1124)*	*Preeclampsia (n=469)*	
Cesarean birth	513 (45.6%)	303 (64.6%)	<0.01
Gestational age, median (IQR), wk	37 (35.0, 38.2))	35.0 (32.1, 37.0)	<0.01
Birthweight, median (IQR), g	2778 (2268, 3147)	2353 (1765, 2920)	<0.01
NICU	171 (16.0%)	154 (33.0%)	<0.01
SGA	226 (20.3%)	75 (16.2%)	0.06
Neonatal composite morbidity	108 (9.6%)	110 (23.5%)	<0.01

219 Pregnancies in heart transplant recipients: the impact of preeclampsia on pregnancy outcomes and graft loss

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OBJECTIVE: Heart transplant recipients have an increased risk of hypertension, with a prevalence of 72% at 1 year after transplant. Pre-pregnancy hypertension elevates risk of preeclampsia, with >25% of heart recipients experiencing this complication. The impact of preeclampsia on heart transplant recipients is unknown. We describe heart transplant recipients who developed preeclampsia and the effect of preeclampsia on graft and pregnancy outcomes.

STUDY DESIGN: This is a retrospective cohort study of adult heart transplant recipients with subsequent pregnancy of ≥ 20 weeks' gestation enrolled in an international transplant registry between 1967- 2022. Primary outcome was graft loss within 2 years from delivery. Secondary outcomes included pregnancy and neonatal outcomes. Statistical comparisons were made with Wilcoxon rank sum and Fisher's exact tests in Rstudio v.2023.06.1.

RESULTS: 146 pregnancies and 149 neonates met inclusion criteria. All were livebirths. 42 pregnancies (28.8%) developed preeclampsia. Cardiomyopathy was the leading diagnosis for transplantation in both cohorts. Baseline characteristics of age, BMI, race, and multiple gestation were similar, with the majority self-identifying as white. The preeclampsia group had higher rates of nulliparity (81.0% vs

54.8%, p< 0.01), chronic hypertension (73.8% vs 34.6%, p< 0.01), and repeat transplant (11.9% vs 1.9%, p< 0.05). Immunosuppressant regimens were similar between cohorts; notably there were mycophenolate and sirolimus exposures in both groups (p >0.05). Incidence of graft loss at 2 years was similar with (4.8%) or without (2.9%) preeclampsia, p=0.72. Preeclampsia was associated with lower gestational age at birth (35.0 vs 37.0 weeks, p< 0.01) and lower birth weight (2310 vs 2801 grams, p< 0.01).

CONCLUSION: There was no difference in graft loss within 2 years from delivery in heart transplant recipients who developed preeclampsia. Risk factors for preeclampsia included nulliparity, chronic hypertension, and repeat heart transplant. These data provide pertinent information for counseling heart transplant recipients who pursue pregnancy.

Table 1: Table 1: Demographics, graft, and pregnancy outcomes by preeclampsia in heart transplant

	No Preeclampsia (n=104)	*Preeclampsia (n=42)*	*P-value*
Demographics			
Age at conception, median (IQR), y	29.3 (24.92, 32.6)	28.4 (26.1, 32.6)	1
Body mass index, median (IQR), kg/m^2	23.6 (20.7, 27.3)	24.0 (20.7, 27.9)	0.69
Race			0.82
Asian	0 (0%)	1 (2.4%)	
Black	8 (7.7%)	3 (7.1%)	
Hispanic	6 (5.8%)	2 (4.8%)	
White	71 (68.3%)	28 (66.7%)	
Other	3 (2.9%)	1 (2.4%)	
Unknown	16 (15.4%)	7 (16.7%)	
Multiples	2 (1.9%)	2 (2.4%)	0.38
Year of conception	2008 (1999, 2015)	2012 (2005, 2016)	0.14
Nulliparity	57 (54.8%)	34 (81.0%)	<0.01
Aspirin use	27 (26.0%)	10 (23.8%)	0.88
Insulin-treated diabetes	8 (7.7%)	7 (16.7%)	0.31
Chronic hypertension	36 (34.6%)	31 (73.8%)	<0.01
Graft Characteristics			
Transplant to conception interval, median (IQR), y	6.2 (3.7, 12.4)	6.7 (3.7, 14.5)	0.40
Repeat transplant	2 (1.9%)	5 (11.9%)	0.02
Mycophenolic acid during pregnancy	8 (7.7%)	8 (19.0%)	0.12
Cyclosporine during pregnancy	40 (38.5%)	9 (21.4%)	0.10
Tacrolimus during pregnancy	60 (57.7%)	31 (73.8%)	0.15
Sirolimus during pregnancy	8 (7.7%)	7 (16.7%)	0.13
Prednisone during pregnancy	58 (55.8%)	16 (38.1%)	0.08
Graft Outcomes			
Rejection during pregnancy	6 (5.8%)	2 (4.8%)	1
Graft loss at 2 years from delivery	3 (2.9%)	2 (4.8%)	0.72
Adult follow-up, median (IQR), y	7.1 (3.1, 13.7)	6.4 (3.2, 10.4)	0.38
	No Preeclampsia (n=106)	*Preeclampsia (n=43)*	*P-value*
Neonatal outcomes			
Cesarean delivery	44 (41.51%)	21 (51.2%)	0.13
Gestational age, median (IQR), wk	37.0 (36.0, 38.8)	35.0 (32.0, 37.0)	<0.01
Birth weight, median (IQR), g	2801 (2438, 3064)	2310 (1822, 2778)	<0.01
Congenital anomalies	17 (16.0%)	4 (9.3%)	0.44
Neonatal death	0 (0%)	0 (0.%)	1

220 Telehealth use and patient care utilization within one year postpartum

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OBJECTIVE: Telehealth is now widely used in obstetrics. Our objective was to examine the relationship between exclusive telehealth vs. in-person postpartum visits and healthcare utilization within the first year postpartum.

STUDY DESIGN: We performed a retrospective cohort study of individuals receiving postpartum care at a single institution between 7/1/2020—6/30/2021. The primary exposure was exclusive use of telehealth vs. in-person visit for postpartum care. Primary outcomes were use of long-acting reversible contraception (LARC) and pap smear screening within 1 year postpartum, services that require an in-person visit and can be provided outside of routine obstetric care (i.e., by a primary care provider). Secondary outcomes included weight assessment, prescription contraception use, primary care visits, and pregnancy within 1 year postpartum. Logistic regressions were performed to assess the association between the outcomes and telehealth vs. in-person postpartum care.

RESULTS: Of the 3,407 individuals who delivered, 3,096 (90.9%) had a postpartum visit; 1,304 (33.4%) utilized telehealth exclusively. Those who used telehealth exclusively were more likely to self-identify as White (69.2 vs. 61.4%, p< 0.001), report English as their primary language (93.3 vs. 87.9%, p< 0.001), and not have pregnancy-related hypertension (13.8 vs. 18.5%, p< 0.001), gestational diabetes (6.7 vs. 11.3%, p< 0.001), and mental health conditions (15.9 vs. 18.8%, p=0.03). The telehealth users were less likely to have a pap smear (22.5 vs. 47.0%, p< 0.001) or use LARCs (8.7 vs. 21.9%, p< 0.001) than those receiving in-person care. There were reduced odds of all services in the telehealth compared to the in-person cohort, except subsequent pregnancy within 1 year (Table).

CONCLUSION: There was lower utilization of commonly recommended services within the first year postpartum for individuals who utilize telehealth services for postpartum care. As telehealth has become for patients to access medical care, these findings should prompt clinicians to consider what services may be delayed or missed by the exclusive use of telehealth.

Odds of Health Care Utilization and Screening Services within 1 year of Delivery for Exclusive Telehealth Use compared to In-Person Postpartum Care

Outcomes	Unadjusted Odds Ratio for Exclusive Telehealth vs. In-Person Postpartum Care (95% CI)	Adjusted Odds Ratio for Exclusive Telehealth vs. In-Person Postpartum Care (95% CI) [3]
Primary		
Pap Smear [1]	0.33 (0.25-0.42)	0.30 (0.23-0.39)
Long-Acting Reversible Contraception [2]	0.34 (0.27-0.43)	0.35 (0.27-0.44)
Secondary		
Any Prescribed Contraception [2]	0.72 (0.62-0.83)	0.72 (0.62-0.84)
Blood Pressure Assessment	0.03 (0.02-0.05)	0.03 (0.02-0.05)
Weight Assessment	0.15 (0.13-0.19)	0.16 (0.13-0.19)
Primary Care Visit	0.77 (0.67-0.89)	0.81 (0.70-0.94)
Subsequent Pregnancy within 1 Year	0.98 (0.73-1.33)	1.00 (0.74-1.36)

CI, confidence interval.

[1] Denominator for comparison: individuals without pap smear in the 3 years prior to delivery.

[2] Denominator for comparison: individuals who did not receive long-acting reversible contraception or have a sterilization procedure during the delivery hospitalization.

[3] The adjusted logistic regression model included the following covariates that were defined a priori: age (continuous), parity (nulliparous vs. multiparous), preterm birth, primary language (English vs. non-English), self-identified race, self- identified ethnicity (Hispanic vs. non-Hispanic), primary payer for delivery admission, delivery mode, and maternal comorbidities (pre- and gestational diabetes, chronic and pregnancy-related hypertension, mental health conditions).

221 Sex-specific placental histopathology effects on newborn cytokine-chemokine levels in a cohort with universal placental examination

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OBJECTIVE: To determine the association(s) of placental histopathology types with levels of developmentally important regulatory molecules assayed in newborn dried blood spots (DBS), and whether any associations differ by infant sex.

STUDY DESIGN: 1809 children with complete placental evaluation by a single pathologist (CMS) had DBS retained as part of the New York State Newborn Screening Program. Assays were performed using the Bio-Rad 40-plex Illumina assay. Histopathology types were considered as binary (present/absent), and Mann Whitney U tests compared their relationships with DBS analyte levels. Results were stratified by sex. Acronyms for placental histopathology types with at least one significant association with a DBS analyte in either sex are as follows:

MAIR	Any versus no maternal inflammatory responses
FAIR-UC, FAIR-CV	Any versus no fetal inflammatory responses in umbilical cord (UC) or chorionic plate vessels (CV)
MVP-RVA	Any versus no maternal malperfusion pathology: reduced villous arborization
MVP-INF	Any versus no maternal malperfusion pathology: infarction
MVP-IVT with INF	Any versus no maternal malperfusion pathology: intervillous thrombus with peripheral infarct
FVP-Macro	Any versus no fetal vascular pathology in chorionic plate or fetal stem vessels
FVP-Micro	Any versus no fetal vascular pathology in villous capillaries
Dysmaturity	Immature and/or edematous appearing villi with decreased vasculosyncytial membranes
CPI-Mat	Any versus no chronic inflammation in maternal tissues
CPI- Fet	Any versus no chronic inflammation in placental villi

RESULTS: Multiple significant associations were observed between placental histopathology types and DBS analytes, and the majority were seen either in males or females, but not both (Table).

CONCLUSION: The dramatic sex-specific differences in associations linking placental histopathology types and DBS analytes make infant sex a critical variable in any study of placental histopathology and its potential downstream and lifelong effects.

Analyte	Infant Sex	MAIR	FAIR-UC	FAIR-CV	MVP-RVA	MVP-Inf	MVP-IVT with INF	FVP-Macro	FVP-Micro	Dysmaturity	CPI-Mat	CPI-Fet
C6kine/ CCL21	M							0.009	0.041	0.0001		
	F		0.044	0.007	0.0001				0.058			
BCA-1/ CXCL13	M								0.012			
CTACK/ CCL27	M									0.021		
	F						0.053					
ENA-78/ CXCL5	F					0.023		0.0001				
Eotaxin/ CCL1	M			0.045								
Eotaxin3/CCL26SS	M		0.019							0.053		
FractalkineCX3C/IL177	M		0.04						0.032	0.0001		
	F				0.003							
GCP2/CXCL6	M				0.005					0.018		
	F				0.004							
GM-CSF	M		0.028									
	F									0.039		
Gro-a / CXCL1	M										0.044	
Gro-B/ CXCL2	M				0.004			0.019		0.009	0.002	
	F				0.0001				0.003			
I-309/ CCL1	M		0.006									
	F		0.012									
IFN-gamma21	M				0.051					0.01		
	F			0.064								
IL-1B	M		0.008		0.009							
IL-2	M		0.052		0.009		0.035			0.0001	0.005	
	F				0.0001				0.017	0.012	0.014	
IL-4	F									0.006		
IL-6	M						0.01		0.033	0.001		
	F				0.001				0.018			
IL-8/ CXCL8	M			0.014							0.044	
IL-10	M		0.037							0.024		
IP-10/ CXCL10	M						0.026					
I-TAC/ CXCL11	F		0.046	0.011	0.038							
MCP-1/ CCL2	M				0.008					0.032	0.052	0.036
	F										0.011	
MCP-2/ CCL8	M									0.017		
MCP-3/ CCL7	M									0.003		
	F										0.046	0.043
MCP-4/ CCL13	M							0.048		0.008		
	F				0.023							
MDC/ CCL22	F			0.016	0.036	0.024						
MIF35	M		0.018						0.011			
	F						0.058					
MIG/ CXCL9	M									0.0001	0.056	0.04
	F				0.0001					0.007		
MIP-1A/ CCL3	M				0.005			0.058		0.005	0.004	
	F				0.0001				0.005	0.031		
MIP3a/ CCL20	M			0.054								
	F										0.007	
MPIF-1/ CCL23	M						0.04		0.043			
MIP3B/CCL19	M									0.0001		
	F							0.036		0.015		
SCYB16/ CXCL16	M							0.032	0.016	0.044		
SDF-1a+B/CXCL12	M				0.026				0.01	0.001	0.01	
	F				0.0001				0.03			
TARC/CCL17	M	0.012	0.019	0.053						0.003	0.054	
	F		0.04		0.011					0.055		
TECK/ CL25	M	0.023	0.0001	0.011	0.003							
	F		0.027									
TNFAlpha	M								0.054	0.0001		
	F				0.001					0.001		

222 Early postpartum appendicular skeletal muscle mass in Japanese women with gestational diabetes

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OBJECTIVE: Gestational diabetes (GDM) is strongly associated with the development of type 2 diabetes mellitus (T2DM) and it is suggested that, in addition to obesity, reduced appendicular skeletal muscle mass (ASM) may be a risk factor for T2DM, particularly in lean populations such as East Asians. However, few studies have investigated the association between ASM and GDM. This study aimed to investigate the volume of ASM in Japanese women with GDM.

STUDY DESIGN: In this prospective study, singleton pregnant women with or without GDM were recruited at 35 weeks' gestation. ASM was measured using a body composition analyzer (Tanita MC780A-N), along with body mass index (BMI), four weeks postpartum. We compared the early postpartum body fat mass (BFM), ASM/body weight (BW), and ASM/BMI between women with and without GDM.

RESULTS: A total of 118 women with GDM and 426 women without GDM were included in the study. Compared with women without GDM, women with GDM had significantly higher BMI and BFM. Regarding ASM, although the absolute ASM did not differ between the groups, the ASM/BW and ASM/BMI in the GDM group were significantly lower than those in the non-GDM group (**Table**).

CONCLUSION: This is the first report to demonstrate that women with GDM were associated with the reduced ASM during the early

postpartum period compared to those without GDM. It suggests that not only obesity but also reduced ASM may be associated with the development of GDM in Japanese women.

Table: Comparison of BFM and ASM between women with or without GDM

	GDM (n=118)	Non GDM (n=426)	P value
Hight (cm)	158.0 ± 5.1	157.6 ± 5.6	0.56
Postpartum weight (kg)	61.1 ± 11.8	57.5 ±10.4	0.0011
Postpartum BMI (kg/m^2)	24.5 ± 4.4	23.1 ± 3.8	0.0009
BFM (kg)	22.6±9.2	19.7 ± 7.8	0.0004
% BFM (%)	35.9 ± 7.5	33.1 ± 6.8	0.0002
ASM (kg)	16.8 ± 2.1	16.5 ± 2.0	0.16
ASM/BW	0.28 ± 0.03	0.29 ± 0.03	0.0005
ASM/BMI	0.70 ± 0.10	0.73 ± 0.10	0.013

223 Uterine rupture among patients with placenta accreta spectrum: pre-labor vs. in -labor

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OBJECTIVE: There is to date limited data examining uterine rupture in placental accreta spectrum (PAS). This study examined clinical and pregnancy characteristics related to uterine rupture among patients with PAS.

STUDY DESIGN: This serial cross-sectional study queried the Healthcare Cost and Utilization Project's National Inpatient Sample. The study population was 18,180 patients with diagnosis of PAS from 2017-2020. Patient and pregnancy characteristics were assessed for uterine rupture type (pre-labor or in-labor) in multivariable analysis.

RESULTS: Uterine rupture occurred in 220 patients (12.1 per 1,000 PAS diagnoses), including 110 (6.1 per 1,000) pre-labor uterine ruptures and 110 (6.1 per 1,000) in-labor uterine ruptures. Patients who had pre-labor uterine rupture were older compared to those without uterine rupture (rupture (age ≥35 years, adjusted-odds ratio [aOR] 2.05, 95% confidence interval [CI] 1.37-3.05). Patients with placenta percreta were four times more likely to have pre-labor uterine rupture compared to those with placenta accreta (adjusted-odds ratio [aOR] 4.26, 95% confidence interval [CI] 2.81-6.46). Prior vertical or low-transverse uterine incision was not associated with pre- or in-labor uterine rupture. Pre-labor uterine rupture occurred more in extreme-preterm (< 28 vs ≥36 weeks, aOR 13.35, 95%CI 6.71-26.57) followed by early-preterm (28-35 vs ≥36 weeks, aOR 5.61, 95%CI 3.09-10.16). In-labor uterine rupture occurred more in extreme-preterm (aOR 2.66, 95%CI 1.38-5.14) but not in early-preterm (aOR 1.28, 95%CI 0.81-2.03). Pre-labor uterine rupture, but not in-labor uterine rupture, was associated with fetal demise or stillbirth (aOR 3.69, 95%CI 1.93-7.05).

CONCLUSION: This nationwide analysis suggests that uterine rupture can occur in one in nearly 80 patients with PAS and that pre- and in-labor uterine ruptures have distinct differences in clinical and pregnancy characteristics.

224 Umbilical cord occlusion of twin reversed arterial perfusion (TRAP) sequence: laser photocoagulation vs radiofrequency ablation

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OBJECTIVE: TRAP sequence is rare (1:30,000 pregnancies) and associated with poor perinatal outcomes in high-risk cases. Surgical management via umbilical cord occlusion (UCO) has been shown to improve pump twin survival, but limited data are available comparing surgical techniques. The study objective was to review perinatal outcomes of patients with high-risk TRAP sequence who underwent mid-trimester UCO via laser photocoagulation vs radiofrequency ablation (RFA).

STUDY DESIGN: This is a retrospective cohort study of all patients seen between 2006-2023 with high-risk TRAP sequence who underwent UCO at a gestational age (GA) of 16-26 weeks. Criteria used to classify TRAP sequence patients as high-risk and eligible for UCO included: (1) abdominal circumference of the acardiac twin greater than or equal to that of the pump twin, (2) polyhydramnios (maximum vertical pocket ≥ 8 cm), (3) critically abnormal Doppler studies in the pump twin, (4) pump twin hydrops, or (5) monoamniotic twins. The primary outcome was 30-day survival of the pump twin.

RESULTS: Of 77 consecutive high-risk TRAP sequence patients that underwent UCO, perinatal outcomes were available in 74, of which 37 underwent UCO by laser and 37 by RFA. All gestations had at least 1 high-risk characteristic (Table); 63 were twins, 10 were triplets and 1 was quadruplets. The average GA of UCO was similar between the laser and RFA groups (20.5 ± 2.3 vs 20.7 ± 3.1 weeks, p=0.987). Five fetal demises occurred, 1 in the laser group (1/37, 2.7%) and 4 in the RFA group (4/37, 10.8%) (p=0.358). Postoperative pump twin membrane detachment was a risk factor for demise (4/7 [57.1%] vs 10/67 [14.9%], OR 7.69 [1.47-33.33], p=0.015). The average GA at delivery was similar between groups (35.2 ± 4.6 vs 34.5 ± 5.7 weeks, p=0.812) groups. The 30-day neonatal survival rate was 91.9% (34/37) in the laser group and 89.2% (33/37) in the RFA group (aOR: 1.42 [0.27-7.46], p= 0.677).

CONCLUSION: No significant differences in perinatal outcomes were identified in patients with high-risk TRAP sequence who underwent UCO by laser vs RFA.

Table 1. Characteristics of umbilical cord occlusion patients by surgical technique.*

TRAP high-risk factors	Laser photocoagulation (n=37)	RFA (n=37)
(1) Abdominal circumference of acardiac greater than or equal to pump twin	89.1% (33)	89.1% (33)
(2) Pump twin polyhydramnios	70.3% (26)	51.4% (19)
(3) Critically abnormal Doppler studies in pump	27.0% (10)	16.2% (6)
(4) Pump twin hydrops	0	2.7% (1)
(5) Monoamniotic twins	0	0

*Patients may have more than 1 characteristic.

225 Evaluation for congenital infections in late-onset small for gestational age (SGA) neonates

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OBJECTIVE: Symmetric SGA neonates are thought to be small due to familial, genetic, or infectious causes. The association of maternal infections with early-onset SGA is controversial and SMFM recommends against screening for congenital infections in SGA in the absence of other risk factors (strong recommendation, low-quality evidence). We have evaluated the utility of routine investigation for late-onset symmetric SGA infants.

STUDY DESIGN: Cohort study of all infants with birth weight $< 10^{th}$ centile born at >35 weeks over a 2-year period (2021-2022). Symmetric SGA was defined as both birth weight and head circumference < 10 centile. Excluded were infants with congenital anomalies, genetic syndromes, and those transferred to high acuity neonatal intensive care units. Birth weight centile were evaluated according to Fenton growth curves to include late preterm infants. SGA infants were recommended testing for congenital infections, head ultrasound (US), complete blood cell count, and glucose testing.

RESULTS: Of the 6075 babies born at >35 weeks during the study period, 339 (5.6%) were SGA and 116 of them (34%) were symmetric SGA. Urine CMV PCR was done on 67/116 (58%) babies with symmetric SGA, and all results were negative. TORCH IgM/Total IgM was done on 65 babies (56%), and only 1 had a mild elevation in Total IgM. Head US was done on 67 babies (58%); it was normal in 60 (89%). Seven babies had abnormal US findings: 2 with increased echogenicity in the periventricular matter, 1 with small periventricular calcifications, and 4 with grade 1 IVH (one of which had a small periventricular calcification). Repeat head US or brain MRI 3 months later was normal. Urine CMV PCR was negative in all these babies.

CONCLUSION: Extensive laboratory work-up for congenital infections in symmetric SGA babies at >35 weeks is not useful or cost effective.

226 Family separation at birth: impact of marijuana-only positive urine drug screening on the parent-neonatal dyad

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OBJECTIVE: This study described and compared the neonatal outcomes and interventions for pregnant patients with a positive marijuana-only UDS compared to those with a negative UDS after implementation of a urine drug screening protocol.

STUDY DESIGN: This is a retrospective cohort study comparing pregnant patients with a positive marijuana-only UDS result and those with a negative UDS admitted to the labor floor from 9/1/2020 to 6/1/2022. Patient demographics and neonatal outcomes were collected from the electronic medical record (Table 1). Chi square analysis was used to evaluate the association between categorical variables.

RESULTS: Of 7022 births during the study period, 127 (1.8%) patients had a UDS collected. Patients who identified as Black were significantly more likely to have a UDS collected (P< 0.0001). Of the 127 patients with a UDS result, 55 (43%) had a negative UDS, 28 (22%) had a marijuana-only positive result, 44 were positive for other substances (34.6%). Of the patients with marijuana-only positive results, 12 were sent for no prenatal care, 1 for altered mental status, 4 for use of illicit substances, 3 for treatment with medications for opioid use disorder, 1 for suspicion of abruption, 4 for intrauterine fetal demise, and 1 undocumented indication. There was no difference in neonatal outcomes between the two groups, however, significantly more in the marijuana only group were referred to DHS (44% versus 16%).Of the 28 patients with marijuana-only results with a DHS referral, 4 were discharged home without custody of their neonates.

CONCLUSION: No significant differences in neonatal outcomes were observed between patients with and without a positive marijuana-only UDS result. Nonetheless, current UDS testing practices have significant adverse impact on parent-baby dyad and may lead to family separation and its associated downstream health effects. Given the legality of marijuana in much of the U.S., and its lack of medical significance, we recommend that its detection should be removed from the UDS for birthing parents.

	Positive THC (n=28)	Patients with negative UDS (n=55)	p-value
Age (mean, SD)	28.89 (6.14)	30.87 (5.63)	0.1
Race (n, %)			
White	1 (3.6%)	10 (18.1%)	0.19
Black	27 (96.4%)	41 (74.5%)	
Asian	0 (NA)	1 (1.8%)	
Public Insurance (n, %)	27 (96.4%)	51 (92.7%)	0.45
DHS call	12 (44.44%)	9 (16.36%)	0.006
Neonatal Abstinence Syndrome (n, %)	2 (8.0%)	6 (12.2%)	0.73
Eat/Sleep/Console (n, %)	6 (24%)	5 (10.2%)	0.12
Baby morphine (n, %)	0 (NA)	0 (NA)	N/A
IVH (n, %)	0 (NA)	0 (NA)	N/A
NRDS (n, %)	0	5 (10.2%)	N/A
TTN (n, %)	0 (NA)	2 (4.1%)	N/A
NEC (n, %)	0 (NA)	2 (4.1%)	0.59

227 Satisfaction of placenta accreta training during maternal-fetal medicine versus gynecologic oncology fellowship.

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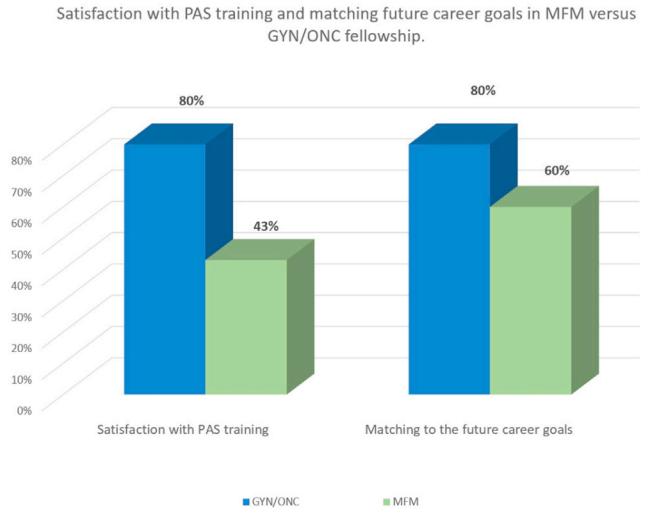
OBJECTIVE: Training in placenta accreta spectrum disorder (PASD) is essential to Maternal-Fetal Medicine (MFM) and Gynecology Oncology (Gyn/Onc) fellowships. Our objective was to assess the satisfaction and alignment with future career goals of placenta accreta training during MFM and Gynecology Oncology fellowship.

STUDY DESIGN: An anonymous survey was distributed to all ACGME-accredited MFM and Gyn/Onc fellowship programs between 04.08.23-07.30.23. The survey contained demographic information, and questions reflecting satisfaction with PASD training during

fellowship and matching future career goals. This was assessed with modified 5-point Likert scale.

RESULTS: We received 43 responses, 28 (65.1%) responders were from MFM fellows, and 15 (35.9%) were from Gyn/Onc fellows. Out of all responders, satisfaction with PASD training in their fellowship was greater in Gyn/Onc fellows compared to MFM fellows (80% vs. 42.9%, p=0.02). Conversely, MFM fellows reported that they were not satisfied with their PASD-related training more frequently than Gyn/Onc fellows (32.1% vs 13.3%, p=0.39) PASD training in MFM fellowship matched trainees' future career plans in 60.1% in contrast to 80% of Gyn/Onc fellows (p=0.19).

CONCLUSION: Satisfaction with PAS training and alignment with future career goals were higher in Gyn/Onc fellowship programs compared with MFM fellowship.



228 Utility of standardized FIGO descriptors for reporting of intra-operative findings of placenta accreta spectrum disorders.

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OBJECTIVE: Proper reporting of placenta accreta spectrum disorder (PASD) findings intra-operatively allows consistency of communications between multidisciplinary teams within the institution and improves research opportunities on national and international levels. The universal use of the International Federation of Gynecology and Obstetrics (FIGO) classification for a description of intra-operative findings is an important tool for potential use in this standardization.

STUDY DESIGN: We conducted a retrospective chart review of patients delivered for PASD at the University Health System in San Antonio, TX in twelve-month period between 2022 and 2023. We compared the reported rate of intra-operative findings and reported standardized FIGO descriptors before and after the implementation of standardized use of the FIGO criteria.

RESULTS: A total of 30 cases were evaluated: 17 pre-implementation and 13 post-implementations. Pre-implementation, cesarean hysterectomy was performed in 13 out of 17 cases (76.5%) with histological confirmation of placenta percreta in 69.2%, increta in 15.4%, and accreta in 15.4%. Post-implementation, cesarean hysterectomy was performed in 10 out of 13 (76.9%) cases with histological confirmation of placenta percreta in all cases (100%). Intraoperative findings were documented in all (100%) charts. FIGO staging classification was not used in the pre-implementation period and was utilized in 69.2% of cases after the implementation. The reporting of "bluish/purple coloring, distention or bulge" increased from 41.2% to 84.6%, "hypervascularity" description improved from 52.9% to 76.9%, "placenta tissues in the uterus or clear plane between the uterus and bladder" improved from 41.2% to 84.6%, "invasion into the bladder or nearest organs" improved from 41.2% to 69.2% in 2022 and 2023 respectively. Table 1 demonstrated a reported rate of standardized intra-operative descriptors.

CONCLUSION: The use of a standardized FIGO classification approach for reporting intra-operative findings during PASD cases in our institution significantly improved the quality of reported findings.

Table 1. Report rate of standardized intra-operative FIGO descriptors before and after implementation of the universal protocol.

Positive or negative description of findings	2022 N=17 (%)	2023 N=13 (%)	P*
Intra-operative findings described in the operative report	17 (100)	13 (100)	-
FIGO staging of intra-operative findings	0	9 (69.2)	0.0001
Bluish /purple coloring and distention or "bulge"	7 (41.2)	11 (84.6)	0.02
Hypervascularity	9 (52.9)	10 (76.9)	0.18
Placenta tissues in the uterus or clear plane between the uterus and bladder	7 (41.2)	11 (84.6)	0.02
Invasion into the bladder or nearest organs	7 (41.2)	9 (69.2)	0.13

* Chi-square

229 Biomechanical modeling of cervical support during pregnancy: implications for the treatment of cervical insufficiency

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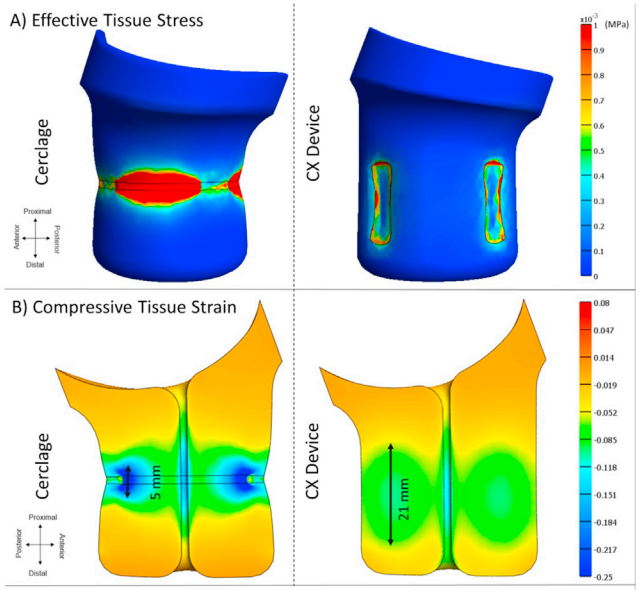
OBJECTIVE: A cerclage supports the cervix by applying compression to the cervical stroma. However, the biomechanics of cervical compression are not well understood. In this study, we aimed to investigate the biomechanics of cerclage support by modeling cerclage compression. We also examined cervical compression using the Cx Device, a medical device currently in development as an alternative to cerclage. The Cx Device is designed to distribute cervical compression over a larger contact area. Our hypothesis was that our models would show a wider distribution of compression with the Cx Device compared to the cerclage.

STUDY DESIGN: Three-dimensional ultrasound measurements of the uterus and cervix were taken from a patient at 21 weeks of gestation. The ultrasound anatomy was then converted into a computer-aided design (CAD) model, which included the cervix, uterus, fetal membranes, and abdomen. The model was meshed using tetrahedral elements in Hypermesh and imported into FEBio for finite element analysis. Material properties for the maternal reproductive tissue were assigned based on previously published mechanical data, and appropriate boundary conditions were applied. A force of 0.85 N was applied to the areas where the Cx Device and cerclage contact the cervix. The distribution of tissue stretch and stress in the cervix was computed for both the cerclage and Cx Device, allowing for a comparison of their biomechanical function.

RESULTS: Biomechanical modeling shows that cerclage is associated with areas of high stress concentration in the region where the suture is placed (Figure). Cervical compression is concentrated over a distance of 5 mm with a cerclage (blue color). In contrast, the Cx Device spreads cervical compression over a wider distance of 21 mm (green color), resulting in decreased stress concentrations.

CONCLUSION: Biomechanical modeling has demonstrated that the distribution of cervical compression is directly influenced by the method of cervical support used. This study provides valuable insight into the mechanism of mechanical support for the cervix.



A) Effective tissue stress and B) compressive tissue strain on cervix as cerclage and CX Device are applied to the model and loaded with the same force.

230 Trial of labor or repeat caesarean delivery in women with morbid obesity

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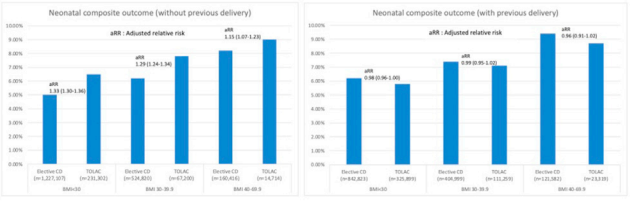
OBJECTIVE: Given that obesity affects vaginal delivery rates (VD), which impact trial of labor after cesarean (TOLAC) success and safety, we aimed to evaluate the impact of BMI on adverse neonatal outcomes associated with TOLAC, after accounting for prior VD.

STUDY DESIGN: This was a repeated cross-sectional analysis of individuals with singleton, cephalic, and term deliveries with a history of one or two cesarean deliveries in the Linked Birth/Infant Death data from 2011 to 2020. Outcomes were examined according to the BMI category including BMI < 30, 30-39.9, and 40-69.9 kg/m^2. The primary outcome was a composite neonatal outcome, defined as any presence of neonatal death, neonatal intensive care unit admission, assisted ventilation, surfactant therapy, or seizures. Outcomes were compared between TOLAC and elective repeat cesarean delivery (eRCD) after stratifying by BMI category and previous VD. Log-binomial regression was performed to obtain adjusted relative risk (aRR) with 99% confidence intervals, controlling for covariates.

RESULTS: Of 4,055,440 individuals, 2,627,131 had BMI$<$ 30, 1,108,278 had BMI 30-39.9, and 320,031 had BMI 40-69.9 kg/m^2. In individuals with no prior VD, VD rates after TOLAC were 66.7%, 57.2%, and 48.1%, respectively. In individuals with prior VD, VD rates after TOLAC were 81.4%, 74.7%, and 67.3%, respectively. In the subgroup without prior VD, TOLAC was associated with the primary outcome in individuals with BMI < 30 kg/m^2 (5.0% vs. 6.5%; aRR 1.33 [1.30-1.36]), BMI 30-39.9 kg/m^2 (6.2% vs. 7.8%; aRR 1.29 [1.24-1.34]), and BMI 40-69.9 kg/m^2 (8.2% vs. 9.0%; aRR 1.15 [1.07-1.23]) compared with eRCD. In the subgroup with prior VD, there were no differences in the primary outcomes between TOLAC and eRCD across BMIs (BMI < 30: (6.2% vs.5.8%; aRR 0.98 [0.96-1.00]), BMI 30-39.9: (7.4% vs.7.1%; aRR 0.99 [0.95-1.02]), and BMI 40-69.9: (9.4% vs. 8.7%; aRR 0.96 [0.91-1.02]).

CONCLUSION: Neonatal outcome in TOLAC is impacted by prior VD rather than BMI. Prior studies regarding the safety of TOLAC in obese patients are likely confounded by prior VD.



231 Impact of OBTeleflex program on delivery outcomes at an academic urban center

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OBJECTIVE: Studies have shown that telehealth can improve obstetric outcomes such as smoking cessation and breastfeeding rates. However, the effect of telehealth on outcomes such as mode of delivery has not been adequately investigated.

STUDY DESIGN: We performed a retrospective cohort study of all patients who initiated prenatal care between October 1st 2021 and September 30th 2022 at a major urban academic center. Patients were included if they were eligible for OBTeleflex, a hybrid telemedicine/in-person prenatal program that provides flexible, education-oriented prenatal care where 6 traditional antepartum/postpartum visits are replaced by remote visits with an OB nurse navigator. Low risk patients were eligible for OBTeleflex and included in this study if they had a singleton, viable, non-anomalous fetus, and did not have hypertension requiring medication. The primary outcome was mode of delivery. Patients who elected to participate in OBTeleflex were compared to those who opted for routine care. Standard labor management were per hospital protocol and maternal characteristics and pregnancy outcomes were collected from the EMR.

RESULTS: Of the 351 patients eligible for the OB Teleflex program, 63 (18%) chose to participate. The groups differed by race but other maternal characteristics did not differ significantly (Table). OBTeleflex participation was associated with a significantly higher rate of vaginal delivery compared to routine prenatal care (81% vs. 68%, p $= 0.04$) and lower rates of perineal tears (p=0.02). Rates of vaginal delivery did not differ significantly between OBTeleflex and routine prenatal care when comparing only nulliparous patients (78% vs. 66%, p $= 0.14$).

CONCLUSION: In this small cohort, a hybrid prenatal telemedicine program was associated with similar delivery outcomes in nullips and an increased rate of vaginal delivery in all comers compared to routine prenatal care. A randomized trial may help to elucidate

whether the increased flexibility and education in programs like OBTeleflex can lead to improved delivery outcomes.

Table- Participant Characteristics and Outcomes by Prenatal Care Type

DEMOGRAPHICS	Not Enrolled in OBTeleflex N=288	Enrolled in OBTeleflex N=63	p-value
Maternal age (Mean, SD)	30 (4)	31 (6)	0.30
Race			0.01
American Indigenous/Alaska Native	0%	0%	
Asian	13%	11%	
Black or African American	12%	29%	
White	54%	52%	
More than one race	2%	0%	
Unknown	18%	8%	
Ethnicity			0.62
Hispanic or Latino	15%	13%	
Non-Hispanic or Latino	79%	84%	
Unknown	6%	3%	
Parity			0.06
0	50%	66%	
1-3	49%	34%	
4+	1%	0%	
Prior Low Transverse C-section	21%	9%	0.19
Chronic hypertension	3%	5%	0.38
Previous GDM	6%	3%	0.40
OUTCOMES			
Gestational Age (wks)			0.37
34 0/7 - 35 6/7	0%	2%	
36 0/7 - 37 6/7	17%	16%	
38 0/7 - 39 6/7	66%	59%	
40 0/7+	17%	24%	
Birthweight (g) (Mean, SD)	3302 (444)	3241 (511)	0.35
Vaginal Delivery	68%	81%	0.04
Cephalic Positioning	94%	96%	0.54
Perineal Tear			0.02
None	25%	49%	
1st Degree	18%	10%	
2nd Degree	52%	37%	
3rd Degree	4%	3%	
4th Degree	1%	0%	
Length of Stay (Mean, SD)	3 (1)	3 (1)	0.23

232 Nipocalimab pharmacokinetic/pharmacodynamic and exposure-response modeling in pregnancies at risk for early-onset severe (EOS) HDFN

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OBJECTIVE: Hemolytic disease of the fetus and newborn (HDFN) is a rare, immune-mediated red blood cell (RBC) disorder, where maternal IgG alloantibodies attack fetal RBCs. Nipocalimab is a fully human monoclonal antibody designed to selectively block the IgG binding site on neonatal Fc receptors (FcRn). Modeling approaches were used to characterize the pharmacokinetic/pharmacodynamic (PK/PD) and exposure-response (E-R) relationships of nipocalimab in the Phase 2 UNITY study in pregnancies at risk for EOS-HDFN.

STUDY DESIGN: UNITY is a multicenter, open-label, single-arm study evaluating the safety, efficacy, and PK/PD of nipocalimab in pregnant individuals at risk for EOS-HDFN. Data from three Phase 1 studies in healthy volunteers and the UNITY study were combined and utilized for the PK/PD and E-R modeling. Nipocalimab PK and FcRn occupancy (RO) were characterized by a 2-compartment target-mediated-drug-disposition (TMDD) model following intravenous (IV) doses. A PK/PD model was established to describe the observed longitudinal IgG data following IV doses. E-R relationships were explored to correlate nipocalimab PK or total IgG with efficacy and safety endpoints.

RESULTS: Nipocalimab PK exhibited nonlinear behavior. The developed TMDD PK model characterized the time courses of nipocalimab PK and FcRn RO. The PK/PD model indicated high potency of nipocalimab to reduce the maternal total IgG levels. Similar to total IgG, maternal alloantibodies decreased and showed a correlation with maternal total IgG. At the studied dose levels in UNITY, nipocalimab fully saturated FcRn, leading to decreased maternal alloantibodies and inhibition of their placental transfer. E-R modeling for primary efficacy and selected safety (ie, infection) endpoints showed that optimal responses have been achieved in EOS-HDFN participants.

CONCLUSION: This study demonstrates the correlation of nipocalimab PK and FcRn RO with reduction in total IgG and alloantibodies, as well as with clinical efficacy and safety endpoints. These relationships inform the appropriate dose regimen for evaluation in the pivotal Phase 3 study in EOS-HDFN.

233 Is ethnicity associated with different rates of engagement with remote postpartum blood pressure monitoring?

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OBJECTIVE: Remote postpartum blood pressure (ppBP) programs reduce racial disparities in ppBP assessment. Their effect on ethnic disparities in ppBP assessment is less clear. We examined whether ppBP assessment differed among participants in remote ppBP monitoring programs who self-reported being Hispanic versus non-Hispanic.

STUDY DESIGN: This is a planned secondary analysis of a RCT including women in our tertiary care center's postpartum unit who had chronic or pregnancy-related hypertension (HTN) and were enrolled into our remote ppBP program, in which they manually enter BPs into a patient portal for 6 weeks. In the parent trial, consenting patients were randomized to remain in this program or be enrolled in another remote ppBP program, in which a Bluetooth-enabled BP cuff synched to an app utilizing AI to respond to each BP/symptom and flag abnormalities for providers. For this study, women who self-reported their ethnicity were stratified into two ethnic groups—Hispanic and non-Hispanic—regardless of randomization group. The primary outcome was ≥1 BP assessment 3-7 days after discharge. Secondary outcomes are listed in the Table. Odds ratios (OR) were calculated for categorical and betas for continuous outcomes.

RESULTS: Among 119 women in the parent study, 83 (70%) self-reported ethnicity, and the proportion of Hispanic people was similar in both groups. This study included 21 Hispanic (19% monolingual in Spanish) and 62 non-Hispanic women. Rates of BP assessment 3-7 days after discharge were similar (Hispanic 71% vs Non-Hispanic 79%; OR 0.7 (95% CI 0.2, 2.0). There were no

differences in mean number of remote ppBP assessments and rates of remote BP medication initiation or titration and HTN-related ED visits or readmission. Patients rated their remote ppBP program highly favorably, with median Likert scale scores of 10 (out of 10) in both groups.

CONCLUSION: Hispanic and non-Hispanic women in remote ppBP monitoring had similar HTN-related outcomes and favorable patient perceptions. These findings suggest the impact of remote ppBP programs on perinatal equity may not be limited to race-based disparities.

Table 1: Outcomes among Hispanic versus non-Hispanic postpartum women participating in a randomized trial comparing remote blood pressure monitoring programs

	Hispanic (n=21)	Non-Hispanic (n=62)	Odds Ratio or Beta (95% Confidence Interval (CI))
Primary Outcome			
Assessment of BP 3-7 days after discharge	15 (71)	49 (79)	0.7 (0.2-2.0)
Secondary Blood Pressure Outcomes			
BP max systolic (mmHg)	143 (139-152)	146 (134-154)	0.1 (-7.2-7.4)
BP max diastolic (mmHg)	98 (94-104)	97 (9)	2.0 (-3.7-7.7)
Number of remote BP assessments	14 (7-45)	23 (12-37)	0.1 (0-0.2)
Secondary Outcomes: Health Care Utilization			
Remote BP medication initiation within 6 weeks	0 (0)	6 (10)	---
Remote BP medication titration within 6 weeks	3 (14)	16 (26)	0.5 (0.1-1.8)
Presentation to ED within 30 days for hypertension	3 (14)	11 (18)	0.8 (0.2-3.1)
Readmission within 30 days for hypertension	2 (10)	7 (11)	0.8 (0.2-4.3)
Secondary Outcomes: Patient experience/mood			
"Using any number from 0 to 10 where 0 is the worst possible experience and 10 is the best possible experience, please rate your experience in the postpartum hypertension program"*	10 (9-10)	10 (9-10)	0.4 (-0.7-1.4)

Data are presented as n (%) or median (interquartile range)
*As measured by (0=highly unfavorable and 10=highly favorable)

234 Expanded carrier screening for genetic conditions with clinical trials in-utero therapy

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OBJECTIVE: Molecular fetal therapies for monogenetic conditions are an emerging area of care with the potential to transform outcomes. Identifying pregnancies eligible for treatment is challenging for conditions with no ultrasound manifestations. We evaluated carrier frequency for 9 conditions identifiable through reproductive carrier screening, focusing on conditions with active in-utero (IU) clinical trials.

STUDY DESIGN: This retrospective observational study included carrier screening tests from female patients, aged 18-55 years, ordered from a US commercial laboratory (Jan 2020-Sept 2022). Samples were tested for a variety of panels ranging from 2 to 421 genes. We calculated the proportion of samples that included screening for any of the conditions with IU therapy trials and the gene-specific carrier frequency for 7 autosomal recessive (AR) conditions and 2 X-linked (XL) conditions (Table 1). To focus on severe subtypes eligible for IU therapy, we excluded pseudodeficiency variants in IDUA, GAA, and ARSB and the neuronopathic protective variant (p.N409S) of Gaucher disease.

RESULTS: Of 822,155 samples screened, 228,720 (28%) were for a panel that included *none* of the conditions and were excluded from the analysis. 15,237 (1.9%) were for a panel with all of the relevant conditions with clinical trials of IU therapy. For the 7 AR conditions, the carrier frequency ranged from 1 in 77 for Pompe disease (GAA) to 1 in 1693 for MPS VII (GUSB) (Table 1). For the XL conditions, the carrier frequency was 1 in 5580 for X-linked Hypohidrotic Ectodermal Dysplasia (EDA) and 1 in 19274 for Hunter syndrome (IDS).

CONCLUSION: Our study highlights that carriers for these individually "rare" conditions are, collectively, not uncommon. However, many patients have screening with panels that detect *none* of the conditions and few have panels that detect all. As fetal and early postnatal treatment options expand for rare genetic conditions, we should reconsider the paradigm of screening (currently based on carrier frequency) to also include conditions with actionable findings.

Table 1. Gene specific carrier frequencies

	Gene (Condition)	Number Screened	Positive n (%)	95% CI
autosomal recessive	ARSB (MPS VI or Maroteaux-Lamy syndrome)	124,032	154 (0.124%; 1 in 805)	0.106%, 0.145% (1 in 943, 1 in 688)
	GAA (GSD II or Pompe)	101,350	1,310 (1.293%; 1 in 77)	1.225%, 1.364% (1 in 82, 1 in 73)
	GALNS (MPS IVA or Morquio syndrome)	15,237	28 (0.184%; 1 in 544)	0.127%, 0.265% (1 in 786, 1 in 377)
	GBA* (Gaucher)	593,435	2,679 (0.451%; 1 in 222)	0.435%, 0.469% (1 in 230, 1 in 213)
	GUSB (MPS VII or Sly syndrome	15,237	9 (0.059%; 1 in 1693)	0.031%, 0.112% (1 in 3218, 1 in 891)
	IDUA (MPS Type I Or Hurler syndrome)	155,859	744 (0.477%; 1 in 209)	0.444%, 0.513% (1 in 225, 1 in 195)
	LIPA (Wolman disease)	132,557	257 (0.194%; 1 in 516)	0.172%, 0.219% (1 in 583, 1 in 457)
X-linked	EDA (Hypohidrotic X-Linked ectodermal dysplasia)	111,608	20 (0.018%, 1 in 5580)	0.012%, 0.028% (1 in 8620, 1 in 3613)
	IDS (Hunter syndrome)	96,371	5 (0.005%; 1 in 19274)	0.002%, 0.012% (1 in 45123, 1 in 8233)

MPS= Mucopolysaccharidosis. GSD = Glycogen storage disease. *Excludes cases with the p.N409S variant which protects against neuronopathic Gaucher (Types 2 or 3). Pseudodeficiency variants in IDUA, GAA, and ARSB were excluded from the carrier frequency.

235 Endometriosis and adverse pregnancy outcomes: a nation-wide population-based study

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OBJECTIVE: Endometriosis is one of the main causes of infertility and pelvic pain; however, there are insufficient data about pregnancy outcomes in women with endometriosis. This study aimed to evaluate the relationship between endometriosis and adverse pregnancy outcomes

STUDY DESIGN: Data on singleton pregnancy deliveries between January 2014 and October 2019 were obtained from the Korean Health Insurance Review and Assessment Service database. The index date was defined as 266 days before delivery, and the follow-up end date was 42 days after delivery. Women with diagnostic codes for endometriosis within 3 years of the follow-up end date were classified into the endometriosis group. We compared the clinical characteristics and adverse pregnancy outcomes between women with endometriosis and those without endometriosis.

RESULTS: In total, 1,251,597 pregnant women were enrolled, of which 32,951(2.6%) were assigned to the endometriosis group. The mean maternal age was higher, and the rates of nulliparity and assisted reproductive technology were higher in the endometriosis group than in the non-endometriosis group. Women with endometriosis had significantly higher adverse pregnancy outcomes than those without endometriosis after adjusting for confounding factors. Adverse pregnancy outcomes associated with endometriosis included preterm labor, preterm birth, gestational hypertensive disorders, fetal growth restriction, placenta previa, placental abruption, antepartum and postpartum hemorrhage, and stillbirth. Additionally, cesarean delivery was significantly associated with endometriosis. The cesarean delivery rate was significantly higher in the endometriosis group than in the non-endometriosis group even when excluding cases with antenatal obstetric complications that could increase the risk of cesarean delivery.

CONCLUSION: Women with endometriosis have a significantly higher risk of adverse pregnancy outcomes even after successful conception.

236 Implementation study of early postpartum glucose tolerance test

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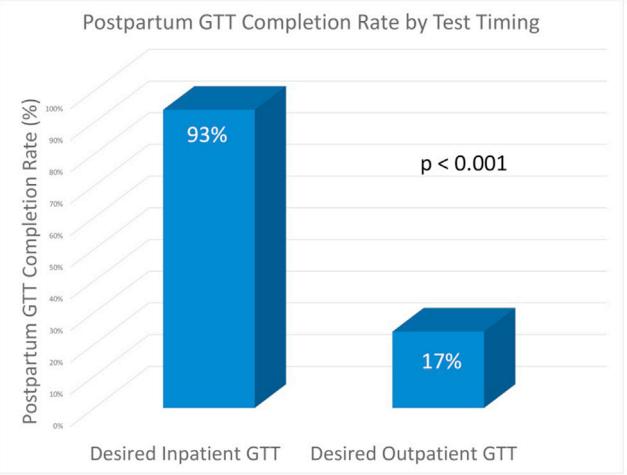
OBJECTIVE: Recent data have shown that inpatient glucose tolerance tests (GTTs) >24 hours after delivery have similar diagnostic utility as the standard of care 4-12 weeks postpartum GTT to identify prediabetes and diabetes after gestational diabetes mellitus (GDM). Given low completion of the 4-12 week postpartum GTT, we sought to assess completion rate of the inpatient postpartum GTT in clinical care.

STUDY DESIGN: A prospective, single-center implementation study was performed at a tertiary care, urban hospital. Implementation strategy included interdisciplinary clinical protocol development, staff education, electronic health record modifications, and direct patient communication. All admitted postpartum patients with GDM were eligible for enrollment in the study and inpatient GTTs unless they received steroids in the prior 7 days, were critically ill, or could not tolerate a glucose load. The primary outcome assessed was postpartum GTT completion. Individuals who elected inpatient testing were compared to those who deferred testing to 4-12 weeks postpartum.

RESULTS: Between June 2022 and July 2023, 94% (161/171) of patients with GDM receiving postpartum care at our center were eligible for inpatient postpartum GTTs. Following implementation of the inpatient GTT option, 75% (n=120) of eligible postpartum patients elected inpatient testing. Postpartum GTT completion was significantly higher among those who elected inpatient GTTs compared to those who deferred testing (93% v 17%, p< 0.001, Figure). Maternal characteristics did not differ between those who desired inpatient GTTs and those who deferred testing except that those requiring medication management for GDM were more likely to elect inpatient GTTs (p=0.01). Among those whose GTT was deferred, 76% cited personal preference, 5% cited medical recovery needs, and 19% were not offered early testing. Postpartum visit attendance did not differ by timing of the GTT (57% v 59%, p=0.90).

CONCLUSION: When postpartum GTTs are offered as part of routine inpatient care after GDM, >90% test completion can be achieved with simple implementation strategies.



237 Mifepristone as an adjunct to transcervical balloon for labor induction (MiLI): a randomized controlled trial

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OBJECTIVE: Additional options for outpatient cervical preparation prior to term labor induction are needed. Mifepristone decreases induction times by nearly half in the second trimester when used for cervical preparation. We sought to assess uterine and fetal heart tracing (FHT) response to mifepristone in term, inpatient, labor induction.

STUDY DESIGN: We conducted an exploratory, unmasked, randomized controlled trial that enrolled nulliparas 18 to 45 years old at 37 to 42 weeks' gestation undergoing induction with a transcervical balloon. Participants were randomized to receive either oral mifepristone 200 mg or oral misoprostol 50 mcg within three hours of balloon placement. Clinicians managed labor and delivery using standard care. We assessed presence of uterine contractions while the balloon was in place, and uterine tachysystole and category II FHT in the 12 hours following study medication and induction duration.

RESULTS: We enrolled and randomized 30 participants between July 2022 and April 2023. Of the participants who received misoprostol, 86% received one dose and 14% received two doses. In the 12 hours after medication administration, participants who received mifepristone had a median number of contraction 38% lower than those who received misoprostol (p< 0.001) and zero incidence of tachysystole versus five among those who received misoprostol (p=0.04). No category II FHT occurred in either group in the first 12 hours after medication administration. Compared to misoprostol, mifepristone had longer median times with a balloon (2.6 hours, p=0.01) and to complete dilation (8 hours, p=0.01), with a similar proportion delivering by 24 hours (p=0.45).

CONCLUSION: In this exploratory study, when used with a balloon at term, compared to misoprostol, mifepristone induced fewer median number of contractions and less tachysystole in the 12 hours following administration. Category II FHT did not occur in the 12

hours following medication administration in both groups. These data may help inform future studies on the safety and efficacy of outpatient mifepristone for pre-induction cervical preparation.

Table 1. Obstetric and neonatal outcomes among participants who were randomized to receive mifepristone 200 mg versus misoprostol 50 mcg in conjunction with a transcervical balloon.

Obstetric outcomes	Mifepristone N=15	Misoprostol N=15	P-value
Hours from balloon to first medication, median (Q1-Q3)	1.0 (0.0-2.0)	0.5 (0.0-1.0)	0.17
Hours balloon in place, median (Q1-Q3)	12.0 (11.8-12.7)	9.4 (5.0-12.0)	**0.01**
Number of uterine contractions with balloon in place, median (Q1-Q3)	103 (68-156)	112 (84-186)	0.44
Rate of contractions per hour, median (Q1-Q3)	9 (6-13)	15 (9-17)	**0.02**
Number of uterine contractions 12 hours after medication administration, median (Q1-Q3)	123 (77-162)	197 (169-238)	**<0.001**
Rate of contractions per hour, median (Q1-Q3)	10 (6-14)	16 (14-20)	**<0.001**
Uterine tachysystole, n (%)			
12 hours after medication administration	0	5 (33.3)	**0.04**
Total labor duration	1 (6.7)	5 (33.3)	0.17
Fetal tachycardia (total labor duration) n (%)	6 (40.0)	4 (26.7)	0.70
Late decelerations (total labor duration) n (%)	13 (86.7)	11 (73.3)	0.65
Category 2 fetal heart tracing (total labor duration), n (%)	13 (86.7)	13 (86.7)	1
Time (hours) from medication to			
Complete cervical dilation, median (Q1-Q3)	24.0 (16.0-33.0)	16.0 (11.0-22.0)	**0.01**
Birth, median (Q1-Q3)	26.0 (21.0-39.0)	19.0 (13.0-26.0)	**0.04**
Postpartum transfer, median (Q1-Q3)	29.0 (24.0-41.0)	21.0 (15.0-32.0)	**0.04**
Birth by 24 hours after medication administration, n (%)	6 (40.0)	8 (57.1)	0.45
Cesarean birth, n (%)	5 (33.3)	2 (13.3)	0.68
Operative vaginal birth, n (%)	1 (6.7)	1 (6.7)	0.68
Oxytocin augmentation, n (%)	14 (93.3)	13 (86.7)	1
Maximum dose (milliunits/minute), mean (SD)	12.3 (10.4)	7.2 (6.0)	0.14
Total duration (hours), mean (SD)	14.5 (11.5)	11.8 (7.5)	0.47
Postpartum hemorrhage, n (%)	3 (20.0)	2 (13.3)	1
Intraamniotic infection (IAI), n (%)	4 (26.7)	3 (20)	1
Composite of severe maternal morbidity, n (%)*	0	1 (6.7)	1
Neonatal outcomes			
Meconium-stained amniotic fluid, n (%)	1 (6.7)	4 (26.7)	0.33
Neonatal cord gas (arterial pH), mean (SD)	7.16 (0.06)	7.17 (0.06)	0.90
Neonatal Apgar score <7			0.17
1 minute	5 (33.3)	1 (6.7)	
5 minutes	1 (6.7)	0	
Admission to neonatal intensive care unit, n (%)	3 (20)	0	0.22
Respiratory distress, IAI	1 (6.7)		
Hypoglycemia, undiagnosed fetal anomaly	1 (6.7)		
Hypoxic ischemic encephalopathy, shoulder dystocia	1 (6.7)		
Composite of severe neonatal morbidity, n (%)^	3 (20)	0	0.22

Q1, quartile 1; Q3, quartile 3; SD, standard deviation
Continuous variables compared using Mann Whitney U test and categorical variables compared using Fisher's exact test. Differences considered statistically significant using two-sided tests (P-value <0.05).
*Composite of severe maternal morbidity defined by CDC indicators
^Composite of severe neonatal morbidity up to 7 days of life defined by the California Perinatal Quality Care Collaborative

238 Optimal timing of delivery in pregnancies complicated by pregestational diabetes: a population-based study

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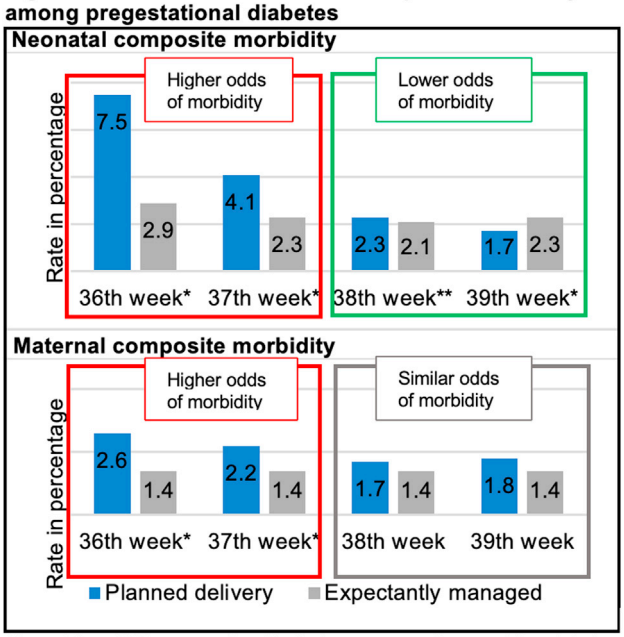
OBJECTIVE: The American College of Obstetricians and Gynecologists recommend delivery 36 0/7-39 6/7 weeks for pregnancies complicated with pregestational diabetes mellitus (PGDM) based on limited data. Our objective was to assess neonatal and maternal morbidity at birth for each week of gestation in pregnancies complicated with PGDM to determine risk versus benefit between 36 0/7-39 6/7 weeks.

STUDY DESIGN: This was a population-based cohort study of non-anomalous, singleton, live births complicated by PGDM between 36 and 41 completed weeks using data from the U.S. Natality Vital Statistics (2015-2021). Planned delivery group were births at each completed week from 36 to 39 weeks that had a labor induction or pre-labor cesarean delivery, excluding spontaneous labor. Expectant management group included all births that delivered on or after the following week (i.e., planned birth at 36 0/7-36 6/7 was compared to all births ≥ 37 0/7 weeks). The primary outcomes were neonatal and maternal adverse composites (Figure 1). These outcomes were compared between both groups at each week using multivariable analyses.

RESULTS: There were 173,822 births. Before 38 weeks, planned delivery had higher odds of neonatal morbidity than those expectantly managed (planned 36 weeks births: 7.5% vs expectant births ≥37 weeks: 2.9%, aOR 1.81, 95% CI 1.61-2.04; planned 37 weeks birth: 4.1% vs expectant births ≥38 weeks: 2.3%, aOR 1.34, 95% CI 1.21-1.48). Planned delivery at 38 weeks and 39 weeks had lower odds of neonatal morbidity than those expectantly managed (38 weeks: 2.3% vs ≥39 weeks 2.1%, aOR 0.88, 95% CI 0.77-0.99; 39 weeks: 1.7% vs ≥40 weeks: 2.3, aOR 0.71, 95% CI 0.61-0.83). Planned delivery at ≥38 weeks had similar odds of maternal morbidity to those expectantly managed.

CONCLUSION: For pregnancies complicated with PGDM, planned delivery at 38 0/7-39 6/7 weeks had lower odds of neonatal morbidity and no difference in maternal morbidity compared to expectant management. This data suggests optimal delivery timing for pregnancies with PGDM is 38 0/7-39 6/7 weeks. A randomized trial is needed to confirm this finding.

Figure 1: Neonatal and maternal composite morbidity among pregestational diabetes



Neonatal morbidity composite: 5-min Apgar score <5, neonatal assisted ventilation use >6 hours, neonatal seizures, 10-min Apgar score =0, and neonatal death
Maternal morbidity composite: third- and fourth-degree perineal lacerations, maternal ICU admission, maternal transfusion, and unplanned hysterectomy.
*Adjusted *P*<0.05 for maternal age, BMI, chronic hypertension, hypertensive disease of pregnancy, nulliparity, SGA, and LGA
**aOR 0.88, 95% CI (0.77-0.99)

239 Perinatal outcomes of myelomeningocele by mode of delivery in the United States

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OBJECTIVE: The optimal mode of delivery for fetuses with myelomeningocele remains uncertain. Our study aimed to compare perinatal outcomes of newborns with myelomeningocele by mode of delivery in a contemporary United States (US) cohort.

STUDY DESIGN: A retrospective cohort used population-based data from the US Natality Database on live singleton births complicated by myelomeningocele (2017-2021). Data was stratified to vaginal versus planned cesarean delivery. Cases delivered by cesarean after a failed trial of labor or unknown trial of labor attempt were excluded. The primary outcome was adverse perinatal composite, including preterm birth < 37 and < 34 weeks, chorioamnionitis, 5-minute Apgar score < 3, NICU admission, immediate and >6 hour assisted ventilation use, surfactant use, neonatal seizures, and neonatal mortality. Our secondary outcome included each component of the composite. Neonatal death was defined at the time of the birth certificate reporting. Multivariable logistic regression compared outcomes between vaginal and cesarean groups, adjusting for potential confounders.

RESULTS: Of the 13,368,848 births included, 1,559 (0.012%) were affected by myelomeningocele. Delivery mode was planned cesarean in 939 (60%) and vaginal in 492 (32%). Examining gestational age at birth in newborns with myelomeningocele, 457 (29%) were < 37 weeks, and 179 (39%) < 34 weeks. Vaginal birth was associated with lower odds of adverse perinatal composite compared with planned cesarean birth (Table 1). Evaluating individual components of the composite, vaginal delivery was associated with a higher rate of chorioamnionitis and planned cesarean delivery was associated with high rate of respiratory adverse outcomes. Additionally, vaginal delivery was associated with higher odds of seizures and neonatal death compared to planned cesarean delivery.

CONCLUSION: Patient counseling on delivery planning for pregnancies complicated by myelomeningocele should include a discussion of potential adverse outcomes individualized to patients in the shared-decision-making process.

Table 1. Perinatal outcomes of births complicated by myelomeningocele by mode of delivery

Outcomes	Vaginal delivery N=492	Planned cesarean delivery N=939	*P*	aOR, 95% CI*
Perinatal adverse composite	376 (76.4%)	881 (93.8%)		0.21 (0.15-0.30)
Mean GA at delivery, weeks	37.4±3.8	36.6±3.1	<0.001	
Preterm birth <37 weeks	104 (21.1%)	330 (35.1%)		0.52 (0.40-0.67)
Preterm birth <34 weeks	48 (9.8%)	122 (13.0%)		0.80 (0.57-1.14)
Mean birthweight	2944.1±791.2	2855.3±709.7	0.031	
Chorioamnionitis	11 (2.2%)	7 (0.8%)		3.04 (1.17-7.90)**
5-minute Apgar score <3	23 (4.7%)	10 (1.1%)		4.56 (2.15-9.65)**
NICU admission	335 (68.1%)	854 (91.0%)		0.21 (0.16-0.28)
Immediate ventilation use	86 (17.5%)	243 (25.9%)		0.61 (0.46-0.81)
Assisted ventilation for >6 h	35 (7.1%)	112 (11.9%)		0.54 (0.36-0.81)
Surfactant use	3 (0.6%)	26 (2.8%)		0.22 (0.06-0.72)**
Seizures	6 (1.2%)	4 (0.4%)		2.89 (0.81-10.27)**
Infant transferred	180 (36.6%)	245 (26.1%)		1.56 (1.23-1.98)
Neonatal death	23 (4.7%)	8 (0.9%)		5.71 (2.53-12.86)**

*Adjusted for nulliparity, assisted reproductive technology use, smoking, and private insurance

**Only OR due to low outcome rate

240 Isthmocele in patients with history of cesarean delivery followed by pregnancy complicated with placenta accreta

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OBJECTIVE: Isthmocele, a complication of Cesarean Delivery (CD), is associated with postmenstrual spotting, secondary infertility, cesarean scar pregnancies, and abnormal placentation. The extent isthmocele is associated with development of placenta accreta spectrum (PAS) is unknown and existing data is mostly retrospective. This study aims to determine the relationship between isthmocele and development of PAS.

STUDY DESIGN: A retrospective study was conducted at a National Accreta Center from January 1, 2012 through September 30, 2022. All patients with a history of CD and confirmed PAS were identified and compared to patients who did not develop PAS and underwent repeat CD. Ultrasounds were reviewed for presence, size, and appearance of isthmocele, as well as associated prenatal and demographic information. Statistical analysis included T test and Chi square with $P < 0.05$ considered significant when comparing the two study groups.

RESULTS: We identified 137 patients with a history of CD who went on to develop PAS. Among those who had early ultrasound images for review, there were 23 patients who developed PAS after CD compared to 70 patients who had normal placentation. There were no differences in age and number of prior CDs across study groups. Patients who developed PAS were nearly 6 times as likely to have an isthmocele on early US ($p=0.002$). Notably, every patient with early implantation in the lower half of the uterus ultimately developed PAS whereas those patients with implantation in the upper half of the uterus did not irrespective of isthmocele diagnosis.

CONCLUSION: Isthmoceles diagnosed on early US are associated with a significantly increased risk of PAS. Our study highlights the importance that accurate identification of early implantation in the lower uterine segment has in prediction of development of PAS in patients with history of CD. Prospective studies are critically necessary in order to evaluate isthmocele as an independent risk factor for development of PAS.

241 Efficacy of non-pharmacologic interventions for antepartum cervical ripening in term pregnancies

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OBJECTIVE: While various non-pharmacologic interventions for antepartum cervical ripening (NPACR) are widely utilized, their effectiveness remains unknown. This study sought to evaluate the effects and potential benefits of commonly used interventions for ACR for pregnant patients at term.

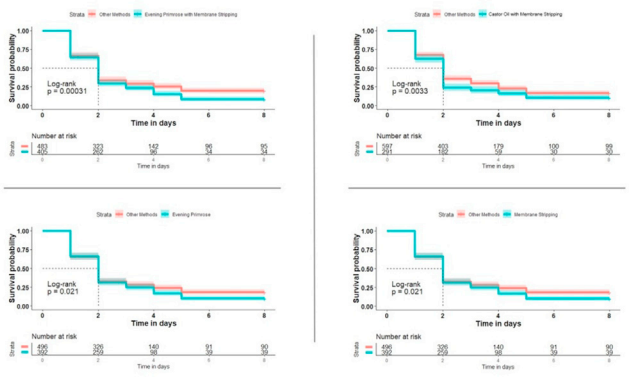
STUDY DESIGN: We conducted a multi-center, prospective observational study from 7/2021 to 7/2023 comparing all pregnant patients who received any form of NPACR within the gestational age range of

40 0/7 to 41 0/7 weeks. Interventions considered for analysis included exercise, sexual intercourse, membrane stripping (MS), diet modifications, nipple stimulation, castor oil, evening primrose, and black cohosh. Patients less than 40 0/7 weeks gestation, multiple gestations, or utilized more than one mechanical or dietary intervention were excluded. The primary outcomes included time to spontaneous labor (SL) and the need for pharmacologic induction of labor at late term as a discrete event.

RESULTS: The study included 888 patients who reported using an NPACR. Study groups' demographics were not significantly different. Patients using either evening primrose (2.6 v. 3.1 days, p=0.020) or MS (2.7 v. 3.9 days, $p<$ 0.001) had lower times to SL as compared to non-use. Combinations of MS with primrose (2.5 v. 3.2 days, $p<$ 0.001) or MS with castor oil (2.5 v. 3.0 days, p=0.01) had lower times to SL. Kaplan-Meier survival analysis also demonstrated significantly less time to SL (Figure 1.) Nipple stimulation (4.9 v. 2.8 days, $p<$ 0.001) and sexual intercourse (4.2 v. 2.7 days, $p<$ 0.001) were associated with increased times to SL. In adjusted models, a 35%, 49%, 46%, and 37% decreased risk of needing pharmacologic induction of labor was noted with use of primrose (RR 0.65, 95%CI 0.47-0.9, p=0.010), MS (RR 0.49, 95%CI 0.45-0.76, $p<$ 0.001), combinations of MS with primrose (RR 0.54, 95%CI 0.38-0.77, $p<$ 0.001), or MS with castor oil (RR 0.67, 95%CI 0.45-0.76, $p<$ 0.001), respectively.

CONCLUSION: Antepartum use of primrose oil and/or membrane stripping is a potentially efficacious method of NPACR for pregnant patients at term.

Kaplan Meier Survival Analysis for Non-Pharmacologic Methods of Cervical Ripening



242 Impact of unit acuity on postpartum hemorrhage and severe maternal morbidity

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OBJECTIVE: Many have investigated the impact of individual patient and hospital factors on maternal morbidity. We sought to understand the impact of labor and delivery unit acuity and patient volume on a patient's risk of postpartum hemorrhage (PPH) and severe maternal morbidity (SMM).

STUDY DESIGN: This is a retrospective cohort study between 3/2021 and 11/2022 at 8 hospitals and included laboring patients with viable, liveborn deliveries with an Obstetric Comorbidity Index (OB-CMI) score recorded on admission. We measured the association of unit acuity (mean OB-CMI score on a unit in a 24-hour period) on PPH and SMM using logistic regressions. Fixed effects for hospital were included to account for fixed hospital-specific characteristics, and standard errors were clustered by hospital. Models were adjusted for volume (number of deliveries in 24-hour period) and patient factors (OB-CMI, parity, and gestational age). We performed this analysis in a subset of patients at low risk of morbidity (OB-CMI $\leq$2). As sensitivity analyses, we assessed other measures of unit acuity (relative unit acuity, maximum OB-CMI, and unit presence of a patient with OB-CMI >5), and an outcome of non-transfusion SMM.

RESULTS: Of 22,159 patients included, 713 (3.2%) had SMM, and 1,921 patients (8.6%) had a PPH. In unadjusted models, mean daily OB-CMI was associated with PPH (OR 1.19, 95% CI 1.14-1.24) and SMM (OR 1.26, 95% CI 1.17-1.36). The association was not affected by delivery volume in a 24-hour period. However, after adjusting for patient factors, there was no association with SMM; the association with PPH was weak (Table 1). For the adjusted analysis in the low-risk cohort, unit acuity was not associated with PPH or SMM. This pattern persisted for alternative measures of unit acuity and for non-transfusion SMM.

CONCLUSION: In a large healthcare system, measures of unit acuity were not associated with a patient's risk of PPH or SMM after controlling for patient-level factors. This suggests individual outcomes are not significantly affected by unit acuity or volume, rather most risk is related to individual patient factors.

Table 1 - Association of mean daily unit OB-CMI with PPH and SMM

	Postpartum hemorrhage		Severe maternal morbidity	
	All deliveries N=22,159	OB-CMI ≤2 N=17,348	All deliveries N=22,159	OB-CMI ≤2 N=17,348
Mean OB-CMI	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Model with fixed effects of hospital	1.19 (1.14-1.24)	1.11 (1.05-1.18)	1.26 (1.17-1.36)	1.08 (0.91-1.3)
Model further adjusted for delivery volume[a]	1.19 (1.15-1.24)	1.11 (1.05-1.18)	1.26 (1.17-1.36)	1.08 (0.91-1.3)
Model further adjusted for delivery volume and patient factors[b]	1.05 (1.01-1.09)	1.05 (0.98-1.13)	1.01 (0.91-1.11)	1.02 (0.85-1.23)

a - Delivery volume defined as number of patients delivered on the unit in 24 hour period
b - Patient characteristics include patient OB-CMI, nulliparity, and preterm
Abbreviations: OB-CMI, Obstetric Comorbidity Index; PPH, postpartum hemorrhage; SMM, severe maternal morbidity; OR, odds ratio

243 A standardized anemia protocol and obstetric clinic-based intravenous iron center reduces anemia at delivery admission

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OBJECTIVE: Protocols for diagnosis and management of antepartum anemia increase use of intravenous (IV) iron and improve pre-delivery hematocrit (Hct). IV Fe use is limited, however, by delays in diagnosis and administration restricted to infusion centers or inpatient units. To address these issues, we launched a standardized protocol for diagnosis and management of anemia across our practice as well as an IV iron center in our obstetrics clinic. We sought to study the impact of the protocol and onsite IV iron center on rates of IV iron administration and anemia diagnosis at the time of delivery.

STUDY DESIGN: Our retrospective cohort study included patients admitted for delivery at an urban academic hospital during a 10-month period pre- and post-intervention (3/2021-12/2021 and 8/2022-6/2023) that had a Hct recorded prenatally and at delivery hospitalization. Patients with a comorbidity contributing to anemia (hemoglobinopathy, bleeding disorder, renal disease, bleeding in pregnancy) were excluded. Anemia was defined as Hct < 33% at any point during pregnancy. The primary outcome was anemia on

admission. Secondary outcomes were the receipt of IV iron and blood transfusion at delivery.

RESULTS: There were 2,704 and 2,624 patients in the pre- and post-intervention groups of which 765 (28.3%) and 998 (38.0%) had antepartum anemia (P< 0.001). Of patients with anemia, 47/765 (6.1%) and 162/998 (16.2%) received IV Fe pre- and post-intervention (P=0.001) with no significant change in the rate of PO Fe (24.5% vs. 27.5%, P=0.17). Anemia on admission was lower in the post-intervention group (34.7% vs. 39.5%, P=0.04) and persisted at a threshold of Hct < 30% (4.5% vs. 6.7%, P=0.05). The rate of transfusion also decreased during the study period (2.5% vs. 4.6%, P=0.02).

CONCLUSION: The creation of an anemia protocol and obstetrics based IV iron center drastically increased utilization of IV Fe and decreased rates of anemia and blood transfusions at delivery at our institution. Given these findings, OB practices should strongly consider integrating similar interventions into their practices.

Table 1 - Rates of anemia and treatment before and after intervention

	Pre-intervention	Post-intervention	
	All patients		
	N=2,704	N=2,624	P-value
Hct <33%	765 (28.3)	998 (38.0)	<0.001
Hct <30%	163 (6.0)	205 (7.8)	0.01
Hct <27%	29 (1.1)	28 (1.1)	0.98
GA at anemia diagnosis (weeks)	27.8 (7.7)	27.0 (8.0)	0.041
	Patients with anemia		
	N=765	N=998	
IV iron (patients)	47 (6.1)	162 (16.2)	0.001
PO iron (patients)	210 (27.5)	245 (24.5)	0.17
Anemia on delivery admission			
Hct <33%	296 (39.5)	338 (34.7)	0.04
Hct <30%	50 (6.7)	44 (4.5)	0.05
Blood transfusion	35 (4.6)	25 (2.5)	0.02

Presented as mean (SD) or N (%) as appropriate

Abbreviations: Hct, hematocrit; GA, gestational age; IV, intravenous; PO, *per os* (oral)

244 An anemia protocol and obstetric clinic-based iron infusion center decreases disparities in IV iron access

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OBJECTIVE: Racial disparities in antepartum anemia exist with Black pregnant people experiencing 2x greater prevalence of anemia than non-Hispanic Whites. The use of protocols for the diagnosis and management of anemia increases the use of intravenous (IV) iron and delivery hematocrit, but it is unknown if all racial and ethnic groups benefit. IV iron can be difficult to access because it is often administered in IV infusion centers or inpatient. To improve access, our institution established a standardized anemia protocol and infusion center housed in the obstetrics clinic.

STUDY DESIGN: This retrospective cohort study examined patients admitted for delivery at a large academic hospital in the 10 months pre- and post-intervention (3/2021-12/2021 and 8/2022-6/2023). Patients with Hct < 33% at any point in pregnancy were included. Those with hemoglobinopathy, renal disease, and bleeding in pregnancy were excluded. Self-reported race/ethnicity data was abstracted from the EMR. The primary outcome was anemia on admission and secondary outcomes were rates of IV iron and blood transfusion during the delivery encounter.

RESULTS: There were 2,704 and 2,624 patients in the pre- and post-intervention groups respectively, including 1,772 White (78%) and 206 Black (8%). Black patients had higher baseline rates of anemia than White patients (39% vs 27%). All racial and ethnic groups saw increases in IV iron administration after the intervention (p< 0.05), with Black patients experiencing an 11-point increase compared to a 10-point increase among White patients. The rates of anemia on admission for delivery and transfusion were not statistically different for any racial or ethnic groups pre- or post-intervention but were significant for the cohort as a whole.

CONCLUSION: Implementation of a standardized anemia protocol and an obstetrics clinic-based infusion center improved access to IV iron administration for all racial and ethnic groups, including for black patients. Given the urgent need to address disparities in maternity care, practices should consider implementation of similar interventions.

Table 1 - Rates of anemia and treatment by race and ethnicity before and after intervention

	Pre-intervention (%)		Post-intervention (%)	
	All patients N=2704	With anemia N=765	All patients N= 2624	With anemia N=998
	Antepartum anemia	IV iron	Antepartum anemia	IV iron
Race				
All races	765 (28)	47 (6.1)	998 (38.0)	162 (16.2)*
White	478 (27)	26 (5.4)	592 (26)	86 (14.5)*
Black	80 (39)	10 (12.5)	113 (58)	27 (23.9)*
Asian	65 (22)	1 (1.5)	116 (35)	11 (9.5)*
Other	142 (34)	10 (7)	177 (26)	38 (21.5)*
Ethnicity				
All	739 (28)			
Non-Hispanic	576 (27)	34 (5.9)	147 (7)	113 (15.2)*
Hispanic	163 (32)	13 (8)	49 (9)	46 (21.7)*

Presented as mean (SD) or N (%) as appropriate

*=P<0.05 for pre- vs. post-intervention, Chi-square performed

Abbreviations: IV, intravenous

245 Accuracy of deep learning models in interpreting intrapartum fetal monitoring to predict fetal acidemia

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OBJECTIVE: Up to 30% of cesareans in the US are performed due to false-positive interpretations of intrapartum electronic fetal monitoring (EFM). EFM interpretation is subjective and vulnerable to bias. Novel deep learning techniques can improve complex data processing and pattern recognition in medicine. We sought to apply deep learning approaches that could interpret EFM data to predict fetal acidemia.

STUDY DESIGN: The database was created using intrapartum EFM data from 2006-2020 at a large, multi-site academic health system. We included patients ≥34 weeks with a singleton, vertex fetus with EFM data available for ≥1 hour prior to delivery and an umbilical cord blood pH result available. We excluded those with >30% missingness in EFM data. Data pre-processing removed noise and artifact. Data was divided into training and testing sets with equal distribution of acidemic cases. Several different deep learning architectures were explored, including transformers, convolutional neural networks (CNNs), and long short-term memory (LSTM) networks. The primary outcome was low cord blood pH, investigated at four clinically meaningful thresholds: 7.2, 7.15, 7.1, and

7.05. Receiver operating characteristic (ROC) curves were generated with area under the curve (AUC) assessed to determine the performance of the models.

RESULTS: A total of 124,776 fetal monitoring files were available, 35,604 had a corresponding umbilical cord gas pH result, and the final sample size was 10,176. The prevalence of the outcome in the data was 20.9% with pH < 7.2, 9.1% < 7.15, 3.3% < 7.10, and 1.3% < 7.05. The median AUC values for each deep learning model at each different pH threshold are shown in Figure 1. The best performance was achieved with the CNN multiscale model and a pH threshold of 7.10, with an AUC of 0.82 95% CI [0.82-0.83].

CONCLUSION: A novel application of deep learning methods achieves excellent performance in predicting fetal acidemia on umbilical cord blood pH. This technology could improve the accuracy and consistency of EFM interpretation to prevent unnecessary cesarean deliveries and avoidable intrapartum fetal injury.

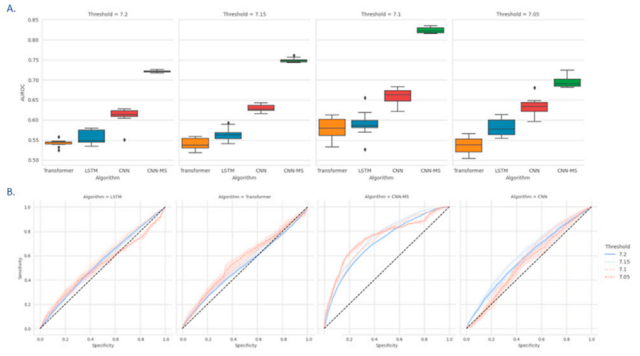

Figure 1. Panel A: box plots depicting area under the curve and 95% confidence intervals of each model type at each umbilical cord blood pH threshold. Panel B: ROC curves for each model type at each umbilical cord blood pH threshold. *LSTM: long short term memory; CNN: convolutional neural network; CNN-MS: convolutional neural network multiscale.*

246 The fragility index of randomized controlled trials in obstetrics

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OBJECTIVE: To assess the fragility index (FI) and fragility quotient (FQ) of recently published obstetric randomized controlled trials (RCTs) in order to evaluate the robustness of study results beyond conventional statistical significance testing.

STUDY DESIGN: A retrospective analysis was conducted to identify obstetric RCTs published between 2018 and 2022 in the top medical and obstetric journals, based on impact factor. Eligible studies included those with at least one statistically significant binary primary outcome. Two independent reviewers extracted data on sample size, event and control group sizes, loss to follow-up, blinding status, type of intervention, and other relevant factors. The FIs and FQs were calculated for each study.

RESULTS: A total of 245 RCTs were identified, and 31 met the eligibility criteria. The median and interquartile range FI for all studies was 6 (2-20), while the median FQ was 0.011 (0.004-0.034). Of the studies, 39% had an FI < 5. RCTs with placebo control groups demonstrated greater robustness compared to those with active control groups (5 [2-12]; P=0.028). Otherwise, no statistically significant relationships were observed between FI or FQ and other variables. Loss to follow-up exceeded the FI in 39% of the studies.

CONCLUSION: Incorporating the FI and FQ as complementary measures to traditional statistical significance testing is crucial for assessing the robustness of trial results in obstetrics. These metrics offer valuable insights into study reliability and can guide informed decisions regarding the safety and efficacy of interventions. By considering the FI and FQ, clinicians and researchers can navigate uncertainties associated with the evidence more effectively.

247 Exploring the limits of artificial intelligence for referencing scientific articles

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OBJECTIVE: To evaluate the reliability of three artificial intelligence (AI) chatbots (ChatGPT, Google Bard, and Chatsonic) in generating accurate references from existing obstetric literature.

STUDY DESIGN: Between mid-March and late April 2023, ChatGPT, Google Bard, and Chatsonic were prompted to provide references for specific obstetrical randomized controlled trials (RCTs) published in 2020, adhering to the AMA Manual of Style guidelines. RCTs were considered for inclusion if they were mentioned in a previous article that primarily evaluated RCTs published by the top medical and obstetrics and gynecology journals with the highest impact factors in 2020, as well as RCTs published in a new journal focused on publishing obstetric RCTs. The selection of the three AI models was based on their popularity, performance in natural language processing, and public availability. Data collection involved prompting the AI chatbots to provide references according to a standardized protocol. The primary evaluation metric was the accuracy of each AI model in correctly citing references, including authors, publication title, journal name, and DOI. Statistical analysis was performed using a permutation test to compare the performance of the AI models.

RESULTS: Among the 44 RCTs analyzed, Google Bard demonstrated the highest accuracy, correctly citing 13.6% of the requested RCTs, while ChatGPT and Chatsonic exhibited lower accuracy rates of 2.4% and 0%, respectively. Google Bard often substantially outperformed Chatsonic and ChatGPT in correctly citing the studied reference components. The majority of references from all AI models studied were noted to provide DOIs for unrelated studies or DOIs that do not exist.

CONCLUSION: To ensure the reliability of scientific information being disseminated, authors must exercise caution when utilizing AI for scientific writing and literature search. However, despite their limitations, collaborative partnerships between AI systems and researchers have the potential to drive synergistic advancements, leading to improved patient care and outcomes.

Summary of permutation analysis

	ChatGPT vs Google Bard			Chatsonic vs Google Bard			ChatGPT vs Chatsonic		
	ChatGPT	Google Bard	p-value	Chatsonic	Google Bard	p-value	ChatGPT	Chatsonic	p-value
Correct lead author (%)	6.8	31.8	.007	3.5	31.8	<.001	6.8	3.5	.626
Correct secondary authors (%)	4.5	22.7	.038	4.5	22.7	.022	4.5	4.5	1.00
Correct publication title (%)	18.2	68.2	<.001	15.9	68.2	<0.001	18.2	15.9	1.00
Correct journal name (%)	40.9	63.6	.053	29.5	63.6	.006	40.9	29.5	.358
Correct DOI (%)	2.3	38.6	<.001	0	38.6	<.001	2.3	0	1.00
Partially correct reference (%)*	52.3	84.1	.002	31.8	84.1	<.001	52.3	31.8	.063
Completely correct reference (%)	2.3	13.6	.122	0	13.6	.030	2.3	0	1.00

DOI: digital object identifier.
*If any component of the reference was correct

248 Changes in low-dose aspirin eligibility and use among nullips after updated USPSTF guidance

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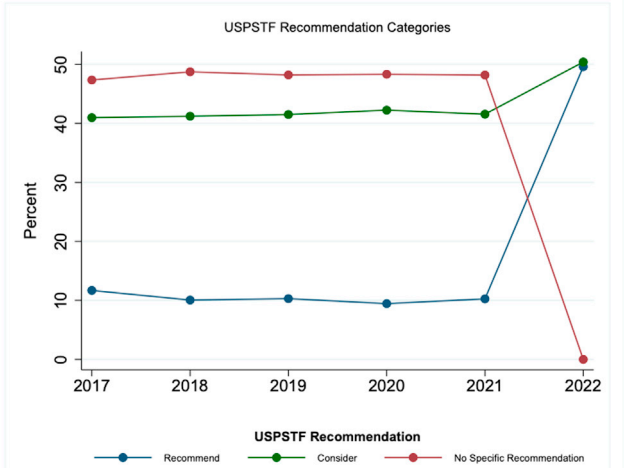
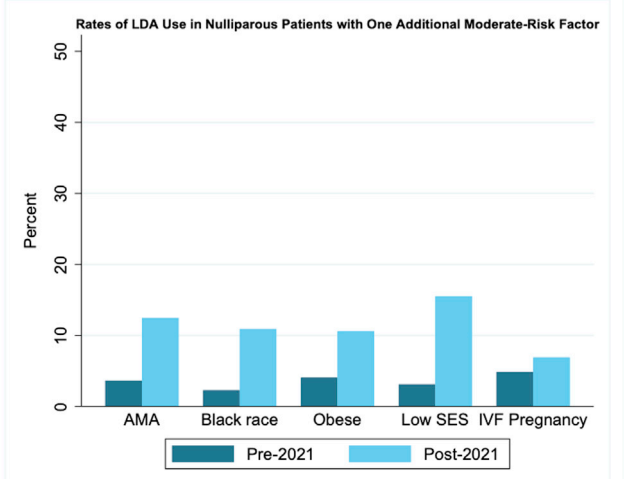
OBJECTIVE: The USPSTF recommends low-dose aspirin (LDA) for patients at risk of preeclampsia. Guidance from 2014 was updated in 2021, expanding recommendations for LDA. We sought to determine how the updated recommendation changed LDA use.

STUDY DESIGN: Retrospective cohort study of nulliparous patients with ≥2 moderate-risk factors and no high-risk factors delivering at ≥24 weeks gestation from 2017-2022 at four hospitals in one healthcare system. Patients were included if they established care before 14 weeks. USPSTF risk factors and aspirin use were obtained from the medical record. The primary outcome was LDA use, determined by presence on the medication list. Analyses used chi square test, with $p< 0.05$ considered significant.

RESULTS: The cohort included 31,555 patients, of whom 19,070 (60.4%) had risk factors for which LDA was recommended or should be considered. Of 5,473 patients for whom LDA was recommended, only 1,431 (26.2%) had use documented; this rate was 678/13,597 (5.0%) for patients in whom LDA should be considered. There was a significant change the makeup of USPSTF categories before and after the 2021 recommendation ($p< 0.001$, Figure). In 2022, 5,633 patients delivered; 2,369 (42.1%) patients had a new recommendation for LDA and 14.8% of these had LDA listed; 2,625 (46.6%) had a new indication for considering LDA and only 4.1% had LDA listed. Among nulliparous patients with no high-risk and one additional moderate-risk factor (to nulliparity), rates of LDA use increased after the updated guidelines: Medicaid insurance (as a proxy for lower income) (13.0 vs 2.0%, $p< 0.001$), advanced maternal age (12.4 vs 3.8%, $p< 0.001$), Black race (as a proxy for racism)(10.7 vs 2.7%, $p< 0.001$), and obesity (10.6 vs 3.6%, $p< 0.001$). There was no change for IVF pregnancies (6.3 vs 4.0%, $p=0.19$).

CONCLUSION: Despite updated recommendations from USPSTF in 2021 expanding recommendations for LDA, documented use of LDA remains low. The additional single moderate risk factors associated with the lowest absolute LDA rates were Black race, obesity, and IVF pregnancy.





249 Assessing the social network structure of high risk patients: A novel research method in obstetrics

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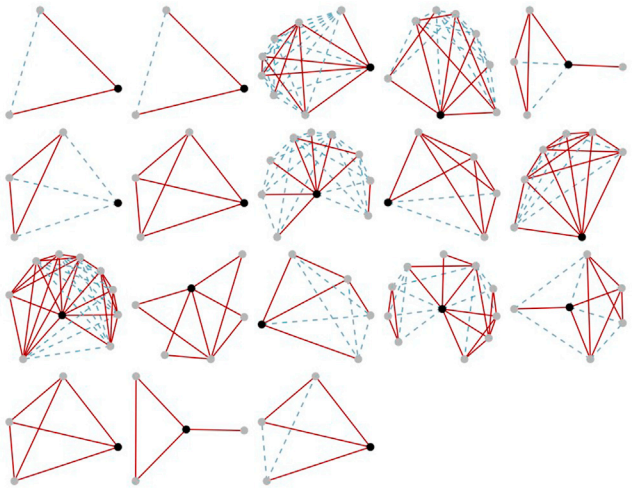
OBJECTIVE: Maternal psychosocial health has been associated with adverse pregnancy outcomes including preterm birth. Quantitative tools to measure an individual's social network have been demonstrated to predict health outcomes (e.g. stroke) in nonpregnant patients. The Surgeon General's 2023 advisory on the loneliness epidemic highlights the research gap in social connectivity as a possible determinant of obstetric outcomes. The objective of this study was to investigate the applicability of a novel quantitative approach to assess social networks within a population of high risk pregnant patients.

STUDY DESIGN: Patients with asthma participating in a longitudinal pregnancy cohort were interviewed in their second or third trimester of pregnancy using an established social network analysis instrument (PERSNET). PERSNET measures components of one's social

network including density (how each tie in the network is related to all ties), constraint (closeness of people to the participant and each other), and size (number of ties). Statistical and graphical analyses were generated using R software.

RESULTS: Eighteen participants completed the PERSNET survey with 100% participation rate. All reported active asthma with medication use in the last three months. The mean age of participants was 28.7 years (SD 3.73). The majority (n=16, 88.9%) reported non-white race. Black race was reported by n=7 (38.8%) and Hispanic ethnicity by n=7 (38.8%). Thirteen (72.2%) completed some college or less. Network structures are depicted in Figure 1. Mean (SD) network density was 0.82 (0.253), mean (SD) constraint was 0.67 (0.22), and the range of network size was 2-12 people [median (IQR) 4, 3.75].

CONCLUSION: Social network structure among a high risk pregnant cohort was highly variable in size, density, and interconnectedness. Smaller networks tended to be more interconnected. Because social capacity may influence health behaviors, these findings represent a rigorous way to capture a critical part of the prenatal social environment. Future research is needed to explore how social network structures may impact reproductive outcomes.



250 Preimplantation genetic testing (PGT) for non-homologous Robertsonian translocation carriers: a twelve-year laboratory experience

Katrina Merrion[1], Carrie Chou[2], Jeannie Klavanian[2], Emily Boniferro[2], Erin Armenti[2], Sarah Stueber[2], Jeffrey Meltzer[2], Karine Hovanes[2], Peter Benn[3]

[1]Natera, San Carlos, CA, [2]Natera, Inc., Austin, TX, [3]University of Connecticut Health Center, Farmington, CT

OBJECTIVE: Report preimplantation genetic testing (PGT) results for trophectoderm (TE) embryo biopsies from patients carrying a balanced non-homologous Robertsonian translocation (RT).

STUDY DESIGN: Retrospective review of results from single nucleotide polymorphism-based PGT performed at a lab between 2011-2023. Results were classified as 'euploid' for normal or balanced chromosomes; 'unbalanced/uniparental disomy (UPD)' for monosomy or trisomy of a translocation chromosome (with or without unrelated aneuploidy) or if UPD for an imprinted translocation chromosome was present; or 'unrelated aneuploid' for aneuploidy that did not involve a translocation chromosome.

RESULTS: PGT results were obtained on 2157/2240 (96.3%) TE biopsies from 301 patients who completed 436 in vitro fertilization cycles (Table 1). Mean maternal age was 34.8 years (range 22-44). Female RT carriers produced a higher rate of embryos with unbalanced translocations compared to male carriers (37.0% vs. 15.8%; p< 0.05%). The rates for normal/balanced embryos were 37.1% for female carriers versus 46.9% for male carriers (p< 0.05%).

CONCLUSION: The risk for unbalanced RTs is dependent on which parent is the carrier. Despite the high rates of abnormality, carriers of non-homologous RTs can be reassured that they can produce normal/balanced embryos.

Table 1. TE results by translocation type.

Type of translocation	IVF-PGT cycles (n)	Mean MA (years)	Embryo biopsies (n)	Euploid (normal or balanced) (%)	Unbalanced/ UPD (%)	Unrelated Aneuploid (%)
Mat 13;14	164	35.4	749	36.7	36.3	27.0
Mat 13;15	11	33.8	42	31.0	38.0	31.0
Mat 13;22	1	27.6	2	50.0	50.0	0.0
Mat 14;15	16	37.5	47	42.6	23.4	34.0
Mat 14;21	42	35.6	228	37.3	40.3	22.4
Mat 14;22	8	31.2	42	40.5	42.8	16.7
Mat 15;21	1	44.2	2	50.0	50.0	0.0
Mat 15;22	3	30.8	19	36.8	42.1	21.1
Mat 21;22	1	32.1	1	100.0	0.0	0.0
Pat 13;14	132	33.7	720	47.4	15.2	37.4
Pat 13;15	6	33.7	13	23.1	23.1	53.8
Pat 13;21	9	34.7	29	27.6	31.0	41.1
Pat 13;22	6	31.6	49	73.5	8.2	18.3.
Pat 14;15	2	33.7	8	25.0	12.5	62.5
Pat 14;21	23	36.3	125	49.6	19.2	31.2
Pat 14;22	5	33.4	34	44.1	3.0	52.9
Pat 15;21	4	35.1	35	28.6	17.1	54.3
Pat 15;22	2	38.4	12	33.3	33.4	33.3
TOTAL	436	34.8	2157	41.8	26.9	31.3

MA: Maternal Age; Mat: Maternal; Pat: Paternal

251 LEEPs and cones: Do they impact labor induction duration?

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OBJECTIVE: Cervical excision via loop electrocautery procedure (LEEP) or cold knife cone (CKC) is associated with subsequent preterm birth, but these procedures may also lead to cervical scarring and stenosis. We aimed to evaluate how the post-excision healed cervix functions during labor in response to induction.

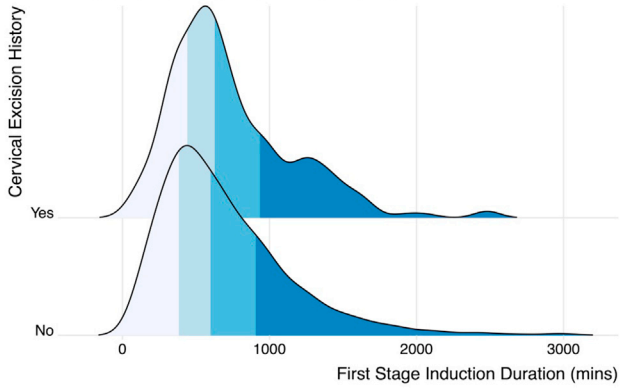
STUDY DESIGN: This is a retrospective cohort study of pregnant patients being induced at a single academic center between 7/2013 and 10/2018. We compared duration of the 1st stage of labor (from induction start to full dilation) among patients with and without prior cervical excision (via LEEP or CKC). We excluded those with multiple gestation, spontaneous labor, or urgent delivery before full dilation. The primary outcome was time from induction initiation to full dilation. Data were analyzed using Chi square, Fischer's exact, Mann-Whitney-U test, and non-parametric signed rank test.

RESULTS: A total of 228 patients with history of cervical excision (223 LEEPs, 6 CKCs) and 5995 patients without such history were studied. Patients with excision history were more likely to be White (82% vs 69%), to have a short cervix (4.4% vs 1.3%), and to have less favorable starting cervical dilation (2.25 cm [IQR 1-3.5] vs 2.5

cm [IQR 1-4]); clinical features (such as median parity) and obstetrical outcomes (such as median blood loss) were similar between groups. Median duration of 1st stage of labor was longer among patients with vs without excision history (Figure: 624 min [IQR 439-935] vs 600 min [IQR 385-907], pvalue < 0.001).

CONCLUSION: Patients with a history of cervical excision experienced a longer duration of the first stage of labor compared to those without excision history. Future studies, such as in the setting of induction failure, may help further explore the differential impact of cervical excision on subsequent labor, possibly informing individualized induction guidelines for these patients.

Figure 1: Ridgeline density plots of the distribution of 1st stage labor durations among patients with and without history of cervical excision procedure



252 Prenatal styrene and ethylbenzene exposures are associated with decreased birth weight and head circumference

Tal Michael[1], Amalia Levy[1], Elkana Kohn[2], Sharon Daniel[1], Ariela Hazan[2], Matitiahu Berkovitch[2], Ori Hochwald[3], Liron Borenstein[4], Moshe Betser[5], Miki Moskovich[5], Ayelet Livne[6], Rimona Keidar[6], Frieda Schwartsburd[7], Adi Malkoff[8], Zeev Weiner[9], ido Solt[10]

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OBJECTIVE: Prenatal exposure to aromatic hydrocarbons has been associated with adverse health outcomes in animal studies; However, there have been limited studies of the associations between prenatal exposure to these compounds and measurable outcomes in human newborns.

STUDY DESIGN: We recruited pregnant women who lived in urban areas in Israel and were admitted to the delivery rooms of two major hospitals between 2016 and 2020. The primary outcomes were newborn birthweight, length, and head circumference, measured by neonatologists in delivery rooms. Urine samples were collected from all mothers within 24 hours of admission for further BTEX analysis.

RESULTS: A total of 883 women and their term-born infants (n(%) 462 (52%) male; mean±SD infant gestational age, 39.5±1.3 weeks) were recruited; Traces of toluene, xylene, and ethylbenzene metabolites were detected in all samples and were lower than those previously reported among worldwide population, with mean (±SD) concentrations of benzylmercapturic-acid (23.8±51.5 μg/g creatinine); methylhippuric-acid (292.5±527.2 μg/g creatinine); and phenylglyoxylic-acid (555.2±737.7 μg/g creatinine), respectively. An increase in phenylglyoxylic-acid levels was found to be associated with a decrease in males birthweight (b= -40.856 g; 95% confidence interval (CI) -73.073 to -8.639). Further exclusion of newborns considered small and large for gestational age resulted in an association between an increase in phenylglyoxylic-acid levels and head circumference of males (b= -.07 cm; 95%CI:-.146 to -.005).

CONCLUSION: Prenatal exposure to Styrene and Ethylbenzene in relatively low levels is associated with decreased birth weight and head circumference among males by a mechanism that is yet to be fully understood and requires further analysis.

253 Aspirin dose effect on uterine artery Doppler in patients stratified by biomarkers: ASPERIN secondary analysis

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OBJECTIVE: To determine if there is a dose-effect of aspirin on uterine artery Doppler over time, when groups were stratified by Fetal Medicine Foundation (FMF) criteria to define risk for preeclampsia.

STUDY DESIGN: This was a planned secondary analysis of The ASpirin in Placental and maternal Endothelial cell Regulation IN preeclampsia (ASPERIN) trial which enrolled a study population as high versus low risk based on the United States Preventive Services Task Force (USPSTF) major criteria. We reclassified the entire population by FMF guidelines with a cutoff of less than 1:100 for further analysis. Criteria for discrimination included mean arterial pressure (MAP), uterine artery pulsatility index (UtA PI), and clinical factors in the first trimester before initiation of treatment. High risk subjects were randomly assigned to 81 mg versus 162 mg daily aspirin in the parent trial. UtA PI was measured at baseline to define risk and subsequently at 20-22 weeks and 28-32 weeks. A mixed model analysis was performed to assess for dose-response, with ANOVA, T test and nonparametric analyses performed where applicable.

RESULTS: Of the 209 patients enrolled in the ASPERIN Trial, 57 assigned to 81 mg, 54 to 162 mg aspirin, and 16 controls were restratified as high risk. Demographics differed between subgroups (see table). In the model, significant interactions were identified in UtA PI related to treatment group (p=0.0002), risk calculation (p=< 0.0001), and time, (p< 0.0001). First and second trimester UtA PI did not differ between aspirin subgroups by dose (p=0.160 and p=0.153, respectively). A significant difference was noted in the third trimester between the subgroups (p=0.024). The difference between enrollment and third trimester UtA PI was significantly greater in the 81 mg group versus 162 mg (0.766 and 0.573, respectively, p=0.040).

CONCLUSION: A dose-effect of aspirin on UtA PI was identified over time, supporting evidence this biomarker is informative in assessing treatment response when discriminating candidates for therapy based on FMF criteria.

Demographics and Select Outcomes	Control (n=16)	Aspirin 81mg (n=57)	Aspirin 162mg (n=54)	P value
Age	26.4 ± 7.1	29.5 ± 5.9	30.1 ± 6.2	0.113
Gravidity, Median [IQR]	1 [1-1.75]	2 [1-3]	2 [1-4]	0.002*
Parity, Median [IQR]	0 [0-1]	1 [0-2]	1 [0-2]	0.004*
Enrollment BMI	35.6 ± 9.3	35.9 ± 9.8	35.8 ± 9.6	0.993
Race (self-reported)				0.485
American Indian or Alaska Native	0	0	1	
Asian	0	2	0	
Black or African American	4	8	10	
Native Hawaiian or Pacific Islander	0	0	1	
White	12	44	34	
More than one race	0	1	2	
Not reported	0	2	6	
Ethnicity (self-reported)				0.320
Hispanic	0	7	7	
Non-hispanic	16	50	47	
Risk Factor for Inclusion	N/A			
History of Preterm Preeclampsia		22	11	0.036*
Diabetes (Type 1 or 2)		15	9	0.217
Chronic Hypertension		27	35	0.064
Autoimmune Disease		2	2	0.956
Renal Disease		2	2	0.956
Tobacco use (%)	2 (12.5)	3 (5.3)	10 (18.5)	0.096
Illicit Substance use (%)	2 (12.5)	2 (3.7)	4 (7.6)	0.420
Select Outcomes				
UtA PI 20-22 wks	1.51 ± 0.60	1.20 ± 0.36	1.32 ± 0.48	0.071
UtA PI 28-32 wks	0.90 ± 0.19	0.93 ± 0.30	1.16 ± 0.61	0.043*
Delta UtA PI, Enrollment – 3rd tri	1.21 ± 0.54	0.78 ± 0.39	0.55 ± 0.60	<0.0001*
Gestational age at delivery (wks)	38.3 ± 1.4	36.0 ± 4.2	36.3 ± 3.9	0.148
Birthweight (grams)	3301 ± 628	3184 ± 644	2962 ± 909	0.222
Preeclampsia (n, any GA)	1	8	10	0.600
Preterm preeclampsia (n)	0	7	6	0.588

254 Social determinants of health improves prediction for postpartum readmissions due to preeclampsia

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OBJECTIVE: Strong associations exist between social determinants of health (SDOH) and preeclampsia. We hypothesize that socially disadvantaged patients are more likely to be readmitted for worsening preeclampsia in the postpartum period. The objective of this study is to compare the performance of 2 machine learning (ML) models where zip code related SDOH variables are added to the basic model.

STUDY DESIGN: This is a retrospective analysis of 146 patients who had the diagnosis of hypertensive disorder of pregnancy (HDP) in a single tertiary medical center from 2020-2023. Two supervised ML models were created using four different ML methods (Random Forest, XGBoost, Logistic Regression, and Support Vector Machines). Model 1 only utilized clinically available variables. Model 2 uses the same variables as Model 1 and the zip codes related Area Deprivation Index (ADI) and SDOH variables from Agency of Healthcare Research and Quality database.

RESULTS: Among the HDP cohort of 73 readmissions and 73 non-readmissions, 51 EMR variables and 175 zip code related variables were included in the models. The best performance was achieved using a two-sample Kolmogorov-Smirnov and correlation reduction-based feature selection method and Random Forest ML method in Model 2 (Table). Adding zip code related variables (Model 2) was able to improve the sensitivity by 65% (Model 1: 0.43; Model 2: 0.71), and area under the curve (AUC) by 30% (Model 1: 0.56; Model 2: 0.73). The top features associated with readmissions are the increase of body mass index in pregnancy, the distance from a tertiary center, the unemployment rate in the neighborhood, the percentage of non-English speakers in the neighborhood, and whether an electrocardiogram was ordered in the pregnancy.

CONCLUSION: Adding zip code related ADI and SODH variables can improve the ML model prediction. The performance of models should be further validated by a multicenter or state database. With greater insights regarding the geographic hot spots for preeclampsia readmissions, new guidelines for targeted intervention and resource allocation may be implemented.

Table: The performance comparison between ML models with and without zip code related variables

Dataset used	Feature selection method	Accuracy	AUC	Sensitivity	Specificity	PPV	NPV	AUC Increase	Sensitivity increase
EMR (Model 1)	None	0.55	0.60	0.43	0.43	0.67	0.40	-	-
	KS2+correlation reduction	0.55	0.56	0.43	0.43	0.56	0.54	-	-
	Mutual info	0.62	0.59	0.52	0.52	0.65	0.60	-	-
EMR+ADI+SDOH (Model 2)	None	0.60	0.64	0.62	0.57	0.59	0.60	14%	45%
	KS2+correlation reduction	**0.71**	**0.73**	**0.71**	**0.71**	**0.71**	**0.71**	**30%**	**65%**
	Mutual info	0.48	0.51	0.57	0.38	0.48	0.47	-14%	10%

* ADI= Area Deprivation Index, AUC= area under the curve, EMR=electronic medical record, KS2= two-sample Kolmogorov-Smirnov, NPV=negative predictive value, PPV=positive predictive value, SDOH=social determinants of health.

255 A prospective pilot study to investigate physical activity levels during pregnancy in an Irish cohort

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OBJECTIVE: Physical activity (PA) during pregnancy has been associated with decreased risks of adverse health outcomes for the pregnant woman and their babies. Attitudes toward and engagement in PA during pregnancy vary considerably among women and change pregnancy. Despite the health benefits for mothers and babies, considerable numbers of women fail to achieve the recommended levels of PA during pregnancy. The objective of this pilot study was to examine the level and types of PA participation during each trimester of pregnancy and whether research subjects meet ACOG guidelines of "moderate intensity exercise on most days of the week".

STUDY DESIGN: Of 107 recruited prospectively, 90 low-risk women attending antenatal midwifery led clinics in a tertiary maternity unit in a diverse socio-economic catchment area were included (17 incomplete questionnaires). The International Physical Activity Questionnaire (IPAQ) was administered to evaluate during pregnancy: i) whether expectant mothers meet ACOG guidelines for PA, ii) change in PA levels and iii) changes in choice of type of PA. Chi-squared and linear analysis were conducted.

RESULTS: Of 90 women over three trimesters, 16/90 (17.8%) women met ACOG exercise recommendations. Moderate exercise reduced from 30% to 20% to 16% over the first to third trimesters respectively (p=0.14). While walking rates over pregnancy did not change (but was neither moderate nor vigorous), rates of cycling, swimming

and yoga decreased. As recommended, all contact sports ended in the first trimester.

CONCLUSION: This prospective pilot study identified that the vast majority of low-risk women do not meet the ACOG guidelines for PA during pregnancy. This study also highlights the need for a larger study to gain additional understanding of PA patterns in a low-risk Irish community to develop future interventions and emhasizes the urgent need for an increase in frequency, intensity and type of PA in pregnancy in this cohort.

Table 1: 16/90 (17.78%) women who met ACOG guidelines for "moderate intensity exercise on most days of the week"

Maternal Age	Trimester	Parity	Exercise modality before pregnancy#	Exercise modality during pregnancy#
33	1	1	1, 2, 3, 4, 5	1, 4, 5, 7
35	1	1	1, 2, 4, 5, 6, 11, 12	1, 2
34	1	0	1, 2, 3, 4, 9, 11, 12	1, 2, 9
33	1	1	1, 2, 3, 11, 14	1, 2, 7
41	1	3	1, 6	1
20	2	1	1, 9	1
22	2	0	1	1
32	2	0	1, 5, 11	1, 5, 8
39	2	0	1, 2, 4, 9, 11, 12	1, 2, 4, 9, 11, 12
35	2	2	1, 5	1
29	3	1	1	1, 16
28	3	1	1	1
29	3	2	1	1
38	3	1	1, 2, 5	1, 5
32	3	2	1,2	1, 2
25	3	1	1, 3, 11	1

1= Walking, 2= Hiking, 3= Running, 4= Cycling, 5= Swimming, 6= Yoga, 7= Pilates, 8= Combined Yoga/Pilates, 9= Weight Training, 10= CrossFit, 11= Cardio based gym classes (HITT, Spinning, Zumba), 12= Weight based gym classes (Kettlebells, Bootcamp), 13= Horse-riding, 14= Team sport (Gaelic Football, Soccer, Rugby, etc), 15= Net Sport (Badminton, Tennis, etc) and 16= Other

256 Activity restriction and time from diagnosis to delivery among patients with preterm pre-eclampsia

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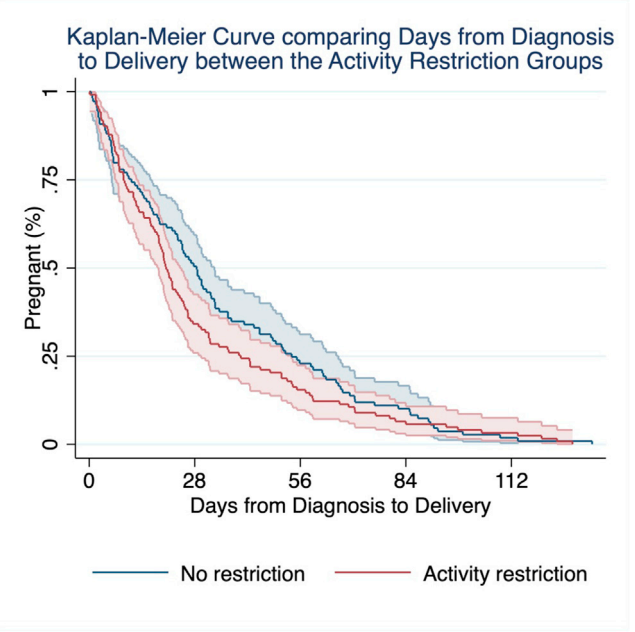
OBJECTIVE: To determine the association between activity restriction and time from diagnosis to delivery among patients diagnosed with gestational hypertension (gHTN) or pre-eclampsia without severe features.

STUDY DESIGN: This is a secondary analysis of nulliparous patients enrolled in the nuMoM2b study. Individuals with gHTN or pre-eclampsia without severe features diagnosed < 37 weeks were included. Individuals with other forms of hypertensive disorders of pregnancy (HDP) were excluded because their management is more dependent on the timing of diagnosis and severity of disease. The primary outcome was days between diagnosis and delivery. The secondary outcome was development of pre-eclampsia with severe features or eclampsia. The exposure was patient report of a recommendation for activity restriction. Cox proportional hazard and logistic regression models adjusted for gestational age at diagnosis, age, diabetes, and fetal growth restriction were performed.

RESULTS: Of 9,289 patients, 299 (3%) were first diagnosis gHTN or pre-eclampsia without severe features prior to 37 weeks; 232 (78%) responded to the survey question about activity restriction. Of respondents, 53% reported being instructed to restrict their physical activity. There was no difference in the gestational age at diagnosis between the activity restriction vs. no restriction groups: median 33.9 (IQR 30.6, 35.9) vs. median 33.1 (IQR 29.8, 36.1), p=0.72. Activity restriction was associated with an increased risk of delivery (adjusted hazard ratio 1.42 (95%CI 1.09, 1.86)) but not with the development of more severe disease (adjusted odds ratio 1.24 (95% CI 0.70, 2.20)).

CONCLUSION: Activity restriction was commonly recommended but not associated with an increased time between diagnosis and delivery or the development of severe features for individuals with gHTN or pre-eclampsia without severe features. The increased risk of delivery for activity restriction may represent confounding (e.g., severity) not captured by the initial diagnosis. Given the lack of evidence, larger studies are needed to evaluate the role for activity restriction in HDP.



257 Aspirated and computed cervical stiffness throughout gestation for patients with and without a pessary

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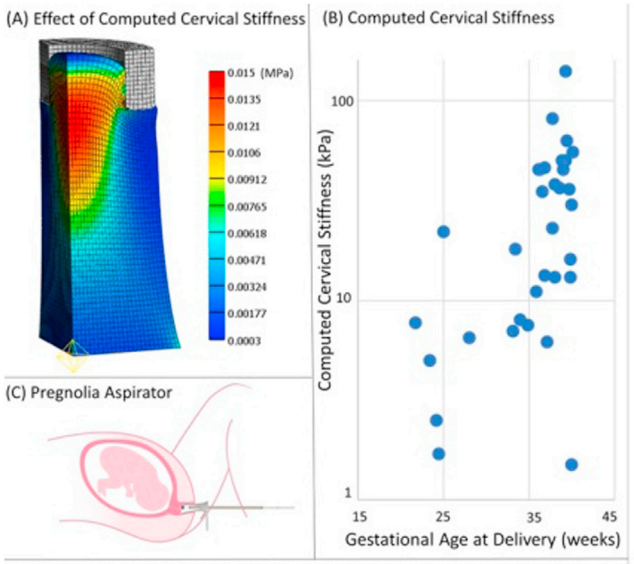
OBJECTIVE: Short cervical length is a risk factor for spontaneous preterm birth (sPTB). This study measured cervical stiffness in patients with a short cervix as an additional assessment to estimate sPTB risk. We also compared the change in cervical stiffness throughout pregnancy for patients with a short cervix with and without a pessary. Lastly, we compared cervical stiffness between patients who delivered preterm versus term.

STUDY DESIGN: Single-site ancillary study to a randomized-controlled trial of usual care versus pessary placement among patients with a singleton gestation and a short cervix (≤2 cm). Aspirated cervical stiffness (aCS) was measured at baseline visit 1 (16w-23w6d) using the Pregnolia aspiration device and again at visit 2 (26-30w0d). At both visits, the cervical shape was obtained using transvaginal ultrasound. Computer-aided design and finite element analysis software combined these measurements with aCS to generate computed CS (cCS). Welch's t-tests compared the baseline aCS and cCS and the difference in visit 2 and baseline aCS and cCS between patients in each treatment group. Lastly, aCS and cCS were compared between patients who delivered term or preterm, regardless of treatment.

RESULTS: At baseline, there was no difference in aCS between patients randomized to pessary (n=17) or usual care (n=16)

(aCS=78mbar ± 40 vs 76mbar ± 39, p >0.05). At visit 2, patients randomized to pessary (n=10) had an increase in aCS and cCS compared to baseline value, while the patients randomized to usual care (n=8) had a decrease. However, this result was not statistically significant (aCS=7mbar ± 40 vs -18mbar ± 28 p >0.05; cCS=8kPa ± 67 vs -13kPa ± 23, p >0.05). Regardless of the treatment group, patients who delivered before 37 weeks (n=17) had lower cCS than those who delivered at term (n=18) (cCS =18kPa ± 16 vs 38kPa ± 33, p< 0.05).

CONCLUSION: There was no significant difference in cervical stiffness between patients who received a pessary and those who did not. When not accounting for the treatment arms, patients with lower cervical stiffness delivered preterm.



A) Effect of computed cervical stiffness on cervix in finite element analysis. B) Gestational age at delivery versus computed cervical stiffness. C) Schematic of pregnolia aspirator measuring cervical stiffness. (Badir, et al., *BMC Pregnancy & Childbirth* 2020)

258 Implementation and outcomes of a stratified patient post-operative relocation protocol after fetoscopic spina bifida repair

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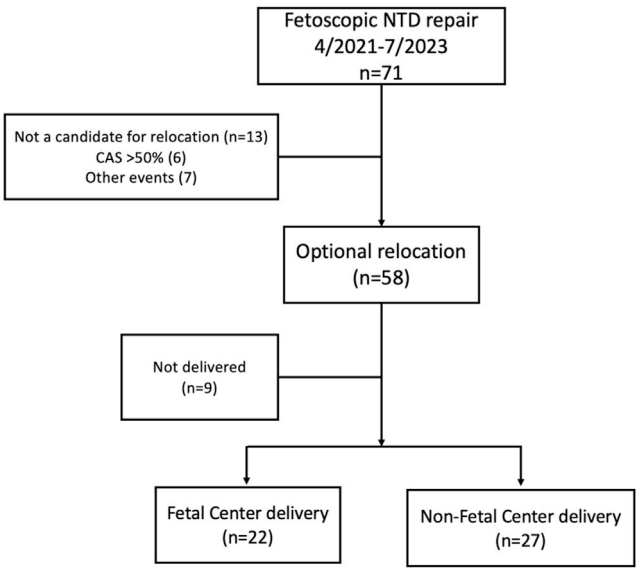
OBJECTIVE: In utero spina bifida repair has been shown to improve neonatal outcomes. Traditionally, antenatal repair requires patient relocation resulting in additional patient financial burden and disruption of family units. In 2021, we developed a protocol for post-operative assessment and safe patient relocation home with support of local institutions. Our primary objective was to assess the perinatal outcomes of this approach to patient centered care.

STUDY DESIGN: This study is a post-implementation analysis of a protocol for patient assessment and relocation after fetoscopic spina bifida repair at our fetal center from 4/2021-7/2023. After surgical recovery, patients followed up at our fetal center for 2 weeks undergoing post-operative assessment and antenatal testing. Patients were then notified if relocation to a home institution was advisable. Clinically relevant outcomes were obtained from electronic medical records.

RESULTS: During the 2-year study period, 71 patients underwent fetoscopic spina bifida repair at our fetal center. Surgical gestational age was 25 ±1 weeks with an average 4 ±1 days post operative stay. Following planned 2-week evaluation, 81% (58/71) of patients met criteria to return home, 38% (22/58) elected to deliver at our fetal center while 47% (27/58) delivered at their local institution. 18.3% (13/71) did not meet criteria for relocation and 9 patients were undelivered at time of study assessment. The average gestational age at delivery (37 [35, 38] vs 36 [34, 39] wk, p=0.54), rates of premature rupture of membranes (32% vs 33%, p=1.0), abruption (0% vs 7%, p=0.49) and vaginal delivery (45% vs 52%, p=0.78) were similar. Neonatal birthweight (2870 ± 425g vs 2670 ± 609g, p=0.18) and NICU stay (14 ± 11 vs 16 ± 20 days, p=0.45) were equivalent.

CONCLUSION: Our study shows the feasibility of implementing a standardized protocol for patient relocation home after fetoscopic spina bifida repair with equivalent perinatal outcomes. This approach provides an evidence-based, patient-centered and collaborative approach to fetal care while focusing on patient desires and optimal outcomes.



259 A comprehensive early pregnancy access clinic increases first trimester care in an underserved urban population

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OBJECTIVE: To assess the gestational age at which prenatal care (PNC) was initiated in an underserved urban population, and to compare the proportion of patients receiving first trimester PNC in a comprehensive Early Pregnancy Access Clinic (EPAC) versus traditional care model.

STUDY DESIGN: This retrospective cohort study included patients initiating PNC at multiple faculty practice sites within a large urban medical center in the Bronx, NY from February to May 2023. Our

EPAC offers multidisciplinary early pregnancy care at one location. During a single encounter, patients seen in EPAC are screened for medical comorbidities, have an ultrasound to confirm dating and viability, receive initial prenatal counseling/labs, and are scheduled for appropriate follow-up including routine obstetric care, high-risk obstetric care, or complex family planning care. Bivariate analyses comparing patient demographics and gestational age at entry into PNC by site of care were performed using Chi Square, Mann Whitney U, and t-tests. We used a multiple logistic regression model to estimate the adjusted odds ratio of attending PNC in the first trimester (< 14 weeks).

RESULTS: Of 698 patients, 392 patients were seen in EPAC and 306 patients received routine PNC at other sites. Patients in both groups were largely non-White and publicly insured. EPAC patients initiated PNC earlier than patients at traditional PNC sites (10.6 vs. 14.0 weeks, $p < 0.001$). More EPAC patients were seen in the first trimester (73.0% vs. 49.7%, $p < 0.001$). After adjusting for age, BMI, race, and preferred language, EPAC patients had a 2.76 increased odds of initiating care in the first trimester (aOR 2.76, 95% CI 1.93-3.94).

CONCLUSION: Patients who initiated PNC at EPAC were more likely to be seen at an earlier gestational age. EPAC is a novel, patient-centered approach consolidating multiple facets of early pregnancy care into a single encounter and, thereby, increasing access in the first trimester for an underserved obstetric population.

Table 1 Maternal demographics and entry into prenatal care

	EPAC (n = 392)	Routine prenatal care (n = 306)	p-value
Age	29.8 (6.1)	29.6 (5.9)	0.70
Parity	1 (0, 2)	1.0 (0, 2)	0.15
BMI	30.1 (6.9)	29.8 (6.7)	0.50
Race[a]			
Black	140 (40.0)	100 (38.0)	0.03
White	25 (7.1)	10 (3.8)	
Asian	29 (8.3)	12 (4.6)	
Other	156 (44.6)	141 (53.6)	
Ethnicity[b]			
Hispanic	167 (49.4)	129 (50.6)	0.78
Non-Hispanic	171 (50.6)	126 (49.4)	
Preferred Language			
English	302 (77.0)	225 (73.5)	0.13
Spanish	56 (14.3)	52 (17.0)	
Arabic	6 (1.5)	12 (3.9)	
Bengali	17 (4.3)	7 (2.3)	
Other	11 (2.8)	10 (3.3)	
Insurance[c]			
Private	122 (31.1)	83 (27.2)	0.25
Public	270 (68.9)	222 (72.8)	
Gestational age at entry into prenatal care (weeks)	10.6 (8.6, 14.4)	14.0 (11.7, 18.6)	<0.001
Entry into prenatal care in the first trimester (<14 weeks)	286 (73.0)	152 (49.7)	<0.001

Categorical data expressed as n (%), continuous data expressed as mean (±SD) or median (IQR)
[a]Data missing for 85 patients
[b]Data missing for 105 patients
[c]Data missing for 1 patient

260 Quantitative analysis of birth experience narratives identifies drivers of trauma among parturients with hypertensive pregnancy

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OBJECTIVE: Hypertensive disorders of pregnancy (HDP) are associated with traumatic birth experiences. We aim to identify obstetric, interactional, and relational predictors of traumatic experiences as potential targets for quality improvement.

STUDY DESIGN: Participants were recruited nationally via social media. Semi-structured interviews were conducted and transcripts were reviewed for patient-reported birth events. Analysts subjectively assessed participants' characterization of their birth experience as "positive", "neutral", or "negative". Logistic regression was used to predict birth experience based on intrapartum events. Sentiment analysis was used to quantify patterns in words and phrases with specific emotive or relational content. A custom lexicon was built from an independent training dataset of parturients recalling their self-identified traumatic births, in addition to a validated set of emotive terms representing joy, trust, anticipation, surprise, sadness, disgust, fear, and anger. Natural language processing techniques were used to extract these sentiments from participants' descriptions of their birth.

RESULTS: A total of 67 interviews were analyzed; 74.6% (N=50) of respondents had inductions, 50.7% (N=34) received magnesium, and 35.8% (N=27) were delivered preterm. None of these intrapartum events were significantly associated with a negatively framed birth story. Among people with negative birth experiences, fear was the dominant negative emotion in their birth narratives, driven by discussion of the "hospital" environment. "Medical", "emergency", "pain", and "healthy" also contributed to sentiments of Trauma and Sadness (Fig 1).

CONCLUSION: For patients with HDP, expressed fears of medicalized birth were associated with negatively framed birth experiences, as opposed to specific interventions (e.g., magnesium infusion, preterm induction). Supportive and proactive counseling on the birth process may decrease medical anxiety and the experience of birth trauma.

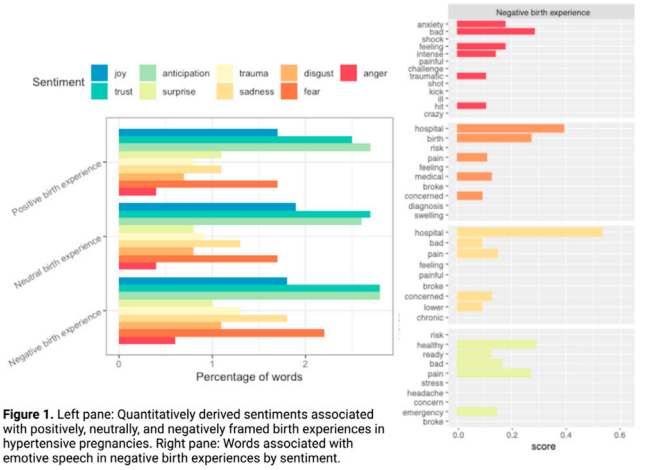

Figure 1. Left pane: Quantitatively derived sentiments associated with positively, neutrally, and negatively framed birth experiences in hypertensive pregnancies. Right pane: Words associated with emotive speech in negative birth experiences by sentiment.

261 Maternal administration of oxygen to predict respiratory morbidities among growth restricted infants

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OBJECTIVE: Maternal hyperoxygenation (MH) decreases the fetal pulmonary vasoreactivity (PVR) and increases the pulmonary blood flow in normally grown fetuses. Considering that fetal growth restriction (FGR) negatively affects the pulmonary development and increases the risk for neonatal respiratory morbidities, we sought to

evaluate the role of MH and PVR in identifying newborns at risk for respiratory morbidities among pregnancies complicated by FGR.

STUDY DESIGN: Case series where singleton pregnancies complicated by FGR underwent MH testing every 1-2 weeks from enrollment to delivery. The pulsatility index (PI) of the middle branch of the pulmonary arteries (mPA) was obtained by ultrasound as a baseline, during MH, and after 15 minutes of MH. MH consisted of maternal administration of 8 L/min of 100% oxygen through a non-rebreathing face mask. A reactive PVR test was defined as any decrease in mPA-PI during MH compared to baseline. PVR results of newborns requiring respiratory support at delivery or admission to the neonatal intensive care unit (NICU) due to respiratory morbidity (Group I) were compared to those in no need of respiratory support at birth (Group II). Results of the last PVR test prior to delivery were compared with neonatal outcomes.

RESULTS: Among 32 subjects enrolled from July 2018 to July 2019, 28 participants were eligible for analysis (Group I=12; Group II=16). Among Group I, 7 fetuses had a non-reactive PVR (NR-PVR) test, while 1 fetus in Group II had a NR-PVR test; P=0.008. When subdivided by early (N=23) or late FGR (N=5) FGR, NR-PVR was seen only on the early FGR subgroup. Sensitivity, specificity, positive (PPV) and negative predictive (NPV) values were 58%, 93%, 87% and 75%, respectively. At 6-mo age, WIDEA-FS was comparable among both groups.

CONCLUSION: PVR tested by MH is a non-invasive test with high specificity and PPV in anticipating respiratory morbidity in early FGR when antenatal NR-PVR is observed. PVR by MH does not predict infant outcomes at 6-mo age.

262 Antenatal corticosteroid exposure in those with hypertensive disorders of pregnancy: a population cohort study

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OBJECTIVE: To examine the association between antenatal corticosteroid (ANCS) exposure and adverse neonatal outcomes among those with hypertensive disorders of pregnancy (HDP) who delivered in the late preterm period.

STUDY DESIGN: This population-based, retrospective cohort study used U.S. Vital Statistics dataset between 2016-2020. Inclusion criteria were those with a diagnosis of HDP (defined as chronic hypertension, gestational hypertension, pre eclampsia and eclampsia), who delivered between 34.0 to 36.6 weeks gestation and known ANCS exposure status. The primary outcomes were a composite neonatal adverse outcome, included: Apgar score < 5 at 5 minutes, immediate assisted ventilation, assisted ventilation > 6 hours, surfactant use, seizure, neonatal or infant mortality. Multivariable Poisson regression models with robust error variance were used to estimate adjusted relative risks (aRR) and 95% confidence intervals (CI).

RESULTS: Between 2016-2020, upwards of 19 million live births occurred in the U.S. Of those, 182,014 (1%) met our inclusion criteria and among them, 130,133 (71.5%) did not receive ANCS and 51,881 (28.5%) received ANCS. After adjustment, the risk of composite neonatal morbidity (aRR 1.32, 95% CI 1.30-1.35) was significantly higher among those with HDP who received ANCS compared to those without ANCS exposure. A subgroup analyses in those with preexisting hypertension, also showed an increase in both neonatal adverse outcome (aRR 1.36, 95% CI 1.30-1.42).

CONCLUSION: In pregnancies with HDP and delivery in the late preterm period, the risk of composite neonatal morbidity was higher in those with ANCS exposure compared to those without ANCS administration. These findings suggest further need of trials investigating the role of ANCS in those with HDP.

Table 1. Composite and individual Neonatal and Maternal Adverse Outcomes among pregnancies with HDP and Antenatal Corticosteroid Exposure

Outcomes	Antenatal steroids	Total live births	n	Rate per 1,000 live births	Crude RR	(95% CI)		Adjusted RR	(95% CI)	
Composite neonatal adverse outcome	Total	181,610	30,376	167.3						
	Did not receive	129,807	18,640	143.6	1.00			1.00		
	Received	51,803	11,736	226.6	**1.58**	**1.53**	**1.61**	**1.32**	**1.30**	**1.35**
5-minute Apgar < 5	Total	181,563	2,663	14.7						
	Did not receive	129,771	1,890	14.6	1.00			1.00		
	Received	51,792	773	14.9	1.02	0.94	1.11	0.93	0.85	1.01
Immediate assisted Ventilation	Total	181,968	28,499	156.6						
	Did not receive	130,099	17,281	132.8	1.00			1.00		
	Received	51,869	11,218	216.3	**1.63**	**1.59**	**1.66**	**1.36**	**1.33**	**1.39**
Assisted ventilation > 6 hours	Total	181,968	11,690	64.2						
	Did not receive	130,099	6,712	51.6	1.00			1.00		
	Received	51,869	4,978	96.0	1.86	1.80	1.93	1.46	1.41	1.52
Surfactant use	Total	181,968	2,425	13.3						
	Did not receive	130,099	1,417	10.9	1.00			1.00		
	Received	51,869	1,008	19.4	1.78	1.65	1.93	1.45	1.34	1.58
Seizure	Total	181,968	125	0.7						
	Did not receive	130,099	84	0.6	1.00			1.00		
	Received	51,869	41	0.8	1.22	0.84	1.78	1.32	0.90	1.95
Neonatal death	Total	180,014	235	1.3						
	Did not receive	130,133	173	1.3	1.00			1.00		
	Received	51,881	62	1.2	0.90	0.67	1.20	0.85	0.63	1.15
Infant mortality	Total	182,014	670	3.7						
	Did not receive	130,133	477	3.7	1.00			1.00		
	Received	51,881	193	3.7	1.01	0.86	1.20	0.99	0.83	1.17

RR: relative risk; CI: Confidence interval.
Composite neonatal adverse outcome includes immediate assisted ventilation, assisted ventilation > 6 hours, NICU admission, surfactant use, transient tachypnea of the newborn and need for IV glucose-minute Apgar < 5. Adjusted for maternal age, race and ethnicity, education, marital status, insurance type, pre-pregnancy body mass index, prior preterm birth, hypertensive disorders and gestational age
Bold indicated statistically significant results.

263 The utility of PlGF as a "rule-out" test: examining outcomes after triage testing

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OBJECTIVE: Despite the release of a new preeclampsia biomarker test in the United States, the clinical application of PlGF-based testing is unclear as few have examined adverse outcomes or assessed the test's ability for timely risk stratification in the triage setting. Therefore, we sought to evaluate the outcomes of patients with suspected preeclampsia according to PlGF value, stratified by inpatient vs. outpatient status to evaluate PlGF as a "rule-out" test.

STUDY DESIGN: This is a secondary analysis of the Preeclampsia Triage by Rapid Assay Trial, a prospective, multicenter, observational study that enrolled patients with suspected preeclampsia aged 18-45 with a singleton pregnancy between 20-35 weeks gestation. Plasma PlGF was measured at enrollment and defined as normal > 100 pg/mL, indeterminate 12-100 pg/mL and abnormal < 12 pg/mL. Our primary outcome was a composite adverse outcome (maternal or neonatal) and delivery within 7 days. A secondary outcome was a diagnosis of severe preeclampsia and delivery within 7 days. Data were analyzed within two disposition groups, inpatient and outpatient. Analysis was performed with use of Fisher's exact or chi-square tests as appropriate.

RESULTS: Of 601 patients who met inclusion criteria, 260 were managed as inpatient and 341 as outpatient. Demographic characteristics were similar between groups. A normal PlGF was identified in 59 (22%) of the inpatient group and 190 (55%) of the outpatient group. Among patients with a normal PlGF, the primary adverse composite neonatal outcome was only identified in 1 (1.7%)

inpatient, and was not observed in the outpatient group. The primary adverse composite maternal outcome was not observed in either disposition group. The secondary outcome did not occur in the outpatient group with a normal PlGF.

CONCLUSION: A normal PlGF may provide reassurance and allow for outpatient surveillance within an interval of 7 days. Our findings suggest PlGF as a "rule-out" test and could strengthen clinical decision making and potentially limit unnecessary hospitalizations.

Table 1. Adverse outcome and preterm delivery within 7 days of PLGF measurement

Inpatient	PlGF < 12 n = 200	PlGF 12-100 n = 82	PlGF > 100 n = 59	P value[a]
Composite Maternal Morbidity[b]	21 (10.5)	3 (3.7)	0 (0.0)	0.08
Composite Neonatal Morbidity[c]	42 (21)	4 (4.9)	1 (1.7)	<0.001
Preeclampsia with severe features[d]	154 (77)	37 (45)	10 (17)	<0.001
Outpatient	**n = 23**	**n = 47**	**n = 190**	
Composite Maternal Morbidity[b]	0 (0)	0 (0)	0 (0.0)	N/A
Composite Neonatal Morbidity[c]	2 (8.7)	0 (0)	0 (0.0)	0.005
Preeclampsia with severe features[d]	2 (8.7)	1 (2.1)	0 (0.0)	0.008

[a]*Chi-square or fishers exact used as appropriate, P < 0.05 considered statistically significant*

[b]Composite maternal morbidity: Maternal death, eclampsia, HELLP syndrome, pulmonary edema or ARDS, placental abruption, need for 3rd IV anti-hypertensive agent, other severe maternal morbidity (acute renal failure, retinal detachment, stroke, DIC, microangiopathy, acute fatty liver of pregnancy).
[c]Composite neonatal morbidity: 5 minute Apgar score < 4, fetal demise, neonatal death, seizure, grade III/IV intraventricular hemorrhage, retinopathy of prematurity, bronchopulmonary dysplasia, necrotizing enterocolitis.
[d]Secondary outcome: superimposed preeclampsia with severe features or Preeclampsia with severe features without history of chronic hypertension.

264 BhCG decline following intrasac methotrexate for the management of cesarean-scar ectopic pregnancy: An 11-year experience.

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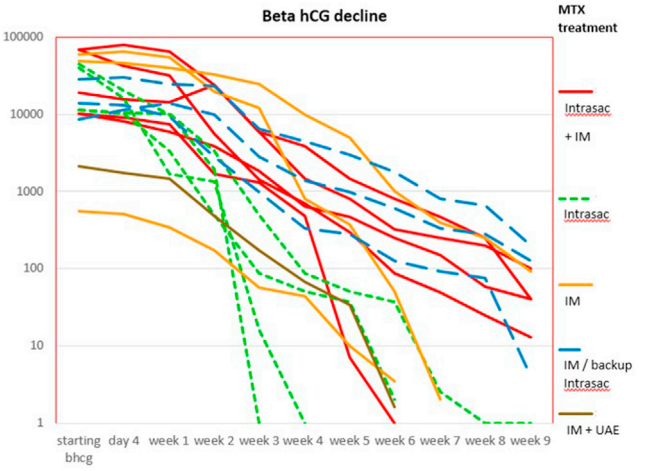
OBJECTIVE: We sought to compare the rate of beta human chorionic gonadotropin (BhCG) levels decline of a protocol of transvaginal intrasac MTX injection to other non-surgical treatment modalities for the management of cesarean scar ectopic pregnancy (CSEP).

STUDY DESIGN: We conducted a case control of CSEP cases at INOVA Fairfax Hospital from September 2012 to March 2023. We abstracted demographic, medical, and obstetric information from medical records. BhCG levels were trended to determine the rate of decline following our protocol of outpatient local intrasac injection of 2.5 mL MTX treatment (IS-MTX) under transvaginal ultrasound guidance compared to (i) only intramuscular methotrexate (IM-MTX), (ii) simultaneous intra-gestational sac methotrexate injection and intramuscular methotrexate (IS-MTX + IM-MTX); (iii) backup intra-gestational sac methotrexate injection given after intramuscular methotrexate treatment failure (IM-MTX / backup IS-MTX); and (iv) simultaneous uterine artery embolization and intramuscular methotrexate (UAE + IM-MTX). Intrasac 1.5 mL KCl was injected prior to IS-MTX whenever a live embryo was present.

RESULTS: Among 920 ectopic pregnancies reported during the study period, we identified 23 cases of CSEP (2.5%) of which 16 cases had complete data and were included in our study. The fastest rate of BhCG decline was seen in the IS-MTX group and in UAE + IM-MTX. A rapid BhCG decline followed rescue IS-MTX when IM-MTX failed. All treatment modalities did not differ in grouped comparison (P=0.095); nonetheless, individual group comparisons showed significant BhCG decline in the IS-MTX group compared to IM-MTX (P=0.047), and in UAE + IM-MTX compared to IM-MTX (P=0.019) and to IM-MTX / backup IS-MTX (P=0.025). The presence of live embryo did not influence the rate of BhCG decline following IS-MTX.

CONCLUSION: IS-MTX alone is superior to IM-MTX. IM-MTX did not accelerate the decline of BhCG when used simultaneously with intrasac MTX (IS-MTX + IM-MTX group) compared to IS-MTX alone. UAE + IM-MTX is a useful non-surgical alternative when IS-MTX is not available.



265 Patient-level trends in vaccine uptake during the COVID pandemic

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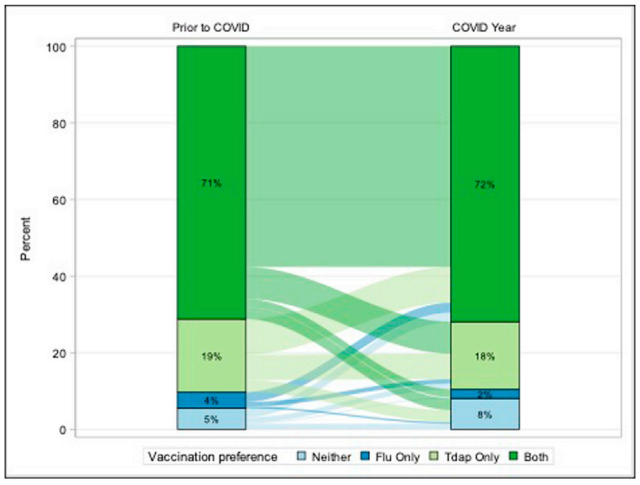
OBJECTIVE: Influenza and tetanus toxoid reduced diphtheria toxoid, acellular pertussis(TDaP) vaccines are safe, effective, and recommended in pregnancy. Despite this, significant vaccine hesitancy exists in pregnancy. The impact of the COVID-19 pandemic on vaccine hesitancy is not well understood. Wedescribe impact of the COVID-19 pandemic on patient-level influenza, TDaP, and dual vaccination trends.

STUDY DESIGN: Retrospective cohort study of patients delivering at single academic center with pregnancies in both pre-COVID(10/1/17-8/31/19) and mid-COVID(10/1/20-8/31/21) periods. Demographic and vaccine data abstracted. Primary outcome was change in vaccine choice between epochs. Generalized estimating equations repeated measures framework used to model changes in patient vaccine choices comparing across race/ethnicity. Analyses adjusted for payor, maternal age, and gestational age, calculating odds ratios and 95% confidence intervals.

RESULTS: Of 420 patients with at least one pregnancy in both periods, 49.8% were NH white, 28.4% NH black, and 14.9% Hispanic. Across all vaccines, the majority of patients had consistent vaccination preferences across both periods. 315/420(75%) the same flu vaccination preference, 353/420(84%) the same TDaP preference, and 242/420(58%) received both vaccinations(Figure). However, NH Black patients had significantly lower odds of flu vaccination mid-COVID vs pre-COVID (aOR: 0.60, 95%CI:0.38, 0.95). NH White patients had significant increase in receiving both vaccinations mid-COVID (aOR:1.61, 95%CI:1.03, 2.53).

CONCLUSION: Majority of vaccination decisions remained consistent despite the pandemic. However, in response to the pandemic NH black patients were less likely to receive influenza vaccination while NH white patients were more likely to receive dual vaccination. These data emphasize the importance of continued counseling and education efforts to better understand societal and cultural norms that impact patient hesitancy during pandemic-mediated prenatal care.



266 The association between post-delivery inferior vena cava diameter and Postpartum hemoglobin levels

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OBJECTIVE: Inferior vena cava (IVC) diameter has been suggested as a useful sonographic tool for estimation of blood loss. To this date, it has been investigated only in an acute or massive hemorrhage setting. The aim of the present study was to determine whether IVC diameter can be an effective prognostic tool for predicting postpartum hemoglobin (Hb) level drop 24-48 hours after delivery.

STUDY DESIGN: A single center prospective cohort study, included postpartum women who delivered at 37 to 41 weeks of gestation. Cesarean delivery, multiple pregnancies, Patients with known coagulation disorders or hepatic failure and those using anti-coagulation drugs were excluded from the study. Abdominal ultrasonography measurements were performed 24-48 hours after delivery, Hb levels were taken before delivery and 24-48 hours after delivery to assess blood loss. Delta-IVC was defined as the difference between IVC diameter at expirium (IVCe) and at inspirium (IVCi). Spearman correlation test was used to assess for correlation between Hb levels and IVC diameter. Man-Whitney's U test was used to compare IVC diameters in cases with Hb drop of above 2g gr\dl and below.

RESULTS: We found no significant correlation between Hb levels and IVCi, IVCe or delta-IVC. Moreover, there was no difference in IVC diameters between parturients with a Hb drop of more than 2 gr/dl and those with a Hb drop of less than 2 gr/dl

CONCLUSION: Our findings did not show a significant association between IVC diameters and Hb levels. This may indicate that IVC diameter measurement, though useful in an acute setting, is not suitable for follow-up in stable patients.

Table 1: Spearman's correlation tests

		HB pre-delivery	HB post-delivery (up to 24 h)	1st delta HB	HB post del (up to 48 h)	Total HB drop
IVCe (mm)	Correlation Coefficient	.048	.058	.026	.115	-.032
	Sig. (2-tailed)	.684	.651	.839	.492	.804
	N	73	63	63	38	64
IVCi (mm)	Correlation Coefficient	.045	-.012	.085	.124	-.001
	Sig. (2-tailed)	.707	.928	.509	.460	.995
	N	73	63	63	38	64
delta IVC	Correlation Coefficient	-.068	.032	-.065	-.084	-.031
	Sig. (2-tailed)	.565	.804	.611	.615	.806
	N	73	63	63	38	64

Table 2: IVC diameters in high vs. low blood loss.

	Overall HB Loss > 2 gr (n=23)	Overall HB Loss ≤ 2 gr (n=41)	p value
IVC expirium	1.61 (1.38-1.98)	1.74 (1.42-2.01)	0.45
IVC inspirium	1.24 (0.98-1.45)	1.27 (1.07-1.41)	0.585
delta IVC	0.37 (0.26-0.56)	0.36 (0.21-0.63)	0.967

Data is presented as median (IQR). Comparisons wre performed using Mann-Whitney's U test.

267 Differences in dosing strategies and perinatal outcomes for pregnant patients on buprenorphine compared with methadone

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OBJECTIVE: There is limited data evaluating differences in dosing and outcomes of patients on methadone and buprenorphine, two common medications for opioid use disorder (MOUD). This study sought to evaluate dosing alterations in pregnancy as well as to compare perinatal outcomes between buprenorphine based MOUD and methadone.

STUDY DESIGN: Retrospective cohort study comprised of patients with opioid use disorder (OUD) during their pregnancy who delivered at a single institution between January 2017 and July 2023. Patients were divided according to their prescribed MOUD: buprenorphine-based and methadone. Exclusion criteria: patients with OUD who were not described MOUD during their prenatal care. These groups were compared using Chi-square, McNemar test, t-tests with statistical significance defined as $p < 0.05$.

RESULTS: With respect to dosing, more patients in the methadone group required dosage changes (n=50, 78.1%) vs buprenorphine group (n=62, 51.7%), $p< 0.01$. In buprenorphine based MOUD, there was no statistically significant difference in the total milligrams prescribed at the beginning of pregnancy compared to the dose at the time of delivery. Comparatively, patients who were prescribed methadone had a statistically significant increase in milligrams prescribed from their dose at the beginning of pregnancy (72.0mg

±43.8) to dose at delivery (106.2mg±50.5, p< 0.01). When comparing maternal and neonatal outcomes across groups, the methadone patients had fewer postpartum follow up visits at 6 weeks, increased risk of NOWS requiring morphine, and lower birth weights (p < 0.01). See Table 1.

CONCLUSION: In our study, compared to buprenorphine, patients with OUD that were treated with methadone needed an increase in dose by delivery. Additionally, they had an increased rate of infants with NOWS, lower birth weights, and less postpartum follow up.

Table 1: Maternal and Neonatal Outcomes Compared between Patients on Buprenorphine versus Methadone

	Buprenorphine (n=257)	Methadone (n=105)	p-value
Pregnancy induced hypertension	34 (13.2)	14 (13.6)	0.92
Gestational diabetes	16 (6.2)	5 (4.9)	0.63
Fetal Growth Restriction	14 (5.4)	5 (4.8)	0.79
Any OB complication	22 (8.6)	9 (8.6)	0.99
PTB <37 weeks	33 (12.9)	20 (19.2)	0.12
Cesarean Delivery	111 (43.7)	50 (48.1)	0.45
Birth weight (g)	3020 (±615)	2810 (±586)	<0.01
NOWS requiring morphine	55 (21.4)	50 (47.6)	<0.01
Admitted to NICU	155 (60.8)	70 (68.0)	0.20
Infant hospital LOS (days)	12.0 (±20.2)	14.9 (±13.1)	0.16
Postpartum visit compliance	52 (20.4)	18 (17.7)	<0.01
Relapse postpartum	8 (3.6)	6 (7.4)	0.21

268 Association between social vulnerability and severe maternal morbidity

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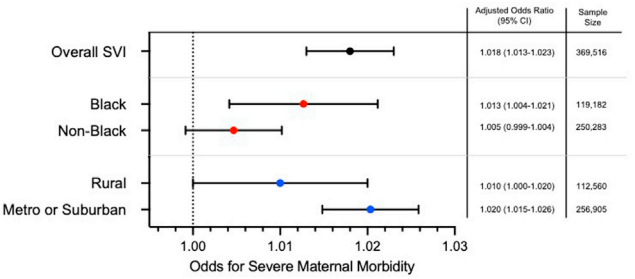
OBJECTIVE: The Social Vulnerability Index (SVI) measures community-level factors associated with health outcomes, but few studies have measured their contribution to perinatal morbidity. We examined the association between SVI and severe maternal morbidity (SMM).

STUDY DESIGN: We included patients 15-44 years enrolled in Tennessee Medicaid who delivered between 2007-2019. Enrollment files were linked to healthcare encounters and prescription fill data, hospital discharge and birth certificate data. The primary exposure was SVI ranging from 0 to 100 (lower to higher SVI) and assigned based on residential address at delivery. Secondary exposures included SVI subthemes: socioeconomic status, household characteristics, racial and ethnic minority status, and housing type and transportation. The primary outcome was SMM as defined by Centers for Disease Control and Prevention criteria using diagnosis codes for 21 conditions. We employed multivariable logistic regression to estimate the association between SVI and SMM, adjusting for covariates selected *a priori*. We stratified by race/ethnicity and rural versus metro residence to test whether the association between SVI and SMM varied by these subgroups.

RESULTS: We identified 369,465 births meeting eligibility criteria, of which 8,057 (2.2%) experienced SMM. SVI quartiles were Q1 0-41, Q2 42-67, Q3 68-87, and Q4 87-100. Increasing SVI was associated with increasing odds for SMM (aOR 1.018 [1.013-1.023] per 5 unit increase in SVI). Increasing SVI was associated with SMM for each subtheme except housing type and transportation. When analyses were stratified by Black or non-Black race, SVI was significantly associated with SMM only among Black patients (adjusted OR 1.013 [95% CI 1.004-1.021] per 5 unit increase in SVI). The association between overall SVI and SMM did not vary significantly by rurality.

CONCLUSION: We demonstrated a positive association between SVI and SMM, especially among Black patients. Greater investment in vulnerable communities may help reduce large disparities in pregnancy outcomes in the United States.

Figure 1: Stratified associations[1] between severe maternal morbidity and social vulnerability index



[1]All models adjusted for maternal age at delivery, parity, education level, pre-pregnancy body mass index, substance use disorder, depression, chronic hypertension, preexisting diabetes.

269 Stress-reducing interventions in pregnancy for prevention of preterm birth: a systematic review and meta-analysis.

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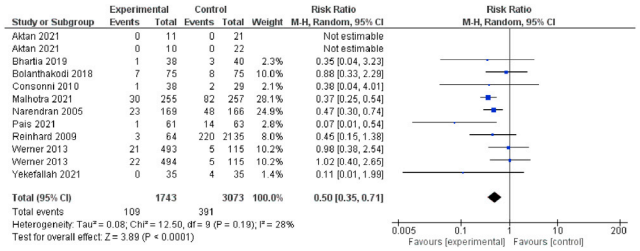
OBJECTIVE: Preterm birth (PTB) is the leading cause of neonatal morbidity and mortality. Maternal stress during pregnancy is an established risk factor for PTB. Therefore, our primary aim was to assess whether stress-reducing interventions during pregnancy can reduce the incidence of PTB.

STUDY DESIGN: This systematic review and meta-analysis searched MEDLINE, Embase, ClinicalTrials.gov, Cumulative Index to Nursing and Allied Health Literature, and the Cochrane Library for (randomized) controlled trials (RCTs), cohort studies, and observational studies reporting on stress-reducing interventions during pregnancy and PTB rates. Studies investigating women already in preterm labor, or aiming at women at high risk of PTB or depression, or with a history of depression or anxiety disorders, were excluded.

RESULTS: Ten studies with a total of 4.816 women were included, with five studies on yoga, two on hypnosis, and three multidisciplinary programs with a mindfulness and psychosomatic approach. The incidence of PTB was significantly lower in the intervention group (RR 0.50, 95% CI 0.35 − 0.71). The incidence of LBW was significantly lower, and mean gestational age was significantly higher in the intervention groups. Our subgroup analysis focusing on the intervention type yoga (N= 5; 757 women), showed a significant reduction in PTB and LBW rates (RR 0.30, 95% CI 0.13 − 0.71, RR 0.57, 95% CI 0.41 − 0.81 respectively). Two studies on maternal anxiety and two studies on maternal stress could not be meta-analyzed due to incomplete data. The overall quality of the included studies was low and risk of bias was high. When excluding high risk studies (N=3; 3046 women), the previously significant associations could no longer be confirmed.

CONCLUSION: This study provides substantial evidence supporting the efficacy of stress-reducing interventions, in particular yoga, in reducing the incidence of PTB in low risk women. Given the low quality and high risk of bias in the included studies, yet promising results, we propose a RCT of high quality to determine the effectiveness of stress-reducing interventions in reducing PTB risk.



270 A cost-effectiveness analysis of neuraxial anesthesia and number of attempts for external cephalic version

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OBJECTIVE: ECV is a key tool in management of presentation and reducing cesarean deliveries. There is debate regarding the optimal use of neuraxial anesthesia for ECV procedures, and whether it is beneficial to offer a second ECV attempt for patients with persistently breech fetuses. Studies have found ECVs with neuraxial anesthesia to be the cost-effective strategy, however this is the first study to directly compare both the use of neuraxial anesthesia and the number of attempts.

STUDY DESIGN: A cost-effectiveness model was built using TreeAge 2023 software to compare outcomes and costs of one or two attempts of ECV with or without use of neuraxial anesthesia. We used a theoretical cohort of 100,000 nulliparous women with non-vertex presenting singletons. The model accounted for costs and quality adjusted life years (QALYs) for the mother and the neonate. Outcomes included unsuccessful ECV, cesarean delivery, maternal death, neonatal death, and major neurodevelopmental disability. Probabilities were derived from the literature, and a cost-effectiveness threshold was set at $100,000/QALY.

RESULTS: In our theoretical cohort of 100,000 pregnant women, we found that two attempts, the first without neuraxial anesthesia, and the second with neuraxial anesthesia to be the most cost-effective strategy with an ICER of $27,874. Two attempts with both under neuraxial anesthesia was the most effective option with 3000 fewer cesarean deliveries, 5 fewer cases of neonatal death and 1 fewer case of major neurodevelopmental disability. However, in our cohort, two attempts under neuraxial anesthesia was 24 million dollars more expensive. With sensitivity analysis, two attempts with neuraxial becomes the dominant strategy if the rate of successful ECV with neuraxial anesthesia were greater than 0.62.

CONCLUSION: Two attempts for ECVs with and without neuraxial anesthesia is optimal when compared to one attempt. The most cost-effective option is to perform the first ECV without neuraxial anesthesia and the second attempt with neuraxial anesthesia at the time of possible cesarean delivery.

	One ECV attempt without NA	One ECV attempt with NA	Two ECV attempts: both with NA	Two ECV attempts: first without NA, second with NA
Cesarean delivery	65,000	53,000	28,000	31,000
Maternal death	2	2	2	2
Neonatal death	292	275	240	245
Neonatal morbidity	93	92	92	93
Cost	$83M	$87M	$86M	$83M
Effectiveness	664,401	664,579	664,713	664,635
ICER				$27,874/ QALY

271 The effects of pregnancy conceived after fertility treatment on perinatal outcomes; a sibling analysis.

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OBJECTIVE: Recent studies have reported an association between fertility treatments and adverse perinatal outcomes. However, the precise contribution of maternal factors versus the fertility treatments per-se to these adverse outcomes remains unclear. This study used a unique sibling analysis method to investigate perinatal outcomes between pregnancies conceived using fertility treatment and spontaneously conceived pregnancies. Using sibling analysis as a study approach allows thorough examination of the association between conception mode and adverse perinatal outcomes while omitting unmeasured potential confounders.

STUDY DESIGN: In a population-based retrospective cohort study, perinatal outcomes of pregnancies conceived following fertility treatment were compared to spontaneously conceived pregnancies of the same women. The study population included all mothers who had at least two deliveries between the years 1991-2021 at a tertiary medical center, with one pregnancy conceived following fertility treatments and another spontaneously conceived pregnancy. The comparison was done using maternal clusters analysis. Generalized linear models were used to control for confounders.

RESULTS: During the study period 12,755 deliveries were included, of which 7,711 (60.5%) were conceived following fertility treatments. Using generalized linear models, controlling for maternal age, pregnancies conceived following fertility treatments were independently associated with adverse perinatal outcomes including hypertensive disorders (9.9% vs. 5.8%, $p< 0.001$), gestational diabetes mellitus (12.7% vs. 7.1%, $p< 0.001$), placenta previa (1.4% vs. 0.5%, $p< 0.001$), preterm delivery (11.7% vs. 7.5%, $p< 0.001$), cesarean delivery (34.1% vs. 21.1%, $p< 0.001$) and small for gestational age (5.3% vs. 3.3%, $p< 0.001$, Table 1).

CONCLUSION: Using maternal clusters analysis, pregnancies conceived following fertility treatments were found to be independently associated with higher risk for adverse perinatal outcomes.

Table 1: The association between conception method and perinatal outcomes; Univariable analysis and generalized linear models controlling for maternal age.

Characteristics	Pregnancy conceived following fertility treatment (n=7,711) n (%)	Spontaneously conceived pregnancy (n= 5,044) n (%)	OR (95% CI)	Adjusted OR* (95% CI)	P* value
Hypertensive disorders	765 (9.9%)	293 (5.8%)	1.78 (1.55-2.05)	1.78 (1.47-2.15)	<0.001
Gestational diabetes mellitus	982 (12.7%)	356 (7.1%)	1.92 (1.69-2.18)	1.79 (1.47-2.17)	<0.001
Placenta previa	106 (1.4%)	25 (0.5%)	2.79 (1.80-4.33)	2.43 (1.57-3.78)	<0.001
Preterm delivery <37	902 (11.7%)	376 (7.5%)	1.64 (1.45-1.86)	1.37 (1.05-1.79)	0.017
Cesarean delivery	7,711(34.1%)	5,044 (21.1%)	1.93 (1.78-2.10)	1.40 (1.31-1.50)	<0.001
Small for gestational age	406 (5.3%)	164 (3.3%)	1.65 (1.37-1.99)	1.72 (1.44-2.06)	<0.001

*Adjusted for maternal age.

272 Appropriate timing of steroid administration in pregnancies at risk for preterm delivery

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OBJECTIVE: The objective of this study was to evaluate the timing of steroid administration in both the preterm and late preterm pregnancies and to evaluate the impact of timing on adverse neonatal outcomes.

STUDY DESIGN: This was a retrospective chart review of all pregnant individuals who delivered at a single academic hospital between 1/1/2016 to 12/31/2016. Non-anomalous, singleton gestations who received antenatal steroids and had available delivery information were included. Maternal demographics, indications for steroid administration, delivery information, and neonatal outcomes were all collected. Latency from steroids to delivery was calculated and analyzed as >7 days or ≤7 days and >14 days or ≤14 days. Statistical analysis with descriptive statistics and logistic regression was done.

RESULTS: Of 1986 deliveries at our institution, 211 (10.6%) met inclusion criteria. A total of 87 (41.2%) delivered >7 days from early steroid administration with the most common indications for steroids being hypertension, preterm prelabor rupture of membranes, and preterm labor. Of those >7 days and >14 days from steroids, 29 (50.9%) and 23 (62.2%) received a rescue course, respectively. In the late preterm period, 35 (92.1%) delivered ≤7 days. An interval of >7 days from steroids was not associated with composite adverse perinatal outcomes as compared to those ≤7 days (OR 1.34, CI 0.58-3.12). Regression analyses showed that greater delivery gestational age was associated with less adverse neonatal outcomes in both the early (OR 0.83, CI 0.79-0.89) and late preterm period (OR 0.79, CI 0.66-0.95). When evaluating for delivery predictors, a regression showed that maternal race (OR 0.31, CI 0.12-0.83), prior preterm birth (OR 0.45, CI 0.22-0.95), and cervical dilation (OR 1.65, CI 1.2-2.2) had an impact on steroid timing >7 days from delivery.

CONCLUSION: Our results were consistent with prior literature indicating that objective criteria need to be developed for optimally timed steroids within seven days of delivery.

273 Pain medication utilization in the obese population after implementation of multimodal pain regimen post-cesarean delivery

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OBJECTIVE: High body mass index (BMI) or obesity is not only a risk factor for cesarean delivery (CD), but also associated with high opioid consumption after surgery. We sought to determine whether differences exist in the use of non-opioid and opioid medications across different BMI categories in patients undergoing CD after implementation of a standardized pain regimen.

STUDY DESIGN: This was a single-institution, retrospective cohort of 907 patients who underwent CD from 01/9/22-12/31/22. A representative sample of patients from 7/2021-12/2021 was obtained for baseline comparison. A standardized pain regimen was implemented in 1/2022. Post-intervention, patients were divided into four BMI cohorts: Non-obese (BMI < 30 kg/m^2), Class 1 obesity (30-34.9), Class 2 obesity (35-39.9) and Class 3 obesity (≥40). Non-opioid analgesia use was quantified over the course of the hospital stay in milligrams while opioid use was quantified in morphine milligram equivalents (MME).

RESULTS: Of the 907 patients, 253 (28%) were non-obese, 258 (28%) were Class 1, 175 (19%) were Class 2, and 221 (24%) were Class 3. Non-obese patients were significantly younger and less likely to identify as Hispanic/LatinX than the other groups. Patients with Class 3 Obesity were more likely to deliver at an earlier gestational age, have pre-existing hypertension, diabetes and asthma, and more likely to have a combined spinal epidural for intra-operative analgesia compared to the other groups. Implementation of a standardized pain regimen decreased total median MMEs in the post-operative period from 50 to 7.5 (p< 0.0001). Post-implementation, although there were some significant differences between BMI groups related to oral acetaminophen and ibuprofen use, overall there was no difference in total MME use between BMI groups (Figure).

CONCLUSION: There is no difference in post-operative opioid pain medication use in patients with higher BMIs undergoing CD in the setting of a standardized multimodal pain regimen, which provides further evidence for the use of a multimodal pain regimen in the obstetric patient population.

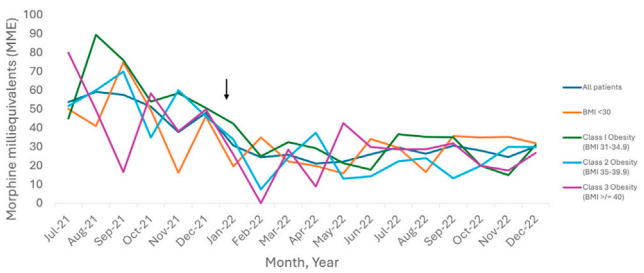

Figure. Run chart of MMEs for all patients and each BMI class before and after implementation of standardized pain regimen. Arrow indicates implementation of standardized pain regimen.

274 Quantifying the operational impacts of varying patient-provider continuity policies in prenatal care

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OBJECTIVE: To describe how different policies of patient-provider continuity in prenatal care affect clinical operations.

STUDY DESIGN: We conducted a simulation study of an appointment scheduling policy at an academic medical center with 12 ambulatory sites. Each site maintains 40% capacity for obstetric appointments, 20% of which is used for telemedicine. Data inputs were derived from a data set of 4,992 patients at a single academic institution from March 1, 2022 to March 1, 2023. Of the 4,992 patients, 62% were medically high risk, and 38% were medically low-risk. Prenatal schedules are tailored to medical need (high-risk: 13 visits; low-risk 9 visits) and patient preference for modality (in-person or virtual), and patients can transition from low to high-risk with changing diagnoses. We tested 3 scheduling policies: 1) provider continuity: patients are booked only with their provider, and overbooked if there are no available appointments; 2) advanced rescheduling: if a patient's primary provider does not have capacity, the patient is booked with another provider; 3) just-in-time rescheduling: if an appointment is still overbooked the week of the visit, the patient is rescheduled with another provider. The simulation was run in C++ for a 92 week horizon over 100 replications to assess effects on clinic utilization, overbooking, and patient delays. All metrics were reported as an average across all clinics.

RESULTS: The overbooking rate was higher for the policy that favored provider continuity compared to rescheduling (Policy 1: 16.9%; Policy 2: 0.9%; Policy 3: 0.9%). Capacity utilization was similar across all policies (Policy 1: 80.7%; Policy 2: 81.2%; Policy 3: 81.4%). On average, patient delays measured in weeks were low over the course of their care pathways for all policies (Policy 1: 0.24, Policy 2: 0.61, Policy 3: 0.24).

CONCLUSION: Policies that favor provider continuity result in significantly higher overbooking rates for providers, without improving overall clinic utilization. Policies that favor more even distributions of patient loads may result in more effective, efficient clinical operations.

275 The effects of dynamic patient trajectories on prenatal care utilization and clinical operations

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OBJECTIVE: To assess the effects of a new tailored prenatal care policy on clinical capacity and efficiency, accounting for dynamic patient trajectories in pregnancy.

STUDY DESIGN: We conducted a discrete event simulation study of traditional versus tailored prenatal care policies. We compared the traditional care model (14 in-person visits for all patients), to a schedule tailored to medical risk (high-risk: 13 visits; low-risk: 9 visits), and preference for care modality (in-person vs. virtual). We also introduced dynamic patient trajectories to account for medically low-risk patients who develop complications (e.g. gestational diabetes, gestational hypertension) in pregnancy, requiring transition to the high-risk schedule. Data inputs were derived from 4,992 real patients who received prenatal care and gave birth at a single academic institution from March 1 2022 to March 1 2023. Simulation parameters included probability of diagnosis of complications, preference for hybrid care (derived from local survey data), patient risk level, and dynamic patient arrival times. The simulation was run in C++ for 100 replications of 92 weeks each. We reported on measures of clinical operations including capacity utilization, patient delay, and overbooking.

RESULTS: In the dynamic patient simulation, 12.18% of low-risk patients became high-risk. Of patients who switched, the average number of appointments added to the pathway was 1. Following a traditional visit schedule showed in-person capacity utilization of 107%, implying overbooking, and patient delay of 0.41 weeks per patient on average. When compared to a traditional visit schedule, implementing a tailored prenatal care policy showed average capacity utilization of 92% (including in-person and virtual appointments), eliminating overbooking. Patient delay was reduced to 0.36 weeks per patient.

CONCLUSION: The implementation of tailored prenatal visit schedules allowing for a dynamic patient type model eliminates in-person overbooking and reduces patient delays. Further study is needed to determine the optimal proportion of clinic capacity to allocate to virtual care.

276 Pregnancy following uterine rupture - maternal and neonatal outcomes

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OBJECTIVE: Uterine rupture is a severe obstetrical complication that is associated with increased immediate maternal and neonatal morbidity. However, the literature regarding subsequent pregnancy outcome is scant and inconclusive. This study aims to investigate maternal and neonatal outcomes in the pregnancy following uterine rupture

STUDY DESIGN: A multicenter retrospective study between 2005 to 2022 that included cases (exposed) of subsequent singleton pregnancies following uterine rupture- defined as a full-thickness defect in the uterine wall. Labor, maternal, and neonatal characteristics were compared to a matched control group (not exposed), in a ratio of 1 to 4 (maternal age, parity and number of previous CD) of subsequent pregnancies following previous CDs with no history of uterine rupture. main outcome: uterine rupture, secondary outcomes: other maternal and neonatal complications Statistics: Descriptive, means±SDs, medians+IQR. Comparisons: chi-square, Fisher's exact test, Mann-Whitney Test, multivariate logistic models

RESULTS: During the study period there were 33 subsequent pregnancies following uterine rupture with one case of recurrent uterine rupture while the control group included 132 pregnancies without any event if uterine rupture (p=0.2). In the exposed group there were higher rates of composite adverse maternal outcomes (41.9% vs 18.6%; p=0.006), preterm delivery < 37 weeks (54.5% vs 10.6%; p< 0.001), NICU hospitalization >72 hours (29% vs 12.7%; p=0.026) and neonatal composite adverse outcomes (51.6% vs 30.4%; p=0.026 multivariate analysis revealed that previous uterine rupture was not associated with composite adverse neonatal outcome (OR= 1.085 95%CI [0.408-2.882] p=0.870). rather, the only association was found with preterm delivery < 37 weeks (OR=6.520 95%CI [2.257-18.838]; P< 0.001)

CONCLUSION: past uterine rupture is not associated with an increased risk of uterine rupture in the following pregnancy. However, other

maternal and neonatal morbidities are increased mostly due to preterm delivery. Balancing timing of delivery vs concern for uterine rupture may improve obstetric outcomes

Table: maternal demographics and maternal and neonatal outcomes

Characteristics	Past uterine rupture (N=33)	Past CD without uterine rupture (n=132)	P value
Maternal age (mean, years)	31.6±5	31.6±5	0.962
Prior CS (Median [IQR])	2[2-2]	2[2-2]	0.992
Parity (Median [IQR])	3[3-5.5]	3[3-5]	0.411
Gestational age (median [IQR])	36[36-37]	38[37-38]	<0.001
Preterm delivery<37 weeks (N, %)	18(54.5%)	14(10.6%)	<0.001
Extension of uterine scar (N, %)	5(15.2%)	6(4.2%)	0.044
Recurrent uterine rupture (N, %)	1(3%)	0(0%)	0.200
Dehiscence (N, %)	3(9.1%)	17(12.9%)	0.400
* Composite adverse Maternal outcome (N, %)	13(41.9%)	24(18.6%)	0.006
Newborn weight (Mean, grams)	2727.2±402	3069.7±537	<0.001
Newborn Apgar 5minutes <7 (N, %)	4(12.1%)	1(0.8%)	0.006
NICU>72 Hours (N, %)	9(29%)	16(12.7%)	0.026
** Composite adverse Neonatal outcome (N, %)	16(51.6%)	38(30.4%)	0.026

* Composite adverse Maternal outcome – defined by one or more of the following: Extension of uterine scar, uterine rupture, accreta, hysterectomy, dehiscence, bladder injury, readmission in 42 days, Puerperal Fever, massive PPH.
** Composite adverse Neonatal outcome - defined by one or more of the following: NICU>72 Hours Newborn Apgar 5minutes <7, jaundice, hypoglycemia, sepsis.

277 Early-onset hypertensive disorders of pregnancy associated with high perinatal mortality in Dar es Salaam, Tanzania

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OBJECTIVE: To estimate the risk of adverse perinatal outcomes associated with early (< 34 weeks) vs late (≥ 34 weeks) presentation of hypertensive disorders of pregnancy (HDPs) in a resource-limited setting.

STUDY DESIGN: We performed a secondary analysis of a randomized noninferiority trial comparing 500 mg vs 1500 mg calcium supplementation daily for preeclampsia (PE) prevention among nulliparous women (n=11,000) in Dar es Salaam, Tanzania (2019-2023). Women were followed monthly during antenatal visits through delivery with serial measurements of blood pressure and urine dipstick for protein. We compared risk of adverse perinatal outcomes associated with early (< 34 weeks) vs late (≥ 34 weeks) presentation of HDPs in multivariable regression models.

RESULTS: Of the 11,000 women enrolled in the trial, 162 (1.5%) were diagnosed with GHTN, 121 (1.1%) with PE without severe features and 194 (1.8%) with PE w/ severe features. Early (< 34 weeks) presentation was associated with a marked increase in the risk of adverse perinatal outcomes across all HDP categories (TABLE). The prevalence of perinatal mortality for early compared to late onset of GHTN was 32.0% vs 5.0% (aRR 5.0; 95% CI: 2.2, 11.1); for PE without severe features 26.1% vs 4.6% (aRR: 8.5; 95% CI: 2.0, 36.7); and for PE with severe features 47.5% vs 8.8% (aRR: 5.8; 95% CI: 3.0, 11.4). Early onset HDP also was strongly associated with preterm birth and low birthweight across HDP phenotypes.

CONCLUSION: Adverse perinatal outcomes were significantly higher among pregnancies with HDPs that presented earlier in gestation (< 34 weeks) compared to later in this large pregnancy cohort from Tanzania. Our findings confirm the importance of early detection and management of HDP. The high rates of perinatal mortality and other adverse outcomes underscore the critical need for scaling up interventions, such as prophylactic aspirin or calcium supplementation, that can prevent or delay the onset of HDP in settings where access to routine neonatal intensive care is limited or currently unavailable.

TABLE: Perinatal outcomes associated with early (<34 wks) vs late (≥34 wks) presentation of HTN in pregnancy

	GHTN (140-159/90-109 mmHg w/o proteinuria)		PE without severe features (140-159/90-109 mmHg w/ proteinuria)		PE with severe features (160+/110+ mmHg or other severe features)	
	n= 162 pregnancies		n=121 pregnancies		n=194 pregnancies	
OUTCOME	Mean (SD) or n/d (%)	aMean diff or aRR (95% CI)	Mean (SD) or n/d (%)	aMean diff or aRR (95% CI)	Mean (SD) or n/d (%)	aMean diff or aRR (95% CI)
Perinatal mortality*						
Early onset (<34 wks)	8/25 (32.0%)	5.0 (2.2, 11.1)	6/23 (26.1%)	8.5 (2.0, 36.7)	19/40(47.5%)	5.8 (3.0, 11.4)
Late onset (≥34 wks)	12/133 (9.0%)	Ref	5/108 (4.6%)	Ref	14/160(8.8%)	Ref
PTB* (<37 wks)						
Early onset (<34 wks)	8/20 (40.0%)	5.1 (1.6, 15.8)	15/17 (88.2%)	3.0 (1.5, 5.7)	20/22(90.9%)	7.3 (4.5, 11.7)
Late onset (≥34 wks)	12/133 (9.0%)	Ref	27/107(26.2%)	Ref	21/149(14.1%)	Ref
SGA at delivery* (<10%)						
Early onset (<34 wks)	6/20 (30.0%)	1.2 (0.6, 2.4)	5/17 (29.4%)	0.9 (0.6, 1.3)	12/22(54.6%)	1.9 (1.1, 3.5)
Late onset (≥34 wks)	36/133(27.1%)	Ref	38/107(35.5%)	Ref	37/149(24.8%)	Ref
Low birthweight* (<2.5kg)						
Early onset (<34 wks)	8/20 (40.0%)	6.4 (1.9, 21.5)	14/17 (82.4%)	2.8 (1.6, 5.1)	18/22 (81.8%)	5.1 (2.8, 9.4)
Late onset (≥34 wks)	10/133 (7.5%)	Ref	31/107(29.0%)	Ref	26/149(17.5%)	Ref

*Birth outcomes are reported per infant rather than per pregnancy. The denominator for perinatal mortality includes both live births and stillbirths whereas the denominator for other perinatal outcomes is restricted to live births. Relative risks adjusted for age, education, wealth quintile, BMI, anemia, HIV, family h/o HTN, trial regimen.

278 Is age just a number? advanced maternal age and stillbirth risk

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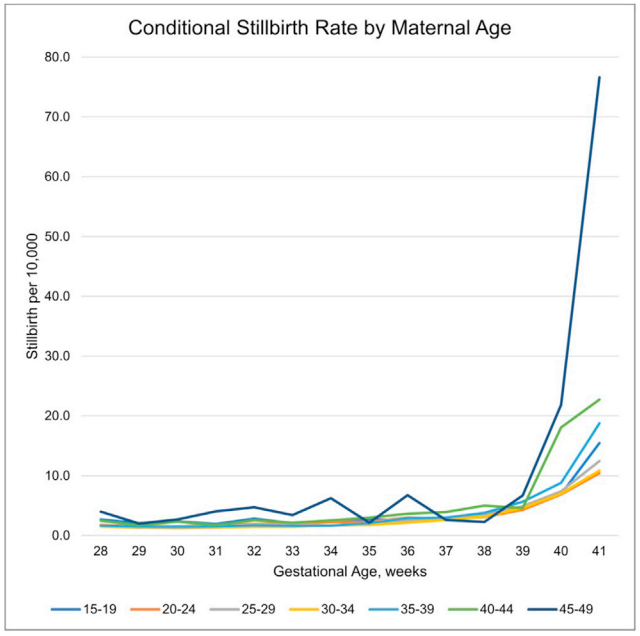
OBJECTIVE: Advanced maternal age (AMA) has been associated with an increased risk of stillbirth, but it is unclear whether this is an independent effect or represents risk of higher baseline morbidity with increasing age. Further, it is not obvious whether these stillbirths are preventable either by antenatal testing or indicated delivery. The objective of this study is to assess risk of stillbirth in a large population among women classifying as AMA.

STUDY DESIGN: This was a population based retrospective study of all singleton, non-anomalous, genetically normal gestations ≥ 20 weeks gestational age in a national registry of live birth vital statistics data from 2020-2022. Women were stratified by age categories in five-year increments from 15-49 years old. Conditional stillbirth rates were calculated per 10,000 women for each gestational age week between 28-41 weeks. Poisson regression with robust error variance was used to calculate adjusted risk ratios (aRR) for still birth overall and ≥ 32 weeks in ongoing pregnancies adjusting for chronic hypertension, pregestational diabetes, and birthweight percentile with age 25-29 as the referent. A secondary analysis restricted the regression to patients with delivery <40 weeks.

RESULTS: A total of 7,032,369 pregnancies were included in this analysis with 15.8%, 3.4%, and 0.2% with maternal age of 35-39, 40-44, and 45-49, respectively. Conditional stillbirth rates increased with advancing gestational age in all groups, with a notable increase following 39; Figure 1. Absolute overall risk of stillbirth was small (range 0.42%-0.85%) with the highest rate at 45-49 years old. The risk of stillbirth after 32 weeks was only significant in women age 40-44 (aRR 1.18, CI 1.07-1.29) and age 45-49 (aRR 1.49, CI 1.10-1.99) after adjustment. However, when further adjusting to exclude deliveries occurring after 39 weeks there were no significantly increased risks of stillbirth across any age category.

CONCLUSION: A small but significant increased risk of stillbirth was seen in women 40 to 49 years old. However, this was not significant restricting to women delivered < 40 weeks.



279 Advanced maternal age and risk of pathologic fetal growth

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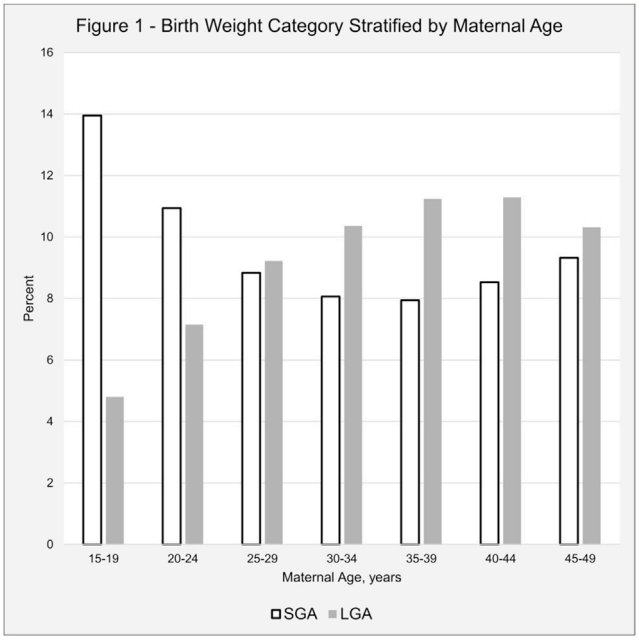
OBJECTIVE: Advanced maternal age is associated with an increased risk of underlying comorbid disease and pregnancy complications, which are associated with both small (SGA) and large (LGA) for gestational age birth weight. For this reason, some centers perform serial growth surveillance in all AMA women, but the independent affect of age on birth weight is unclear. The objective of this study was to analyze a large population of AMA women and assess risk of SGA and LGA accounting for known confounders.

STUDY DESIGN: This was a population based retrospective study of all singleton, non-anomalous, genetically normal gestations $\geq$ 20 weeks gestational age in a national registry of live birth vital statistics data from 2020-2022. Women were stratified by age categories in five-year increments from 15-49 years old. The primary outcome was risk of large (LGA, birth weight >90%) and small (SGA, birth weight < 10%) for gestational age birth weight assigned by sex-specific Fenton criteria. Poisson regression with robust error variance was performed to generate adjusted risk ratios (aRR) among age categories using ages 25-29 years old as the referent adjusting for chronic hypertension, hypertensive disorders of pregnancy, pregestational and gestational diabetes.

RESULTS: A total of 7,022,461 pregnancies were included in this analysis with 9.4% and 9.1% classifying as LGA and SGA, respectively. In unadjusted analysis, rates of SGA decreased and rates of LGA increased with advancing maternal age; Figure 1. The risk of LGA was elevated for all age categories above age 25 and highest among ages 35-39 (aRR 1.20, CI 1.19-1.21). Conversely, the risk of SGA was highest for ages less than 25, and highest among age 15-19 (aRR 1.57, CI 1.55-1.58) and age 20-24 (aRR 1.23, CI 1.23-1.24).

CONCLUSION: Advancing maternal age is associated with decreasing rates of SGA and increasing rates of LGA birth weight that was independent of known comorbid conditions and pregnancy complications.



280 Joint effects of epilepsy and mental health on severe maternal morbidity

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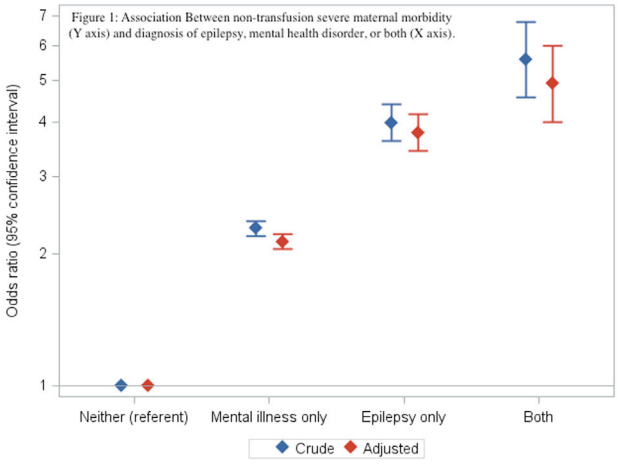
OBJECTIVE: Mental illness and epilepsy are each associated with increased maternal morbidity and mortality, yet their joint effects are unknown. We evaluated the impact of concurrent mental illness on the relationship between epilepsy and non-transfusion severe maternal morbidity (SMM).

STUDY DESIGN: We conducted a population-based cohort study of birth certificate (both live birth and fetal death) and hospital discharge records in California in 2007-2018. Epilepsy and mental health disorders at delivery hospitalization were identified using ICD-CM codes. Mental health disorders included depression, anxiety, bipolar disorder, post-traumatic stress disorder, and psychosis/delusions. Exposures were no epilepsy or mental health disorder (referent), mental health disorder alone, epilepsy alone, or both epilepsy and mental health disorder. The outcome was SMM—defined as presence of 1 of 20 indicators not including blood transfusion—during delivery hospitalization or hospitalization within 6-weeks postpartum. The associations between exposure groups and SMM were modeled by multivariable logistic regression, adjusting for age, race/ethnicity, education, delivery payment, initiation of prenatal care, delivery BMI, and parity.

RESULTS: 5,275,994 people were included. The prevalence of mental health disorder without epilepsy was 296 patients per 10,000, epilepsy without a mental health disorder was 28 per 10,000, and epilepsy with mental health disorder was 5 per 10,000. Within these groups, there was higher incidence of SMM (1.75%, 3.00%, 4.15%) compared to the referent group (SMM: 0.77%). Logistic regression showed increased odds of SMM with each respective diagnosis

compared to the referent group. Patients with both epilepsy and mental health disorder had highest odds of SMM (aOR 4.91 (95% CI 4.01,6.00) Figure 1). An interaction term of epilepsy and mental health disorder on SMM was significant (p=0.005).

CONCLUSION: Independently, epilepsy and mental health disorders were confirmed as drivers of maternal morbidity. Patients with both diagnoses carried even higher odds of experiencing SMM during delivery or postpartum.



281 Association between Medicaid coverage of dental services and dental hygiene during pregnancy

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OBJECTIVE: Poor oral hygiene has been associated with adverse pregnancy outcomes. Unlike prenatal care, dental care is not required to be covered by Medicaid and coverage may change when people become pregnant. We evaluated the association between state Medicaid coverage of dental services and receipt of teeth cleaning during pregnancy among those covered by Medicaid and those privately insured.

STUDY DESIGN: Using 2016-20 data from the Pregnancy Risk Assessment Monitoring System including 44 states, linked with data from the Medicaid and CHIP Payment and Access Commission (MACPAC), we analyzed state-level differences in dental care during pregnancy. Utilizing multivariable Poisson regression, we assessed the association between Medicaid coverage of dental services and the likelihood of teeth cleaning during pregnancy separately among Medicaid and privately-insured populations, controlling for respondent sociodemographic characteristics.

RESULTS: The analysis included 149,748 respondents representing a weighted 7,520,502 population. Teeth cleaning during pregnancy was reported for 34% of Medicaid respondents and 56% of privately-insured respondents. Among Medicaid respondents, in states with the no Medicaid coverage of dental services, there was a 41% lower likelihood of teeth cleaning during pregnancy (aOR 0.59, 95% CI 0.52, 0.67) compared with states with the most generous Medicaid coverage of dental services (Table). The likelihood of dental cleaning during pregnancy for privately-insured respondents was not associated with state Medicaid policies.

CONCLUSION: Minimal or no Medicaid coverage of dental services is associated with a significantly lesser likelihood of receiving teeth cleaning during pregnancy in a Medicaid-only population. This relationship did not exist in a privately insured population, suggesting that receipt of teeth cleaning is not due to state-level differences but rather associated with insurance coverage. Findings demonstrate the importance of dental insurance coverage specifically in pregnant, low-income populations.

Table. Association of Medicaid coverage of dental services and receipt of teeth cleaning during pregnancy

State Medicaid Coverage of dental services[1]	Percent of respondents living in Medicaid coverage category (%)[2]	Percent of Medicaid respondents reporting teeth cleaned during pregnancy[3,4]	Percent of privately insured respondents reporting teeth cleaning during pregnancy[5,7]
No coverage	3.9	21.1	50.8
Emergency coverage	5.8	25.5	56.0
Coverage of 1-4 dental services	9.6	26.3	50.5
Coverage of ≥5 dental services	80.7	36.1	57.2
State Medicaid Coverage of dental services[1]		**Teeth cleaning during pregnancy among Medicaid respondents, aIRR 95% CI[3,4,6]**	**Teeth cleaning during pregnancy among privately insured respondents, aIRR 95% CI[5,6,7]**
No coverage		0.59 (0.52, 0.67)	0.95 (0.90, 0.99)
Emergency coverage		0.71 (0.66, 0.77)	1.01 (0.99, 1.04)
Coverage of 1-4 dental services		0.73 (0.68, 0.79)	0.93 (0.90, 0.96)
Coverage of ≥5 dental services		Referent	Referent

aIRR, adjusted incidence rate ratio, CI, confidence interval
[1]Dental services that may or may not be covered by Medicaid include: diagnostic, preventative, restorative, periodontal, dentures, orals surgery, and orthodontia
[2]N=149,748 respondents representing an estimated 7,520,502 respondents from 44 states, excluding the District of Columbia, California, Idaho, Nevada, Ohio, South Carolina, and Texas
[3]N=57,490; weighted N=2,537,090
[4]Limited to participants whose delivery was paid for by Medicaid
[5]N=100,018; weighted N=5,274,393
[6]Adjusted for education, income, age, race, marital status, preconception uninsurance
[7]Limited to participants whose delivery was paid for by private insurance

282 State conservative ranking and prevalence of intimate partner violence before and during pregnancy

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OBJECTIVE: An estimated 2 to 9 percent of people who are pregnant experience intimate partner violence (IPV), increasing their risk of adverse pregnancy outcomes. We hypothesize that states with a more progressive political culture will have lower rates of IPV than more conservative states. We aimed to evaluate the association between state conservative ranking and state IPV rates before and during pregnancy.

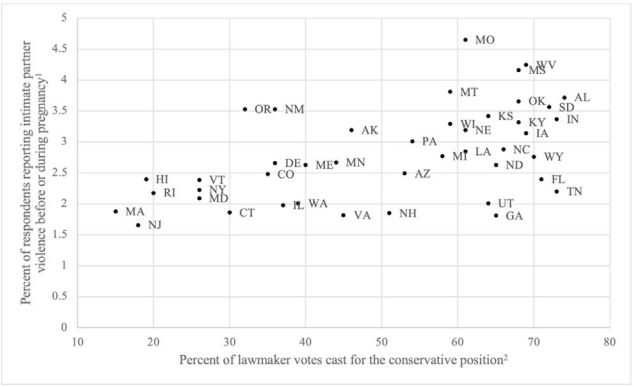
STUDY DESIGN: We used 2016-20 data from the Pregnancy Risk Assessment Monitoring System, linked to published state conservative ranking scores based on the percent of total votes in a state legislature cast for conservative causes. States were grouped into

tertiles of most to least conservative. Using multivariable Poisson regression, we assessed the association between state conservative ranking and the frequency of self-reported IPV before (within 12 months) and during pregnancy, controlling for individual-level sociodemographic variables.

RESULTS: This analysis included 194,334 respondents representing a population of 9,785,771. In total, 3.1% of respondents reported experiencing IPV before or during pregnancy. Pearson correlation coefficients demonstrated a significant linear association (0.57, $p < 0.001$), with states that had a higher proportion of conservative votes associated with higher reported prevalence of IPV (Figure). In multivariate Poisson regression, there was a 14% lower likelihood of IPV in the 14 states with the least conservative (most liberal) state legislative voting records in comparison to a referent group of moderately conservative states (aIRR 0.86, 95% CI 0.79-0.95). However, the risk of IPV was not significantly different between those in highly versus moderately conservative states.

CONCLUSION: Birthing individuals in states with the least conservative (most liberal) policy environment were significantly less likely to report IPV in the 12 months before or during pregnancy. While evaluation of individual-level factors dominates research about IPV, we advocate for a better understanding of how political environments influence the prevalence of IPV in order to reduce IPV rates.

Figure: Percent of reported intimate partner violence before or during pregnancy per state and state legislature conservative ranking



[1]Respondents reporting intimate partner violence in 12 months before or during pregnancy from Pregnancy Risk Assessment Monitoring System
[2]State conservative ranking based off of percent of state legislature votes cast for conservative position Pearson coefficient 0.57, $p < 0.001$
2016-2020 Pregnancy Risk Assessment Monitoring System (PRAMS) for 43 States, Weighted N=9,785,771, excluding the Arkansas, California, District of Columbia, Idaho, Ohio, Nevada, South Carolina, and Texas

283 A Prenatal lead screening and intervention program in a high risk obstetrical population

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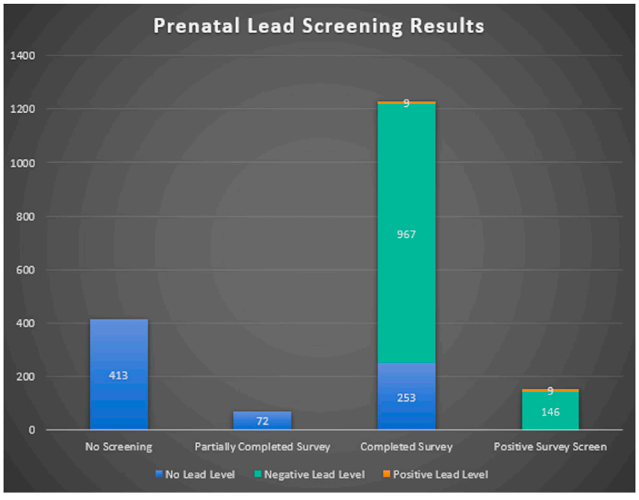
OBJECTIVE: Prenatal lead exposure in pregnancy has known adverse effects on maternal health and infant outcomes. We aimed to assess the efficacy of a prenatal screening and intervention program for lead exposure. We hypothesized that in a city with high rates of lead exposure, blood lead levels drawn in pregnancy would identify additional patients with elevated levels, beyond those discovered via survey screening.

STUDY DESIGN: A prospective quality intervention study of lead exposure in pregnant patients at a tertiary urban center with high lead rates in the city. We screened patients at their first prenatal visit with a survey of their exposure and a blood lead level. "Yes" to any question or a blood lead level >5mg/dL were considered screening positive. Patients with positive screens were referred to the Community Health Worker for intervention, a detailed interview, in depth education on the risks of lead exposure, nutrition education and referrals to a dietician and a lead cleaning kit for use at home. Patients deemed appropriate by the Community Health Worker were also offered a home lead inspection and assessment.

RESULTS: In 2022-2023, the intervention clinic had 1717 new pregnancy encounters. 1229 completed surveys (71.6%) and 72 partially completed a survey (4.2%). Of those surveys, 155 patients (11.9%) screened positive for possible lead exposure. A total of 976 blood lead levels were drawn and resulted in 9 (0.9%) elevated lead levels, all of whom also screened positive for possible exposure on the survey. Of the 155 patients who screened positive, 70 kits were offered for lead intervention. 55 total kits were distributed. Of the patients with the home kits, 18 (33.3%) were referred for inspections. A third of the inspections required intervention.

CONCLUSION: The rate of elevated lead levels in pregnant patients living in areas with high lead exposure is low. It is feasible to conduct a screening protocol for lead exposure using a survey at the obstetric intake visit. The addition of serum lead screening did not increase the identification of high risk patients.



284 Postpartum diabetes screening rates and 1-year outcomes for individuals with early onset gestational diabetes

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OBJECTIVE: ACOG recommends early gestational diabetes (GDM) screening for at risk patients. GDM increases the subsequent risk of developing diabetes mellitus (DM) however compliance with postpartum DM screening is low. Current data does not stratify which GDM patients are at greatest risk of developing postpartum DM. We aim to summarize postpartum screening practices and outcomes for patients with 3 or 4 abnormal values on early 3-hour GTT.

STUDY DESIGN: This is a retrospective study of individuals delivering at a tertiary hospital from 2013 to 2021 with a 3-hour GTT

completed before 26 weeks. Patients with pregestational DM, multifetal gestations, or who delivered before 24 weeks were excluded. Data was extracted from the electronic medical record. Frequencies and chi-square tests of association were performed using SAS.

RESULTS: In our analysis of 151 patients, 111 had 3 and 40 had 4 abnormal values. There were no differences in patient characteristics. 84 (55.63%) had a 2-hour GTT or A1c within 1 year of delivery. 63 patients completed either a 2-hour GTT or A1c within 6 weeks postpartum. Of those, 5 (7.94%) met criteria for DM. 46 patients completed either a 2-hour GTT or A1c after 6 weeks postpartum but up to 1 year post-delivery. Of those, 13 (28.26%) met criteria for DM. Those with 4 abnormal values were more likely to have completed postpartum 2-hour GTT compared to those with 3 abnormal values, p=0.016 (Table). Those who had 4 abnormal values were more likely to be diagnosed with DM postpartum with OR 4.31 (CI 1.49-12.53) compared to those with 3 abnormal values.

CONCLUSION: Patients with 4 abnormal early 3-hour GTT values were more likely to undergo postpartum DM screening and screen positive for DM compared to those with 3 abnormal values. Many patients with 3 or 4 abnormal values did not complete postpartum DM screening. This work emphasizes the importance of adherence to recommended screening guidelines postpartum and the need for close communication with primary care providers to ensure adequate postpartum DM follow up.

Table: Patient characteristics and postpartum diabetes evaluation for individuals with 3 or 4 abnormal values on early glucose tolerate testing

	Number of abnormal glucose values on early GTT		
Patient characteristics	**3 abnormal values n=111 n (%)**	**4 abnormal values n=40 n (%)**	p-value
Age <35 years old	49 (44.1)	19 (47.5)	0.72
Nulliparous	80 (72.7)	24 (60.0)	0.14
Postpartum BMI ≥30	89 (81.2)	37 (92.5)	0.07
Baseline cHTN	24 (21.6)	8 (20.0)	0.83
HDP	32 (28.8)	14 (35.0)	0.47
Type of evaluation			
A1c	36 (32.4)	13 (32.5)	0.99
fasting glucose	40 (36)	22 (55.0)	**0.04**
2-hour GTT	37 (33.3)	22 (55.0)	**0.02**
random glucose	26 (23.4)	16 (40.0)	**0.04**
Diagnosed with DM postpartum°	**7 (6.3)**	**9 (22.5)**	**0.004**

° DM diagnosed by a hemoglobin A1c values >6.4, fasting glucose value of >125 mg/dl, 2-hour post 75g glucose load value of >199mg/dl, or random glucose ≥200 mg/dL

Abbreviations: GTT (glucose tolerance test), BMI (body mass index), cHTN (chronic hypertension), HDP (hypertensive disease of pregnancy – includes gestational hypertension, preeclampsia, eclampsia, and hemolysis, elevated liver enzymes and low platelets), DM (diabetes mellitus)

285 Safety and performance of a cloud-based fetal and maternal monitoring system

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OBJECTIVE: To demonstrate the safety and performance of a remote, wireless, cloud-based monitoring system for fetal and maternal heart rate (FHR and MHR). Uterine activity (UA) monitoring was assessed as a secondary objective.

STUDY DESIGN: A multi-center, single-arm, prospective paired comparison study was conducted to evaluate safety and compare FHR and MHR acquired with a new antenatal monitoring system (M•care System, Marani Health) to simultaneously acquired FHR and MHR measured with a standard cardiotocography (CTG) device and pulse-oximetry, respectively. UA was compared against tocodynamometry (TOCO). Eligible subjects had singleton pregnancies with gestations ≥ 32 weeks and BMI between 15 and 45 kg/m^2. Recruitment occurred on Labor and Delivery units, antepartum floors and outpatient settings across three sites. Bland-Altman 95% Limits of Agreement (LoA_{95}) between the M•care System and CTG measures and pulse oximetry were compared against equivalence thresholds of 15 beats per minute (BPM) for FHR and 10 BPM for MHR. Three blinded physicians independently assessed M•care UA in comparison to TOCO.

RESULTS: Performance data was available for 80 subjects. Demographic and clinical characteristics of the study population are displayed (Table). Between device FHR differed by 0.18±4.77 (mean±SD) BPM, with a lower LoA_{95} [95% CI] of -4.45 [-5.26, -3.61] and upper LoA_{95} of 6.64 [5.25, 8.45] BPM. Between device MHR differed by 0.28±2.48 (mean±SD) BPM, with a lower LoA_{95} [95% CI] of 2.26 [-2.74, -1.95] and upper LoA_{95} of 2.93 [2.52, 3.32] BPM. However, only 57% of TOCO contractions were detected in M•care UA. One mild adverse event occurred, a skin reaction to the exfoliating agent, prior to placement of the study device.

CONCLUSION: The M•care System is safe and its performance is comparable to CTG and pulse oximetry. It is not sufficiently sensitive to measure UA. This technology could support home-based antenatal maternal and fetal monitoring to enable patients and providers to connect efficiently and potentially reduce patient travel and childcare burden.

Table: Subject Demographic and Clinical Characteristics

	Subjects (N=80)
Demographics	
Age	32.0 (22.0, 41.0)
Gestational age (weeks)	39.1 (32.6, 41.4)
Ethnicity	
Not Hispanic or Latino	93.5% (72/77)
Hispanic or Latino	6.5% (5/77)
Race	
White	77.5% (62/80)
Black or African American	5.0% (4/80)
American Indian or Alaska Native	3.8% (3/80)
Asian	5.0% (4/80)
Other	2.5% (2/80)
Unknown	6.3% (5/80)
BMI (kg/m^2)	29.4 (21.6, 43.7)
BMI Group	
Low (≤ 29 kg/m^2)	45.0% (36/80)
Medium (>29 and ≤ 35 kg/m^2)	38.8% (31/80)
High (>35 and ≤ 45 kg/m^2)	16.3% (13/80)
Clinical Characteristics	
GDM	7.5% (6/80)
HTN/preeclampsia	25.0% (20/80)
Induction of labor	77.5% (62/80)
Placenta previa	1.3% (1/80)
Prior preterm birth	6.3% (5/80)

Data presented as % (n/N) or median (min, max)
BMI: body mass index kg/m^2; GDM: gestational diabetes mellitus; HTN: gestational hypertension

286 Amnioinfusion for intrauterine neuroprotection: A pilot randomized feasibility trial

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OBJECTIVE: Amnioinfusion (AI) has the potential to reduce neurologic injury in at risk fetuses via in-utero hypothermia. We performed a pilot randomized controlled trial to assess the feasibility and effects of AI with room-temperature fluid in such fetuses.

STUDY DESIGN: Participants in labor with term singleton pregnancies who developed risk factors for fetal neurologic injury (chorioamnionitis or Category 2 fetal heart tracing) underwent intrauterine pressure catheter placement and randomization to continuous AI of room-temperature fluid or no AI until delivery. Intrauterine temperature (IUT) was monitored with a temperature probe (DataTherm II, Medline). The primary outcome was umbilical artery lactate (UAL). Secondary outcomes included neonatal core temperature within 10 minutes of birth, IUT at 10 minute intervals, composite maternal and neonatal morbidity, decisional self-efficacy and labour agentry scores. To detect a 50% difference in UAL (similar to fetal morbidity data from intrauterine ischemia), 13 participants were needed in both groups (2-tailed test, alpha 0.5, 10% attrition). Analysis was by intention-to-treat. ClinicalTrials.gov Identifier: NCT05513690

RESULTS: Of 226 women approached, 85 (37.6%) were consented with 26 randomized. At baseline, the study groups were similar. UAL did not significantly differ between the AI (median [interquartile range] 5.1 [4.5-7] mmol/L) and no AI group (4.4 [3.6-5.6] mmol/L; p=0.18). IUT, neonatal core temperature, and composite maternal and neonatal morbidity did not significantly differ. Decisional self-efficacy and labour agentry scores were similarly high between groups.

CONCLUSION: Continuous AI with room-temperature fluid in fetuses at risk for neurologic injury is feasible but did not lower neonatal core temperature or UAL. Future research should examine whether AI with cold-fluid will achieve in-utero hypothermia and reduce neurologic injury.

Table 1. Effects of room temperature amnioinfusion in fetuses at risk for neurologic injury.

Feasibility Outcomes	Amnioinfusion N=13 (Intervention)	No Amnioinfusion N=13 (Control)	p-value
Umbilical Artery Cord Blood			
Lactate mmol/L	5.1 [4.5-7]	4.4 [3.6-5.6]	0.24
Maximum	9.9	12.9	--
Minimum	4.0	2.7	--
pH	7.22 [7.19-7.29]	7.22 [7.21-7.26]	0.99
<7.1	0 (0%)	2 (15.4%)	0.48
pCO2 mmHg	56.4 [44.3-61.5]	55.5 [50.1-64.6]	0.66
HCO3 mmol/L	23.2 [19.4-24.7]	22.7 [20.5-25.2]	0.75
Base Excess mmol/L	-6.2 [-7.1 - -4.5]	-5.5 [-6.3- -3.9]	0.54
Intrauterine temperature, Fahrenheit	99.3 [98.4-99.8]	99.1 [98.7-99.4]	0.42
Max	100.4	99.8	--
Min	88.8	90.4	--
Neonatal core temperature, Fahrenheit	99.5 [98.9-100.3]	100.3 [99.3-100.9]	0.42
Max	102.9	101.3	--
Min	97.8	98.2	--
Composite Neonatal Morbidity†	2 (15.4%)	3 (23.1%)	0.99
Composite Maternal Morbidity‡	5 (38.5%)	4 (30.8%)	0.99
Decision Self Efficacy	100% [97.7-100]	100% [95.5-100]	0.68
Labour Agentry Score	188 [176-197]	167 [123-196]	0.14

Data are median [inter-quartile range] or n (percentage); p-value calculated using Mann-Whitney or Fishers
†Composite neonatal morbidity defined as death, respiratory distress syndrome, oxygen, mechanical ventilation, sepsis, hypoxic-ischemic encephalopathy, seizures, APGAR < 5, or neonatal intensive care unit admission.
‡Composite maternal morbidity defined as amniotic fluid embolism, acute respiratory distress syndrome, pulmonary edema, intubation, hemorrhage, blood transfusion, disseminated intravascular coagulation, hysterectomy, endometritis, chorioamnionitis, and sepsis

287 Aspirin restores preeclamptic placental mesenchymal stem cells for licensing to immune suppressor cells

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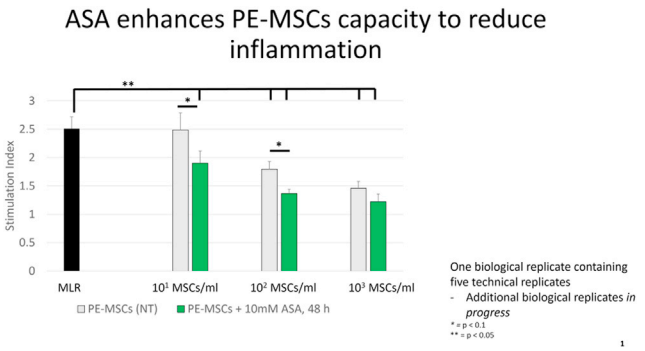
OBJECTIVE: Preeclampsia (PE) affects 2-8% of pregnancies globally and can lead to serious complications. Pregnancy depends on the maternal immune system's ability to tolerate the allogeneic fetus.-Transforming growth factor β (TGF-β) plays a role in this process. MSCs are normally licensed, or educated, by inflammation to act as anti-inflammatory cells. Omics studies in our group identified increased TGF-β signaling when PE-derived placental mesenchymal stem cells (PE-MSCs) were treated with aspirin (ASA). We tested the hypothesis that PE-MSCs restored with ASA can mitigate inflammation.

STUDY DESIGN: We obtained placentas from singleton pregnancies at or near term from healthy and PE patients; excluding subjects with abnormal placentas, infections or preexisting medical comorbidities. MSC identity was confirmed by flow cytometry and multilineage differentiation capacity. We tested the density of TGF-β receptor and amount of active cytokine induced by ASA treatment. Immune suppression by ASA-treated MSCs was assessed in a 2-way mixed lymphocyte reaction (MLR) in which PE-MSCs were added as third-party cells after ASA treatment.

RESULTS: ASA increased TGF-β receptor density, with untreated PE-MSCs expressing undetectable TGF-β receptor and ASA treatment yielding strong expression. ASA treatment led to a >100 fold increase in active TGF-β cytokine production. Functionally, the ASA-treated PE-MSCs were 30% more effective at suppressing T-cell proliferation than untreated PE-MSCs.

CONCLUSION: The data illustrate a possible mechanism through which ASA enhances PE-MSCs' anti-inflammatory capacity through TGF-β. Specifically, ASA treatment yields increased levels of active TGF-β cytokine with concomitant increased TGF-β receptor expression, suggesting that not only are the MSCs producing more of

this anti-inflammatory cytokine, but are more susceptible to it as well. The findings support our hypothesis that the newly licensed ASA-treated PE-MSCs can mitigate inflammation in subjects with PE to decrease the clinical phenotype.



288 Amlodipine versus nifedipine ER for the management of postpartum hypertension: a noninferiority randomized controlled trial

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OBJECTIVE: Hypertensive disorders of pregnancy (HDP) are a leading cause of maternal morbidity, yet data comparing postpartum hypertension (PPHTN) medications are limited. We sought to compare the effectiveness of 2 dihydropyridine calcium channel blockers: amlodipine, which is often used as first-line monotherapy for non-obstetric hypertension, and nifedipine ER, which is frequently used for PPHTN. We hypothesized that amlodipine is non-inferior to nifedipine ER for PPHTN control, as defined by time from delivery until discharge (PPLOS).

STUDY DESIGN: This was a pragmatic, noninferiority RCT at a single regional perinatal center. Patients with unmedicated HDP were randomized 1:1 to postpartum treatment with amlodipine or nifedipine ER, stratified by underlying chronic hypertension (CHTN). The primary outcome was PPLOS with a non-inferiority limit of 24 hrs. Secondary outcomes included readmission rate, side effects, and medication discontinuation. Primary analysis was intent-to-treat; secondary analysis was performed on an as-treated cohort (AT). Wilcoxon rank sum, ANOVA, and logistic regression were utilized as appropriate.

RESULTS: **175** patients met inclusion criteria and were randomized, 87 to amlodipine and 88 to nifedipine ER. 120 were evaluated in the AT cohort. Baseline characteristics were balanced (Table). Median PPLOS was 73.5 hrs. for amlodipine and 72 hrs. for nifedipine ER, consistent with noninferiority ($p< 0.001$). Noninferiority was maintained in the AT cohort and in those with CHTN. There was no difference in readmission (4.1% amlodipine vs 5.1% nifedipine ER, $p=0.77$). Patients exposed to nifedipine ER experienced more hypotension (OR 4.6, 95% CI 1.72-14.63) and tachycardia (OR 2.25, 95% CI 1.08-4.78) compared to patients exposed to amlodipine. Seven patients (10%) exposed to nifedipine ER discontinued medication due to side effects, compared to none exposed to amlodipine.

CONCLUSION: Amlodipine is non-inferior to nifedipine ER in managing PPHTN as measured by PPLOS. Readmission rates were similar and amlodipine discontinuation was lower. Amlodipine should be considered for PPHTN management.

Characteristic	Amlodipine (n = 87)	Nifedipine ER (n = 88)
Maternal age	27.9 (6.8)	27.8 (5.9)
BMI at delivery	36.8 (9.3)	37.0 (10.1)
Parity	1.2 (1.7)	1.1 (1.3)
GA at delivery	35.7 (2.5)	35.6 (3.3)
Mode of delivery		
Vaginal	40 (46.0)	44 (50.0)
Cesarean	47 (54.0)	44 (50.0)
Hypertensive diagnosis*		
CHTN	21 (24.1)	22 (25.0)
Preeclampsia without SF	3 (3.5)	3 (3.4)
Preeclampsia with SF	84 (96.6)	81 (92.1)
History of diabetes		
None	71 (81.6)	66 (75.0)
Gestational	8 (9.2)	15 (17.1)
Pre-gestational	8 (9.2)	7 (7.9)

Continuous variables presented as mean (standard deviation). Categorical variables presented as n (%). BMI = body mass index, GA = gestational age, CHTN = chronic hypertension, SF = severe features. *May have more than 1 diagnosis.

289 Is duration of labor during induction termination associated with adverse maternal outcomes?

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OBJECTIVE: Though duration of labor is associated with adverse maternal outcomes in term labor, there are scant data to evaluate this association during induction termination (IT). We evaluated the relationship between duration of labor during IT and adverse maternal outcomes.

STUDY DESIGN: We performed a retrospective cohort analysis of all individuals undergoing IT with a singleton gestation with no evidence of rupture of membranes, preterm labor, or cervical insufficiency at 3 tertiary care centers in Chicago, IL from 2009-2019. The primary exposure was the duration of labor for complete fetal expulsion in hours, analyzed categorically (duration of labor < 18 hours v. ≥ 18 hours) and continuously. The primary outcome was composite maternal morbidity (i.e., uterine rupture, need for blood transfusion, suspected intraamniotic infection [IAI], and/or intensive care unit admission). Bivariate and multivariate regression analyses were performed. A priori covariates included gestational age and use of mifepristone. Other covariates were included if $p < 0.10$ on bivariate analysis. Tests of homogeneity were performed based on prior history of cesarean birth. A Kaplan-Meier curve was generated, censoring at the time the primary outcome was met.

RESULTS: 506 individuals were included (Table). When evaluating duration of labor continuously, longer duration was associated with increased frequency of maternal morbidity on bivariate (β coefficient 0.05, 95% CI 0.02-0.07) and multivariate analyses, after additionally adjusting for nulliparity and maternal age (aβ coefficient 0.04, 95%

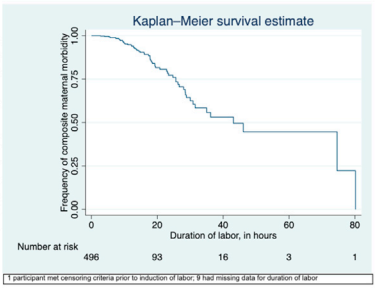
CI 0.02-0.07, see Figure). When evaluating duration of labor categorically, those with labor ≥ 18 hours had an elevated risk for maternal morbidity on bivariate (RR 2.55, 95% CI 1.61-4.06) and multivariate analyses (aRR 2.70, 95% CI 1.70-4.28). Tests of homogeneity showed no difference in risk based on history of cesarean birth.

CONCLUSION: Duration of labor is independently associated with risks for adverse maternal outcomes during IT. Further research should evaluate interventions to reduce the duration of labor in the setting of IT.

Table. Biomedical and sociodemographic data of pregnant people undergoing induction termination, by duration of labor

	< 18 hours (n=380)	≥ 18 hours (n=126)	p-value[a]
Age, in years		33 (28-36)	0.09
Self-reported race/ethnicity			
NHW	140 (36.9)	49 (38.9)	0.60
NHB	92 (24.2)	37 (29.3)	
Latinx	79 (20.8)	19 (15.1)	
AAPI	21 (5.5)	6 (4.8)	
Other or not defined	48 (12.6)	15 (11.9)	
Gestational age, in weeks	21 (19-22)	21 (20-23)	**0.005**
Body mass index (kg/m²)[b]	27.2 (23.7-32.4)	27.7 (24.0-33.3)	0.52
Nulliparous	133 (29.7)	65 (51.6)	**<0.001**
History of cesarean birth[c]	75 (19.7)	24 (19.4)	0.93
Site of delivery			
Northwestern University	221 (58.2)	61 (48.4)	0.16
Rush University	80 (21.0)	32 (25.4)	
University of Chicago	79 (20.8)	33 (26.2)	
Indication for induction/termination			
Intrauterine fetal demise	185 (46.7)	45 (35.7)	**0.03**
Fetal anomaly	164 (43.2)	70 (55.6)	
Maternal comorbidity	21 (5.5)	5 (4.0)	
Other or not defined	10 (2.6)	6 (4.8)	
Induction of fetal asystole[d]	56 (29.2)	19 (23.5)	0.33
Use of misoprostol for induction method	357 (93.9)	95 (75.4)	**<0.001**
Dose of misoprostol administered, in mcg[e]	1200 (1000-1600)	2400 (1600-3200)	**<0.001**
Mifepristone administered	107 (28.2)	33 (26.2)	0.67
Maternal morbidity	33 (8.7)	28 (22.2)	**<0.001**
Uterine rupture[e]	1 (0.3)	1 (0.8)	0.44
Need for blood transfusion[e]	8 (2.1)	4 (3.2)	0.51
Suspected IAI[f]	23 (6.1)	25 (19.8)	**<0.001**
Intensive care unit admission[g]	4 (1.1)	0 (0.0)	0.58

Data are median (IQR) or n (%) unless otherwise specified. Bold indicates statistical significance < 0.05
[a]Chi-squared or Fisher's exact test for categorical variables, Wilcoxon rank-sum test for continuous variables
[b]Available for 491 participants
[c]Available for 504 participants
[d]Available for 273 participants, excluding individuals presenting with intrauterine fetal demise
[e]Available for 503 participants
[f]Available for 502 participants
AAPI = Asian-American/Pacific Islander; m=meter; IAI = intraamniotic infection; mcg = micrograms, kg = kilogram, NHB = Non-Hispanic Black, NHW = Non-Hispanic White



[1] participant met censoring criteria prior to induction of labor; 9 had missing data for duration of labor

290 Analysis of the plan of safe care for parent-child dyads affected by opioid use

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OBJECTIVE: In an effort to address the opioid epidemic, the Comprehensive Addiction and Recovery Act of 2016 (CARA) was passed as a provision of the Child Abuse Prevention and Treatment Act (CAPTA), which expanded use of Plans of Safe Care (POSC) for all infants affected by substance use in pregnancy. There is limited data on parent-child outcomes as it relates to this federal mandate. The goal of this study was to evaluate the outcomes of POSC, specifically the use of medications for opioid use disorder (MOUD) at time of delivery, return to opioid use, and custody of infant at discharge.

STUDY DESIGN: This is a retrospective cohort study of pregnant person-infant dyads who delivered at a tertiary care hospital from January 2019-July 2023. Medical records were reviewed for demographics and clinical characteristics as well as documentation of a POSC. Univariate analysis was completed using chi-square tests and Student's t-test where appropriate. Bivariate logistic regression was used to generate odds ratios (OR) and 95% confidence intervals (CI). Significance was pre-specified as $p < 0.05$.

RESULTS: Of 274 dyads analyzed, 72 had a documented POSC. There was no difference in rates of MOUD or removal of parental custody at discharge between the groups. In a subgroup analysis of dyads with complete data for 12 months after delivery, there was no difference in rates of return to opioid use. On multivariate analysis, we found that any maternal psychiatric condition (OR 2.92, 95% CI [1.03-8.28], $p = 0.044$) or Hispanic ethnicity (OR 3.87 95% CI [1.54-9.73], $p = 0.004$) was associated with having a POSC. Having a documented POSC ultimately increased the odds of a child protective services (CPS) case (OR 2.71, 95% CI [1.328-5.513], $p = 0.006$).

CONCLUSION: A documented POSC is not associated with MOUD utilization in pregnancy, loss of custody, or rate of return to opioid use. However, POSC is associated with a 2.7-fold increase in CPS involvement. These data support a need to refocus POSC efforts to align with the original goals of the policy, generate supportive and evidence-based services, and avoid discriminatory application.

	Plan of safe care (N = 72)	No plan of safe care (N = 202)	p-value
Average maternal age	32.11	32.68	0.462
Treatment with medications for opioid use disorder	31 (64.6%)	101 (66.0%)	0.856
Discharge with biological parent	52 (72.2%)	133 (65.8%)	0.321
Open DCF case at time of discharge	35 (48.6%)	59 (29.4%)	0.003
Reported maternal psychiatric condition	42 (89.4%)	108 (74.5%)	0.032
Return to use within the 1st year postpartum*	12 (27.3%)	29 (31.9%)	0.586

*Calculated based on dyads for which complete return-to-use data was available.

291 Association of resolving placenta previa and other early sonographic markers with postpartum hemorrhage

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OBJECTIVE: Low placentation is associated with increased risk of postpartum hemorrhage (PPH). There is a paucity of data on the association between low placentation on second trimester ultrasound that later resolves, and PPH. We hypothesized that due to lower uterine segment neovascularization seen with low placentation, it's resolution before labor does not eliminate the increased risk of PPH. Aim of this study was to investigate association of low placentation and other early prenatal ultrasound markers, and future development of PPH.

STUDY DESIGN: This was retrospective matched case-control (1:1) study of full term, singleton pregnancies complicated by PPH who delivered vaginally at our regional perinatal referral center between 2018 - 2022. PPH was defined as blood loss > 1L within 24 hours of delivery. Primary exposure variable was second trimester placenta previa (defined as complete or marginal previa, or low-lying placenta within 10mm from internal os) that resolved prior to labor. Additional exposure variables included leiomyoma, first trimester subchorionic hematoma, and second trimester cervical length< 25mm, polyhydramnios or estimated fetal weight over 90%tile. Chi-square test and unpaired student t-test were used to compare categorical and continuous variables, respectively. Multivariable logistic regression was also performed.

RESULTS: We compared 400 gravidas with PPH to 400 without. They were matched by age, parity, gestational age at delivery and mode of delivery. PPH occurred more often in cases with resolved previa versus controls (12% vs 4.6%, $p < 0.01$). On multivariate analysis, those with resolved previa were 2.85 times more likely to have PPH, compared to controls, (95%CI 1.52-5.31, $p < 0.01$). PPH rate was also higher in those with leiomyoma (aOR 3.03, 95%CI 1.25-7.39, $p=0.01$). Rates of subchorionic hematoma, short cervical length,

polyhydramnios and estimated fetal weight >90% were similar between groups.

CONCLUSION: A finding of low placentation on second trimester ultrasound is associated with increased risk of PPH, even when it appears to resolve in the third trimester.

292 Adverse pregnancy outcomes with stimulant and opioid use disorder: costs of care and health-system implications

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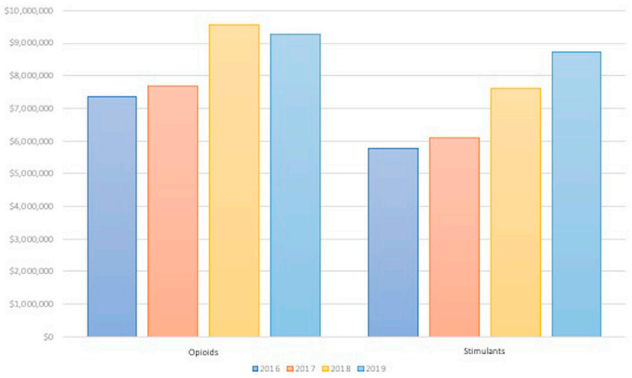
OBJECTIVE: This study was undertaken to identify the current public health cost burden of inpatient hospitalizations for adverse pregnancy outcomes (APO) in the context of stimulant and opioid use disorder (OUD).

STUDY DESIGN: We conducted a cross-sectional analysis of inpatient delivery admissions from the Healthcare Cost and Utilization Project (HCUP) National Inpatient Sample (NIS) from 2016 to 2019. APO was defined as a composite to include hypertensive disorders, antepartum or postpartum hemorrhage, preterm birth, and fetal growth restriction. Inpatient delivery admissions of patients with a stimulant or OUD and concomitant APO diagnosis were identified from NIS using ICD-10 codes and diagnosis related group (DRG) codes. Our primary outcome was total charges of the hospital stay with inflation related adjustments. Survey-weighted means and the percentage of change in total charges over time was calculated and compared across study years.

RESULTS: Inpatient delivery related hospitalizations for APO with stimulant or OUD increased from 2,212 in 2016 to 3616 in 2019. The median hospital charges for admissions with APOs with stimulant use disorder had an 8% increase ($22,108 to $23,827) and those with OUD had a 6% increase ($20,226 to $21,452) from 2016 to 2019. In comparison, delivery admissions with APOs in the absence of stimulant or OUD were noted to have a 1% increase ($21,686 to $21,965) from 2016 to 2019. Evaluation of the aggregate charges and costs, or the "National Bill" revealed that in 2019 the total costs of hospitalizations with APOs with stimulant use disorder was $8,727,192 and with OUD was $9,258,586. The total cost increase for inpatient management of APOs with stimulant use disorder was nearly 3 million dollars compared to an increase of 2 million dollars with OUD from 2016 to 2019 (Figure 1).

CONCLUSION: Our work provides an appreciation of the cost burden from APOs associated with opioid and stimulant use disorder, as an essential first step for designing system-level interventions for addressing the escalating costs of care associated with perinatal substance use disorder.

Figure 1. Aggregate Total Charges of Adverse Pregnancy Outcomes with Opioid and Stimulant Use Disorder in Pregnancy (2016-2019)



293 Cell-free RNA detection of "placental" and immunologic differentially-expressed genes in healthy pregnant vs. non-pregnant individuals

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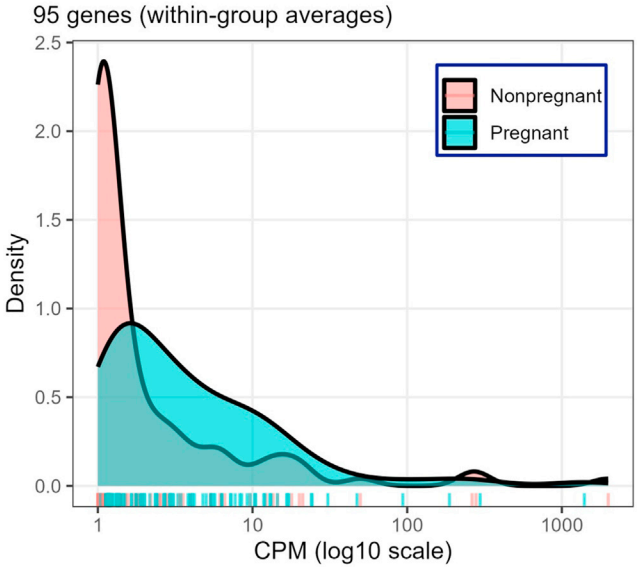
OBJECTIVE: A healthy pregnancy requires extensive physiological adaptations systemically and locally at the maternal-fetal interface. An inability to test all tissues during a pregnancy limits understanding of the transcriptomic shifts that occur from the non-pregnant (NP) to pregnant state. Using cfRNA from maternal blood, we sought to reveal changes in global gene patterns in diverse NP and pregnant individuals.

STUDY DESIGN: For pregnant participants (N=231), individuals had a median age of 32 (range: 20-45) years, BMI of 24 (15 - 60), had no comorbidities and delivered at term without any known pregnancy complications. Maternal blood was drawn at 19 (18-22) weeks. NP individuals (N=49) were 32 (22-40) years, BMI 32 (19-61) and were collected by Discovery Life Sciences. All samples were collected and processed using the same protocol. Differentially expressed genes (DEG) were determined by spearman correlation and gene set overrepresentation by msigdbr v7.5.1.

RESULTS: Pregnancy was associated with 7,301 DEG (adj $p < 0.001$), 38.5% of all plasma-detected genes. Top DEG are known pregnancy genes (top 3: CGA, CSH1, CSH2), with placental genes showing some of the largest differential expression, but 53 of 95 placental genes are also expressed in NP females, with 5 being significantly higher (fig1). Gene set analyses reveal overrepresentation of gene ontologies (GO) linked with immune genes, and even after excluding placental genes, the GO term for inflammatory response is the most overrepresented in pregnancy, demonstrating cfRNA can monitor immune modulation in addition to the fetal/placental genes.

CONCLUSION: Cell-free RNA demonstrates DEG between pregnant and NP individuals, providing insights into underlying biological changes. Placental genes are often expressed in NP females suggesting caution around analyses based on annotations. With several adverse pregnancy outcomes tied to immune response and the inflammatory response observed in these healthy pregnancies, cfRNA offers a comprehensive non-invasive approach to track physiologic changes, including immune response, in pregnancy.

Fig. 1 - Annotated placental genes detected in pregnant and non-pregnant individuals



294 Differences in demographic and obstetrical characteristics among pregnant women with and without COVID-19 vaccination

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OBJECTIVE: Coronavirus disease 2019(COVID-19) infection posed elevated risks of severe illness and adverse obstetrical outcomes for pregnant women. Limited data is available regarding women who have been vaccinated but remained uninfected. Therefore, our study aimed to compare demographic and clinical characteristics of vaccinated and unvaccinated pregnant women without COVID19 infection during the peripartum period.

STUDY DESIGN: We conducted a population-based study at a tertiary medical center, enrolling all women with singleton pregnancies who delivered between 2020 and 2022 and were uninfected with COVID-19. Exclusion criteria included women with incomplete medical records, multiple gestations, and fetal malformations. The study group consisted of women who had received the COVID-19 vaccine, the comparison group consisted of women who had not been vaccinated. We studied the differences in demographic and obstetrical characteristics between both groups. Women with peripartum infection with COVID-19 were excluded.

RESULTS: The study included a total of 26,250 women who met the inclusion criteria. Among them, 3,379 received COVID-19 vaccination. Among vaccinated women, there was significantly higher rate of women with Jewish ethnicity and women above the age of 35. In addition, women with COVID-19 vaccination were found to be significantly associated with an increased risk of cesarean delivery, gestational diabetes, oligohydramnios, induction of labor and epidural anesthesia. However, after conducting a multivariable logistic regression analysis and controlling for confounders the association remained significant only between COVID -19 vaccination and the use of epidural anesthesia (adjusted OR 1.46, 95% CI 1.31-1.63; p< 0.001).

CONCLUSION: In the vaccinated group, there was a significantly greater proportion of women aged 35 and above, as well as those of Jewish ethnicity. Additionally, pregnant women who received the COVID-19 vaccination demonstrated a notable increase in the use of epidural anesthesia.

Table: Demographic and obstetrical characteristics of pregnant women not infected with COVID-19: Comparison between Vaccinated and Non-Vaccinated Groups

Characteristics	Unvaccinated Women without COVID-19 Illness n=22871	Vaccinated Women without COVID-19 Illness n=3379	P- value
Ethnicity Jewish n (%)	7533 (33%)	2241 (66.3%)	<0.001
Bedouin Arab n (%)	15328 (67%)	1137 (33.7%)	
Maternal age 35 and above n (%)	3622 (15.8%)	826 (24.4%)	<0.001
Nulliparity n (%)	5524 (24.2%)	794 (23.5%)	0.4
Recurrent pregnancy losses[a] n (%)	955 (4.2%)	141 (4.2%)	0.99
Previous CD n (%)	3266 (14.3%)	498 (14.7%)	0.47
Obesity[b] n (%)	3271 (16.6%)	546 (17.8%)	0.11
Pre-gestational diabetes n (%)	153 (0.7%)	32 (0.9%)	0.12
Chronic HTN n (%)	73 (0.3%)	12 (0.4%)	0.74
Oligohydramnios n (%)	702 (3.1%)	128 (3.8%)	0.02
PROM n (%)	3660 (16%)	508 (15%)	0.16
PPROM n (%)	480 (2.1%)	82 (2.4%)	0.22
Placental abruption n (%)	101 (0.4%)	13 (0.4%)	0.77
Induction of labor[c] n (%)	3300 (14.4%)	598 (17.7%)	<0.001
Epidural n (%)	8481 (37.2%)	1737 (51.5%)	<0.001
Third- or fourth-degree perineal laceration n (%)	112 (0.5%)	10 (0.3%)	0.13
Episiotomy n (%)	1165 (5.1%)	128 (3.8%)	0.001
Maternal hospital stay above 4 days n (%)	3163 (13.8%)	480 (14.2%)	0.55

COVID-19 coronavirus disease-19, CD cesarean delivery, chronic HTN chronic hypertension, PROM Premature rupture of membranes, PPROM preterm premature rupture of membranes
[a] Defined as 3 or more pregnancy loses, [b] Defined as body mass index before pregnancy ≥ 30, [c]Includes oxytocin induction, extra-amniotic balloon induction and vaginal Prostaglandin induction.

295 Adolescent pregnancies between 2006-2019: Temporal trends, risk factors and adverse pregnancy outcomes

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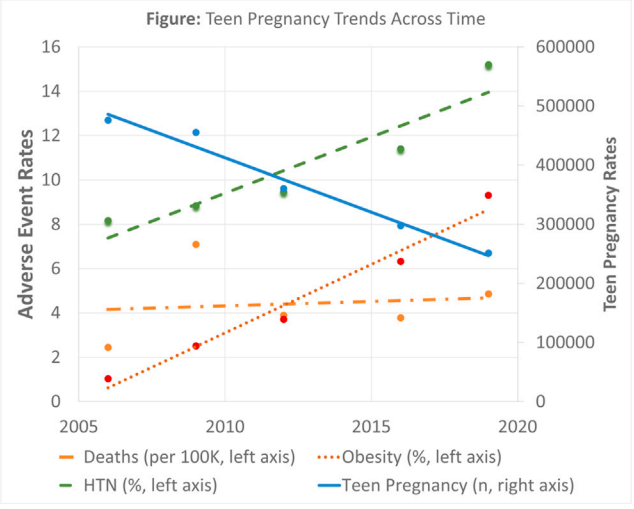
OBJECTIVE: Adolescent pregnancies (AP) pose significant psychosocial, economic and intergenerational burdens on the health system and society. While teens tend to be healthier at baseline, adverse pregnancy outcomes (APO) are a known risk. Trends, risk factors, and rates of these APO have not been quantified in the last decade. Given the increasing restrictions in reproductive options for pregnant individuals, we sought to evaluate modern trends in AP rates and associated APO.

STUDY DESIGN: We performed a retrospective cohort study using the Kids' Inpatient Database (KID) to identify pediatric admissions (9-20 years old) with ICD-9 and -10 codes pertaining to Labor and Delivery in years 2006, 2009, 2012, 2016, 2019 in the United States. We used descriptive statistics and Pearson's correlation to measure the association between each year analyzed and APO.

RESULTS: 1,840,913 AP were reported over the study period. AP disproportionately affects the South (44.5%), urban populations (80.4%), Caucasian and Hispanic (35.6% and 27.1%, respectively), lowest quartile of median household income (41.2%), public insurance (72.4%). AP rates have decreased over time (p=< 0.001), but mortality rates remained stable (p=0.04; Figure). Increasing trends (all p=< 0.0001) were noted for obesity (from 1% to 9.3%), type 2 diabetes (from 1.4% to 1.9%), hypertensive disorders (from 8% to 15%), multiple gestations (from 0.3% to 0.8%), length of stay (from 2.54 to 2.70 days), and severity of illness. Cesarean rates decreased from 19.5% to 16.8% (p=< 0.0001) Overall rates of gestational hypertension, preeclampsia, and eclampsia are 5.8%, 6.4%, and 0.14% respectively.

CONCLUSION: Despite decreasing rates, AP continues to disproportionately affect the South and lower income individuals and yield high rates of APO. These trends highlight the need to focus on preventative health, sex education, access to contraceptive and reproductive options, and prenatal care for this high-risk teen population.

Figure: Teen Pregnancy Trends Across Time



296 Large-for-gestational age with polyhydramnios on late third-trimester ultrasound is associated with cesarean delivery.

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OBJECTIVE: While not routinely performed in uncomplicated pregnancies, late third-trimester ultrasounds could be useful in improving maternal health outcomes. The purpose of this study was to determine the utility of late third-trimester ultrasound findings in predicting cesarean delivery (CD).

STUDY DESIGN: This is a retrospective cross-sectional study (IRB #4869) of singleton pregnancies with large-for-gestational age (LGA, defined as >90% Estimated Fetal Weight) and/or polyhydramnios (AFI ≥25 or MVP ≥8)findings on late third-trimester ultrasound delivered at a single academic medical center from April 2020 to April 2022. Patients were grouped according to ultrasound findings: 1) LGA or polyhydramnios alone and 2) LGA with polyhydramnios. Demographics and outcome data were analyzed using Fisher's exact tests and binary regression in SPSS.

RESULTS: A total of 220 patients were noted to have LGA and/or polyhydramnios on ultrasound performed between 34 and 38-weeks gestation. A significantly higher rate of cesarean delivery (CD) was seen among those patients with LGA and polyhydramnios (62.5%) compared to those with LGA or polyhydramnios alone (41.5%) (p=0.034) (data not shown). After controlling for maternal pre-pregnancy weight status, age, diabetes in pregnancy, gestational age at delivery, and infant sex, the odds of CD among patients with late ultrasound findings of LGA with polyhydramnios was 2.241 (CI .991-5.068, p=0.052) (Table 1).

CONCLUSION: LGA with polyhydramnios is associated with CD and can be evaluated on late third-trimester ultrasound. This information could be valuable in counseling patients on mode of delivery and its potential complications. Further investigation is warranted to establish whether late third-trimester ultrasound should be standard.

Table 1.

	Total N (%)	Vaginal Delivery N (%)	Cesarean Delivery N (%)	Unadjusted Odds (95% CI)	Adjusted Odds (95% CI)
Late Ultrasound Findings					
LGA or Polyhydramnios Alone	188 (85.5)	110 (90.2)	78 (79.6)	(ref)	(ref)
LGA with Polyhydramnios	32 (14.5)	12 (9.8)	20 (20.4)	2.350* (1.086-5.088)	2.241 (.991-5.068)
Maternal Age (years)	29.21 +/- 5.13	28.85+/- 5.30	29.65+/- 4.89	1.031 (.979-1.087)	1.105* (1.030-1.184)
Gestational Age (weeks)	38.84 +/-1.05	38.97+/- 1.03	38.67+/- 1.07	.759* (.586-.983)	.792 (.571-1.099)
Pre-Pregnancy BMI					
Healthy weight (BMI 18.5 to <25)	51 (23.3)	37 (30.6)	14 (14.3)	(ref)	(ref)
Overweight (BMI 25.0-<30)	63 (28.8)	34 (28.1)	29 (29.6)	2.254* (1.023-4.966)	2.239 (.987-5.081)
Obese Class 1 (BMI 30.0 and <40)	74 (33.8)	38 (31.4)	36 (36.7)	2.504* (1.164-5.383)	2.376* (1.063-5.311)
Obese Class 3 (BMI 40.0 or higher)	31 (14.2)	12 (9.9)	19 (19.4)	4.185* (1.620-10.809)	3.907* (1.458-10.473)
Diabetes in Pregnancy					
No	176 (78.6)	102 (83.6)	71 (72.4)	(ref)	(ref)
Yes	47 (21.4)	20 (16.4)	27 (27.6)	1.939* (1.010-3.725)	1.450 (.719-2.925)
Infant Sex					
Female	92 (41.8)	54 (44.3)	38 (38.8)	(ref)	(ref)
Male	128 (58.2)	68 (55.7)	60 (61.2)	1.254 (.730-2.154)	1.218 (.687-2.156)

*$p<05$

297 12 versus 24 hours of postpartum magnesium sulfate for seizure prophylaxis: a cost-effective analysis

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OBJECTIVE: To assess the cost-effectiveness of using 12 hours versus 24 hours of postpartum magnesium sulfate for preeclampsia with severe features to prevent eclampsia.

STUDY DESIGN: We developed a decision-analysis model to determine the cost-effectiveness of 12 versus 24 hours of postpartum magnesium sulfate to prevent eclampsia using TreeAge software. Outcomes

included maternal death, eclampsia, eclampsia within 0-12 hours postpartum, eclampsia within 12-24 hours postpartum, and magnesium toxicity in a theoretical cohort of 47,000 patients diagnosed with preeclampsia with severe features. Probability estimates for seizure, magnesium side effects, toxicity, and the cost of nursing ratios were determined from the literature. The cost-effectiveness threshold was set to $100,000/QALY.

RESULTS: 12 hours of postpartum magnesium sulfate results in 88 more instances of eclampsia in our theoretical cohort compared to 24 hours. However, 12 hours has 169 more QALYs than 24 hours and costs $15 million less than 24 hours. Overall, this is a cost-saving strategy: -$88k/QALY. NNT: 531 people with preeclampsia with severe features treated with 24 hours of postpartum magnesium sulfate to prevent 1 instance of eclampsia.

CONCLUSION: Though there are more instances of eclampsia, and 1-2 additional maternal deaths in the 12-hour group compared to the 24-hour group, the possibility of time not on magnesium sulfate, with its toxicity risk and disutility, is driving the overall relative QALY increase and cost savings of the 12-hour treatment dose. The routine use of 12 hours of postpartum magnesium sulfate should be considered for patients with preeclampsia with severe features in a shared decision-making approach.

Table 1. Outcomes associated with 12 versus 24 hours of postpartum magnesium sulfate with a theoretical cohort of 47,000.

Variable	*12 hours*	*24 hours*	*Difference*
Maternal death	17	15	2
Eclampsia	409	321	88
Eclampsia 0-12 hours	256	256	0
Eclampsia 12-24 hours	153	64	89
Magnesium toxicity	3489	4024	-535
Cost (USD)	$97,616,625	$112,564,683	-$14,948,058
Effectiveness (QALYs)	251	81	170

QALYs, quality-adjusted life-years.

298 Alternative regimens in the treatment of toxoplasmosis during 2nd & 3rd trimester pregnancies

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OBJECTIVE: In high-risk and underserved communities, treatment of otherwise uncommon diseases like toxoplasmosis for pregnant patients poses a significant challenge given limited medication availability, cost, and lack of subspecialty providers. This study sought to evaluate the safety and effectiveness of alternative antibiotic regimens in the treatment of toxoplasmosis for 2nd and 3rd trimesters.

STUDY DESIGN: We conducted a multicenter, prospective observational study from 7/2021 to 7/2023 comparing all pregnant patients who were diagnosed with toxoplasmosis in the 2nd or 3rd trimester and completed treatment. Patients were divided into two treatment groups: those who received pyrimethamine/leucovorin (PL) and those who received amoxicillin/clavulanic acid plus azithromycin (ACA). The treatment method was determined by medication availability, where the first attempt was always the preferred regimen through the Centers for Disease Control and Prevention. If there were barriers to obtaining such treatments, those patients were included in the alternative group. Patients were excluded if there was insufficient treatment compliance or immunosuppressive medical conditions. Primary outcomes included the resolution of maternal symptoms by physician clinical assessment, development of fetal hydrocephalus, clearance of maternal IgM serology, and 1 and 5-minute APGAR scores less than 7, as discrete events.

RESULTS: The study included 88 patients: 52 receiving PL regimens and 36 receiving ACA regimens. Baseline demographics, method of delivery, and rates of fetal hydrocephalus were not significantly different. Rates of treatment compliance were higher in the alternative regimen group (91.7% v. 88.5%, $p = 0.002$). Rates of fetal hydrocephalus, clearance of IgM, and APGAR scores were not significantly different. No adverse medication events were noted in either group.

CONCLUSION: Amoxicillin/clavulanic acid plus azithromycin treatment regimens are safe and effective for toxoplasmosis in pregnancy, with potential added benefits for underserved populations, including decreased barriers to use and increased compliance.

299 Acute post-neuraxial hypotension in patients with hypertensive disorder is associated with fetal acidemia

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OBJECTIVE: Maternal hypotension is a common complication of neuraxial anesthesia, and maternal hypotension has been associated with fetal acidemia. We aimed to determine if pregnancies with hypertensive disorders (HDP) that experienced acute post-neuraxial hypotension were associated with fetal acidemia.

STUDY DESIGN: Retrospective cohort study of non-labor, term, singleton, non-anomalous births via cesarean delivery under neuraxial anesthesia from 2013-2019 that experienced acute post-neuraxial hypotension (systolic blood pressure < 100 mmHg recorded prior to delivery). We compared rates of adverse outcomes in pregnancies with or without HDP defined as gestational hypertension, chronic hypertension, and pre-eclampsia without severe features. Primary outcome was umbilical artery pH < 7.1. Secondary outcomes included umbilical artery pH < 7.2, umbilical cord base deficit of > 8, umbilical cord base deficit of > 12, 5-minute APGAR < 7, neonatal intensive care unit (NICU) admission, and meconium-stained amniotic fluid. Chi-square and multivariate regression tests determined the strength of association.

RESULTS: Of 2851 included subjects, 189 (6.63%) had an HDP while 2662 (93.37%) did not. Pregnancies with HDP had higher BMI, higher rates of diabetes, more often received combined spinal-epidural analgesia, and had longer procedural time from neuraxial placement to delivery (all $p < 0.01$). After adjusting for confounders including maternal BMI, type of neuraxial anesthesia, and time from neuraxial anesthesia to delivery, pregnancies complicated by HDP with acute post-neuraxial hypotension were associated with

umbilical artery pH < 7.1 (aOR 1.75; 95% CI 1.02-3.06) and umbilical cord base deficit >8 (aOR 1.76; 95% CI 1.04-2.98).

CONCLUSION: Findings suggest that among pregnancies that experience an acute post-neuraxial hypotensive episode, those complicated by HDP are associated increased odds of fetal acidemia compared to normotensive pregnancies. Further studies are needed to better determine the effect of hypotensive insult on fetal academia in pregnancies complicated by HDP.

Univariate analysis of post-neuraxial hypotension and adverse outcomes

	No HDP (n=2662)	HDP (n=189)	p-value
Umbilical Artery pH <7.1, n (%)	115 (4.32)	20 (10.58)	<0.01
Umbilical Artery pH <7.2, n (%)	515 (19.35)	60 (31.75)	<0.01
Umbilical Cord Base Deficit >12, n (%)	57 (2.57)	6 (4.05)	0.28
Umbilical Cord Base Deficit >8, n (%)	159 (7.18)	21 (14.19)	<0.01
5-Min Apgar <7, n (%)	6 (0.23)	2 (1.06)	0.04
NICU Admission, n (%)	138 (5.22)	19 (10.11)	<0.01
Meconium-Stained Amniotic Fluid, n (%)	76 (2.86)	8 (4.23)	0.28

Multivariate logistic regression of post-neuraxial hypotension and adverse outcomes*

*Adjusted for BMI at time of delivery, type of neuraxial anesthesia, and time from neuraxial to delivery

	Unadjusted OR	Adjusted OR*
Umbilical Artery pH <7.1	2.62 (1.59-4.32)	1.75 (1.02-3.06)
Umbilical Artery pH <7.2	1.94 (1.41-2.67)	1.26 (0.89-1.79)
Umbilical Cord Base Deficit >12	1.60 (0.68-3.77)	1.29 (0.51-3.26)
Umbilical Cord Base Deficit >8	2.14 (1.31-3.49)	1.76 (1.04-2.98)
5-Min Apgar <7	4.73 (0.95-23.62)	2.37 (0.36-15.46)
NICU Admission	2.04 (1.23-3.38)	1.48 (0.86-2.56)
Meconium-Stained Amniotic Fluid	1.50 (0.71-3.16)	1.00 (0.45-2.24)

300 Association between fetal anomalies and rurality

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OBJECTIVE: To determine if there is an association between fetal anomalies and rural versus urban areas.

STUDY DESIGN: Retrospective cohort analysis using data abstracted from the California Office of Statewide Health Planning and Development (OSHPD) Linked Birth File with hospital discharge International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) diagnoses between 2007 and 2012. Pregnancies in women were stratified into three community types: metropolitan, small town, and rural. The primary outcome of interest was risk of all fetal anomalies. Secondary outcomes included risk of individual anomalies including abdominal wall defects, anencephaly, neural tube defects, diaphragmatic hernia, heart defects, cleft lip and palate, limb defects, down syndrome, chromosomal defects, and other anomalies. Logistic regression analysis was performed to estimate the odds ratio of the outcome of interest for each community type while adjusting for confounding variables.

RESULTS: There were a total of 1,831,360 pregnancies. Pregnant women living in small town areas had the largest percentage of women with fetal anomalies at 0.48%. Women in metropolitan areas had the lowest percentage of women with fetal anomalies at 0.3%. Pregnancies in small town areas had increased risk of fetal anomalies with OR 1.6 (p-value < 0.001; CI 1.29-1.99). The risk of fetal anomalies in rural areas was OR 1.51 (p-value < 0.001; CI 1.14-2.00). There was a higher risk of down syndrome (OR 3.32 p-value < 0.001; CI 2.07-5.30) and cleft palate (OR 3.39, p-value < 0.001; CI 1.59-7.19) in small town areas. Rural areas had an increased risk of chromosomal anomalies (OR 3.69, p-value =0.001; CI 1.74-7.81). There was no significant association with the other individual anomalies.

CONCLUSION: There is a higher risk of overall fetal anomalies, including down syndrome and cleft palate, for pregnant women living in small town areas. Rural areas have higher risk of chromosomal anomalies.

Table 1: Risk of fetal anomalies associated with community living areas

	Metropolitan	Small Town	Rural	p-value
Fetal Anomaly (%)	0.3	0.48	0.45	<0.001
Odds ratio		1.6	1.51	
95% CI		[1.29-1.99]	[1.14-2.00]	
Down Syndrome (%)	0.03	0.1	0.09	<0.001
Odds ratio		3.32	2.94	
95% CI		[2.07-5.30]	[1.57-5.49]	
Chromosomal defects (%)	0.02	0.02	0.06	0.001
Odds ratio		1.32	3.69	
95% CI		[0.49-3.54]	[1.74-7.81]	
Gastroschisis (%)	0.06	0.08	0.06	0.449
Odds ratio		1.41	0.96	
95% CI		[0.83-2.38]	[0.43-2.14]	
Anencephaly (%)	0.01	0	0	0.436
Odds ratio		1	1	
95% CI		-	-	
NTD (%)	0.01	0	0	0.43
Odds ratio		1	1	
95% CI		-	-	
CDH (%)	0	0.1	0.1	0.254
Odds ratio		2.74	2.18	
95% CI		[0.67-11.14]	[0.30-15.70]	
CHD (%)	0.02	0.03	0.05	0.154
Odds ratio		1.38	2.21	
95% CI		[0.57-3.34]	[0.91-5.34]	
Omphalocele (%)	0	0.01	0	0.759
Odds ratio		1.25	1	
95% CI		[0.17-9.00]	-	
Limb (%)	0	0.01	0.01	0.788
Odds ratio		1.21	1.93	
95% CI		0.17-8.68	0.27-13.86	
Cleft lip (%)	0.01	0.01	0.01	0.861
Odds ratio		0.58	0.93	
95% CI		[0.08-4.17]	[0.13-6.66]	
Cleft Palate (%)	0.01	0.04	0.05	<0.001
Odds ratio		3.39	3.86	
95% CI		[1.59-7.19]	[1.59-9.37]	
Other anomaly (%)	0.16	0.2	0.21	0.136
Odds ratio		1.26	1.36	
95% CI		[0.90-1.77]	[0.90-2.06]	

301 Trial of labor after two-previous cesareans, can we predict a failure? A large multicenter study

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OBJECTIVE: Trial of labor after cesarean (TOLAC) after two cesarean deliveries (CDs) is linked to a lower success rate of vaginal delivery and higher rates of adverse obstetrical outcomes compared to TOLAC after one previous cesarean. We aimed to investigate the factors associated with failed TOLAC among women with two previous CDs.

STUDY DESIGN: We conducted a multicenter retrospective cohort study, which included all women with singleton pregnancies 34-42 weeks attempting TOLAC after two previous CDs between the years

2003 and 2021 from four large university affiliated medical center in Israel accounted for approximately 25% of all deliveries in the country. We compared labor, maternal, and neonatal characteristics between women with failed TOLAC and those with successful TOLAC. Univariate analysis was initially performed, followed by multivariable analysis (adjusted odds ratios [aORs]; [95% CI]).

RESULTS: The study included a total of 1181 women attempting TOLAC after two previous CDs. Among these cases, vaginal birth after cesarean was achieved in 973 (82.4%). Several factors were found to be associated with failed TOLAC, including longer inter-pregnancy and inter-delivery intervals, lower gravidity and parity, lower rates of previous successful vaginal delivery, smoking, earlier gestational age at delivery, preterm delivery (34- 37 gestational weeks), lower cervical dilation on admission, non-use of epidural, and smaller neonatal birthweight. Our multivariable model revealed that preterm delivery (aOR=3.79, 95% CI 1.37-10.47) and cervical dilation on admission of labor < 3 cm (aOR=2.58, 95% CI 1.47-4.54) were associated with higher odds of failed TOLAC.

CONCLUSION: In the investigated population of women with two previous CDs undergoing TOLAC, admission at active labor at term may elevate the chances of successful TOLAC and reduce the risk of repeated cesarean delivery.

Multivariate logistic regression analysis for the association between labor and delivery characteristics and failed TOLAC (Adjusted Odds Ratio)

	p value	aOR	95%CI	
Cervical dilation on admission<3 cm	<0.01	2.58	1.47	4.54
Preterm delivery<37 week	0.01	3.79	1.37	10.47
Inter-delivery interval<24	0.12	0.63	0.36	1.12
Epidural analgesia	0.51	0.83	0.48	1.43
Gravidity	0.59	1.07	0.83	1.38
Parity	0.60	0.92	0.68	1.25
Previous vaginal delivery	0.81	0.88	0.31	2.46
Macrosomia (birthweight≥4000 grams)	0.87	1.09	0.40	2.93
TOLAC Trial of labor after cesarean				

302 Maternal and neonatal outcomes of trial of labor after cesarean in parturients with oligohydramnios

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OBJECTIVE: Oligohydramnios is considered a determinant of adverse perinatal outcomes. However, information on trial of labor after cesarean (TOLAC) for parturients with oligohydramnios is limited. This study aims to evaluate the maternal and neonatal outcomes of parturients with oligohydramnios attempting TOLAC versus those who underwent planned repeat cesarean delivery (PRCD).

STUDY DESIGN: We conducted a retrospective cohort study of women with a term singleton pregnancy and a live fetus following a single low-segment transverse cesarean delivery (CD) and a diagnosis of oligohydramnios (maximal vertical pocket < 2 cm and/or Amniotic Fluid Index < 5 cm) within 14 days from birth between 2017 and 2021. Maternal and neonatal outcomes were compared between parturients attempting TOLAC and those opting for PRCD. Univariate analysis was conducted, followed by a multivariate analysis.

RESULTS: A total of 409 eligible births were included, of which 321 (78.4%) attempted TOLAC. The successful vaginal delivery rate for women who attempted TOLAC was 85%. There were no cases of hysterectomy in either group. Uterine rupture and dehiscence of uterine scar rates did not significantly differ between those who had TOLAC vs. PRCD (0.9% vs. 0%, p=0.36 vs. 0.3% vs. 1.3%, p=0.06, respectively). However, the rate of hypoglycemia (2.5% vs. 6.8%, p=0.049) and composite adverse neonatal outcome was higher among women with PRCD (11.5% vs. 21.6%, p=0.01). Nevertheless, after controlling for potential confounders, including hypertensive disorders of pregnancy, diabetes, and SGA, no independent association between composite adverse neonatal outcome and PRCD was demonstrated (adjusted odds ratio 0.50, 95% CI 0.17-1.41, p=0.19).

CONCLUSION: TOLAC for parturients with oligohydramnios appears to be a reasonable alternative and is associated with favorable outcomes. Further large and prospective research in this area may lead to improved management strategies and better maternal and neonatal outcomes.

Baseline and labor characteristics and maternal and neonatal outcomes of the study population

	PRCD n=88	TOLAC n=321	p value
Maternal age, years	33.4±4.9	32±5.5	0.03
Previous miscarriages, any	40 (45.5%)	113 (35.2%)	0.08
Gravidity	5.2±3.4	5.1±3	0.77
Parity	4.3±3	4.4±2.4	0.88
Fertility Treatments	7 (8%)	24 (7.5%)	0.88
Hypertensive disorders of pregnancy	4 (4.5%)	7 (2.2%)	0.23
Smoking	2 (2.4%)	5 (1.6%)	0.63
Diabetes (Pregestational & gestational)	9 (10.2%)	11 (3.4%)	0.01
Obesity (BMI>30)	22 (30.6%)	70 (26.7%)	0.52
Birthweight, grams	3072.1±540.1	3215.5±482.7	0.02
Small-for-gestational age	10 (28.6%)	14 (16.3%)	0.13
Maternal outcomes:			
Postpartum hemorrhage	7 (8%)	39 (12.1%)	0.27
Uterine rupture	0 (0%)	3 (0.9%)	0.36
Dehiscence of uterine scar	2 (2.3%)	1 (0.3%)	0.06
Puerperal fever	1 (2.9%)	2 (2.3%)	0.87
Blood products transfusion	0 (0%)	0 (0%)	N/A
Neonatal outcomes:			
5-Minute Apgar score < 7	2 (2.3%)	1 (0.3%)	0.06
NICU admission	4 (4.6%)	15 (4.7%)	0.98
Prolonged neonatal admission	3 (3.4%)	13 (4%)	0.78
Meconium aspiration syndrome	0 (0%)	0 (0%)	
Jaundice	6 (6.8%)	12 (3.7%)	0.21
TTN/RDS	0 (0%)	3 (0.9%)	0.36
Mechanical ventilation	0 (0%)	4 (1.2%)	0.29
Seizures	0 (0%)	2 (0.6%)	0.46
Hypoglycemia	6 (6.8%)	8 (2.5%)	0.049
Encephalopathy	0 (0%)	0 (0%)	N/A
Intracranial hemorrhage	0 (0%)	1 (0.3%)	0.60
Birth asphyxia	0 (0%)	3 (0.9%)	0.36
Composite adverse neonatal outcome	19 (21.6%)	37 (11.5%)	0.01

Data are mean± standard deviation; number (%);Planned Repeat Cesarean Delivery (PRCD) TOLAC Trial of labor after cesarean. Composite adverse neonatal outcome – at least one of the above neonatal outcomes.

303 Analyzing the utility of ecological momentary assessment in the evaluation of postpartum depression

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OBJECTIVE: Postpartum depression (PPD) affects up to 20% of women in the initial 12 months after delivery. Maternal suicide is a leading cause of maternal mortality in the United States. A smartphone-based application using ecological momentary assessment

(EMA) technology was developed for monitoring and intervention of PPD during the initial 6 weeks after delivery. This innovative method allows for frequent evaluations and interventions when positive findings are noted.

STUDY DESIGN: All postpartum English-speaking women, aged 18 and above, owning a smartphone, agreeing to download the app, and who delivered a liveborn neonate at a quaternary care academic hospital were offered participation in this prospective study. Enrollment occurred between November 2021 and June 2023. Participants received notifications to complete mood evaluations via marking "happy" or "sad" faces and by completing the Edinburgh Postpartum Depression Scale (EPDS) in the app. Following discharge, notifications were sent at least 3 times weekly in weeks 1 and 2, and once per week from weeks 3 to 6. When EPDS scores were ≥12, follow-up contact via phone was made where action was taken based on nurse assessment.

RESULTS: A total of 1430 participants were enrolled, resulting in 3,552 assessments via the app. 232 participants reported feeling "sad" (16.2% of enrolled), and 189 were noted to have an EPDS score ≥12, which was considered positive and alerted the study team (13.2% of those enrolled). The outcomes of the alerts resulted in: 220 completed follow up contacts from a study nurse, 50 clinic referrals, 1 hospitalization, and 2 referrals to Labor & Delivery. Nearly a quarter (24.1%, or 53/220) of follow-up contacts from app positive screens resulted in clinical intervention.

CONCLUSION: The ability to monitor postpartum women continually and intervene in real-time allows for more rapid identification and management of PPD. This intervention may decrease undiagnosed PPD and lessen the mental health burden of new mothers. More studies are required to determine if this application is effective in decreasing maternal morbidity.

304 Examining the impact of antenatal small for gestational age prediction on pregnancy outcomes

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OBJECTIVE: Fetal growth restriction (FGR) affects 5%-10% of pregnancies and raises the risk of maternal and neonatal mortality and morbidity. Given the difficulty of accurate fetal weight assessment in FGR, we aim to assess its impact on these outcomes.

STUDY DESIGN: A retrospective study performed on June 2020 to January 2022 at a large tertiary hospital, focusing on term singleton deliveries with small gestational age (SGA) birthweights. We compared delivery traits and outcomes between women with sonographically estimated fetal growth restriction (FGR) and those mistakenly assessed as appropriate-for-gestational-age (AGA). Definitions for SGA and FGR were birthweight under 2500 gr and estimated fetal weight in the < 10th percentile,respectively, using the Israeli population's standard growth curve referred to as a Dolberg curve. Logistic regression models were used for confounder adjustment.

RESULTS: During the study, 1,173 SGA birthweight deliveries were recorded, with 674 and 499 suspected as being appropriate and restricted growth, respectively. Patients with suspected FGR showed higher frequencies of cesarean deliveries, labor induction, maternal stays over 4 days, and more adverse maternal outcomes. Similarly, neonatal outcomes were worse in suspected FGR cases, with longer stays, higher perinatal mortality, and hypoglycemia. After multivariate analysis, only extended neonatal stay remained significant. Predicting SGA resulted in increased neonatal stays over 4 days, with an adjusted OR=1.41 (CI=1.07-1.87, p-value=0.016).

CONCLUSION: Prediction of SGA before birth was found as associated with neonatal length of stay exceeding 4 days. This unfortunate outcome seems to correlate with an increased frequency of interventions. The complexities surrounding this issue necessitate further research to enhance our understanding and improve clinical approaches.

Table: Results of a multivariable logistic regression analyses

Outcome variable analyzed	Adjusted OR* (95% CI)	P
CD	1.25 (0.90-1.73)	0.179
Maternal length of stay > 4 days	1.26 (0.94-1.67)	0.119
Composite of adverse maternal outcomes[a]	1.11 (0.82-1.49)	0.506
Perinatal mortality	2.85 (0.86-9.50)	0.088
Hypoglycemia	1.95 (0.75-5.12)	0.173
Neonatal length of stay > 4 days	1.41 (1.07-1.87)	0.016
Composite of adverse neonatal outcomes[b]	1.22 (0.94-1.58)	0.142

OR odds ratio, CI confidence interval, P P-value, CD cesarean delivery
*aOR adjusted OR. Models were adjusted for parity, gestational age and oligohydramnios. All variables, excluding CD, were also adjusted for CD performance.
[a]Defined as composite of emergent surgery, hemorrhagic complications, peripartum infections and wound complications and maternal length of stay > 4 days. [b]Defined as composite of 1 & 5 APGAR scores ≤7, PH <7, phototherapy, NICU admission, neonatal length of stay > 4 days, perinatal mortality, asphyxia, hypothermia, hypoglycemia, polycythemia, hypocalcemia, Hyperbilirubinemia, HIE, RDS, NEC, sepsis, IVH, meconium aspiration syndrome and pulmonary hypertension.

305 A multi-organ fetal membrane-placenta-on-chip platform to study the transmission of infection and inflammation during pregnancy

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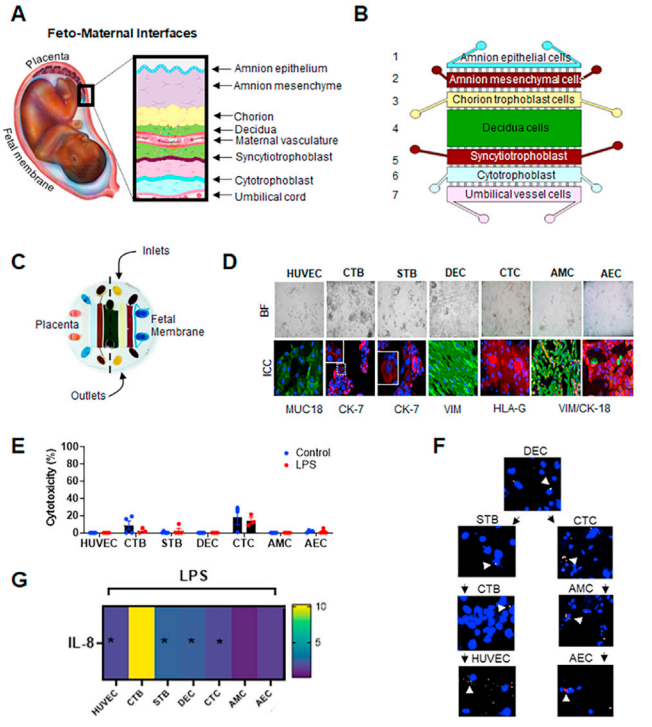
OBJECTIVE: Infection and inflammation are risk factors for spontaneous preterm birth. However, the spread of infection and inflammatory mediators at the two feto-maternal interfaces (FMi; placenta and fetal membranes with decidua [Fig 1A]) are difficult to study due to the limitations of animal models and the lack of comprehensive *in-vitro* models. We developed a humanized multi-organ fetal membrane-placenta organ-on-chip (FMi-PLA-OOC) (**Fig 1B-C**), established physiologic and pathologic models of the FMi, and determined the responses of FMis to infection and inflammation.

STUDY DESIGN: FMi-PLA-OOC contained cells from human umbilical cord endothelium, cyto- and syncytiotrophoblasts, decidua, chorion, and amnion (mesenchyme and epithelium) in seven cell chambers connected by arrays of collagen-filled microchannels.To validate FMi-PLA-OOC, we determined cell viability (cytotoxicity - lactate dehydrogenase [LDH] assay) and confirmed that *in utero* cellular characteristics (immunocytochemistry [ICC]) were maintained during culture on-chip. We also determined lipopolysaccharide (LPS; 100ng/mL) propagation (immunostaining) and inflammation (multiplex cytokine assay).

RESULTS: Cell markers and viability in the FMi-PLA-OOC were similar to *in-utero* FMi, validating the physiological relevance of the device (Fig 1D-E). LPS propagated from maternal to fetal cells within 6 days(Fig 1F), inducing an increase in pro-inflammatory cytokine concentrations (IL-6, IL-8, TNF-a) and a decrease in anti-inflammatory cytokine production (IL-10) across the fetal membrane and placenta layers(Fig 1G; [Heat map is normalized to control. *- p< 0.05]).

CONCLUSION: Healthy and disease models of FMis on a chip demonstrated differential responses of the placental and fetal membrane to infection and inflammation. This platform provides broad utility in obstetrics research.



306 A multi-organ-on-chip model to study the efficacy of exosomal therapeutics in treating inflammation-associated adverse pregnancies

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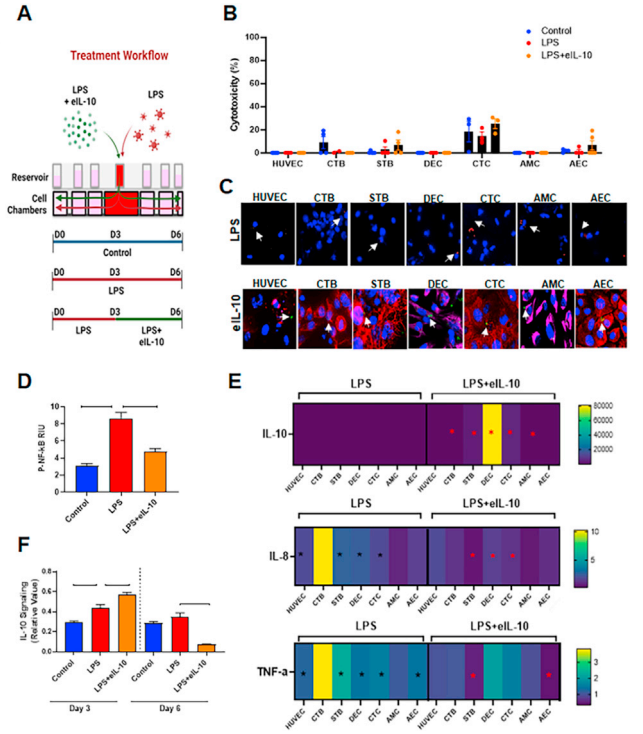
OBJECTIVE: Infection and inflammation are two major risk factors for preterm birth. There is a lack of physiologically-relevant human models of the two feto-maternal interfaces (FMi; placenta and fetal membranes with decidua) to test anti-inflammatory drug efficacy and functions in an *in vitro* setting. We used a fetal membrane-placenta organ-on-chip (FMi-PLA-OOC) to mimic infectious inflammation of the FMiand conduct pre-clinical drug testing (cytotoxicity, mechanism of action, and efficacy) using a novel anti-inflammatory compound, exosomal-derived interleukin-10 (eIL-10), engineered to facilitate drug passage across FMi barriers.

STUDY DESIGN: FMi-PLA-OOC contained cells from human umbilical cord endothelium, cyto- and syncytiotrophoblasts, decidua, chorion, and amnion (mesenchyme and epithelium) in seven cell chambers connected through collagen-filled microchannels.The decidual cells were treated with lipopolysaccharide (LPS; 100ng/mL) followed by a co-treatment of LPS and eIL-10 (500ng/mL) (Fig 1A).LPS and eIL-10 propagation and P-NF-kB expression were determined by immunostaining, functional IL-10 signaling (Quant blue assay), and inflammation (multiplex cytokine assay).

RESULTS: Maternal-to-fetal propagationof LPS occurred within 6 days without inducing cytotoxicity of cells in the FMi-PLA-OOC (Fig 1B-C). LPS induced P-NF-kB expression (Fig 1D) and induced pro-inflammatory cytokines (IL-6, IL-8, TNF-a) across the fetal membrane and placenta layers (Fig 1E; [black *-p< 0.05 normalized to control]). eIL-10 did not induce cytotoxicity (Fig 1B) within the maternal or fetal cells and propagated to distal chambers within 3 days (Fig 1C). LPS+eIL-10 co-treatment induced IL-10 signaling pathways (Fig 1F), reduced P-NF-kB expression (Fig 1D), and suppressed LPS-induced pro-inflammatory cytokine production in the fetal membranes and placenta (red *-p< 0.05 normalized to LPS) (Fig 1E).

CONCLUSION: Using thismodel, we successfully tested the ability of eIL-10 to suppress LPS-induced inflammation at the FMi. FMi-PLA-OOC is an alternative to animal models for preclinical testing of drugs during pregnancy.



307 Absence of SARS-CoV-2 in second trimester amniotic fluid during SARS-CoV-2 virus pandemic: a prospective study

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OBJECTIVE: To determine the presence or absence of severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) in second trimester amniotic fluid during the 2020-2022 SARS-CoV-2 virus pandemic in patients undergoing genetic amniocentesis.

STUDY DESIGN: Women undergoing genetic amniocentesis between September 2020 and April 2022 were asked to participate in the study. On the day of amniocentesis, an additional 5 mL of amniotic fluid, 5 mL of a maternal blood sample, and nasal swabs were collected from each participant. After July 2021, vaccination status was obtained. Amniotic fluid was tested for the presence of the virus by RT-PCR test using an automated bead-based method for extracting total nucleic acid. An electrochemiluminescence immunoassay on maternal blood was used to detect SARS-CoV-2 total (IgG/IgM) antibodies against nucleocapsids. A positive result indicates an immune response to a recent or prior infection with SARS-CoV-2. A molecular PCR, nucleic acid amplification test was also used to detect SARS-CoV-2 antigen using maternal nasal swabs.

RESULTS: The present study enrolled 92 patients. There were 16 patients who had a history of SARS-CoV-2 virus infection: eight of them contracted SARS-CoV-2 virus infection during the first and second trimester, and eight had SARS-CoV-2 virus infection before pregnancy. Forty-nine patients were vaccinated prior to amniocentesis. All 92 amniotic fluid samples tested negative for the SARS-CoV-2 virus. There were 5 positive and 3 negative SARSC-CoV-2 maternal nucleocapsid antibody tests among the eight patients who had SARS-CoV-2 during the 1st and 2nd trimester of pregnancy. All 8 patients had negative swab tests for the SARS-CoV-2 virus antigen.

CONCLUSION: In the eight patients who had SARS-CoV-2 virus infection during the first and second trimester there was no SARS-CoV-2 virus in the second trimester amniotic fluid samples. This finding suggests that after a first and second trimester SARS-CoV-2 virus infection, it is highly unlikely to find the SARS-CoV-2 virus in the amniotic fluid.

Clinical characteristics and outcomes of eight patients who had SARS-CoV-2 in the 1st and 2nd trimester:

Case #	GA at the time of SARS-CoV-2	GA at Delivery	Birth Weight	Amnio Results	Nasal Swabs Results	SARS-CoV-2 total (IgG/IgM) Antibodies
1	6wks	21	N/A	46 XY FISH NL Microarray NL	N	N
2	6wks	N/A	N/A	46 XY Microarray NL	N	N
3	8wks	39+5	7lb 2oz	46 XX Microarray NL	N	P
2	15wks	39+0	6lbs 4.8oz	46 XX Microarray NL Combination of single gene deletion and HbCS:-alpha /alpha HB Constant Spring	N	N
5	18wks	39+1	5lb 13oz	46 XX Microarray Female with a Shox Gene Deletion	N	P
6	6wks	34+0	3lb 15.1oz	46 XX Microarray NL	N	P
7	8wks	N/A	N/A	47 XY Trisomy21	N	P
8	17wks	N/A	N/A	46 XY Microarray NL	N	P

N = negative, P = positive

N/A = not available currently

308 Investigating gaps filled by perinatal patient navigation to address social determinants of health in pregnancy

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OBJECTIVE: Social determinants of health (SDoH) contribute to disparities in maternal and neonatal morbidity and mortality. Community-based patient navigators (PN) may be an important intervention to provide comprehensive health and social services for vulnerable pregnant patients. This study describes the patients referred to a novel perinatal PN program based in a high social vulnerability index county and the patient-driven SDoH needs targeted during its initial instigation.

STUDY DESIGN: This is a descriptive cohort study of patients referred to a novel PN program from 1/2023-4/2023 based on a structured SDoH assessment during the initial prenatal visit. Data regarding patient demographics, referral criteria, resources provided, and PN-reported barriers to intervention were assessed descriptively through EMR review and the PN program records.

RESULTS: 227 patients were referred to the perinatal PN program (3170 total deliveries; 7.2%). The median maternal age was 25, and the median gestational age at referral was 18 weeks. 61% of patients had Medicaid insurance, 63% were Black, and 7.4 % were Hispanic. A description of referral criteria and resources provided is in the Table. The majority of patients were referred for food insecurity (15 %) and the top 3 needs identified were food (44%), doula support (17.1%), and mental health (11.8%). The primary barriers identified were inability to reach the patient via phone (15%) and patients who did not speak English as a primary language (5.7%).

CONCLUSION: Understanding the types of social service needs during pregnancy, and the barriers in connecting patients to these services, allows this and similar programs to effectively target gaps in comprehensive support for socially vulnerable pregnant patients. Optimization of resources to meet the actual needs of patients facing modifiable social barriers may improve perinatal outcomes and decrease disparities.

Table. Referral Criteria and Additional Needs Addressed by Perinatal Patient Navigator Program

	Referral criterion N (%)	Need Identified by Patient Navigator N (%)
Desire for Centering prenatal care*	2 (.08%)	6 (2.6 %)
WIC**	34 (14.9%)	75 (33.0%)
SNAP***	3 (1.3%)	25 (11.0%)
Doula services	20 (8.8%)	39 (17.1%)
Mental health services	4 (1.7%)	27 (11.8%)
Insurance challenges	14 (6.2%)	6 (2.6%)
Domestic violence	8 (3.5%)	3 (1.3%)
Transportation difficulties	12 (5.2%)	10 (4.4%)

*Centering is a form of community-based, holistic, group prenatal care
**WIC (Women, Infants, and Children) is a federal social support program that provides supplemental food, health care referrals, and nutrition education during pregnancy/postpartum and for children up to age 5 ***SNAP (Supplemental Nutrition Assistance Program) is a federal food assistance program (food stamps)

309 Aspirin decreases triglycerides in the development of preeclampsia

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OBJECTIVE: Preeclampsia is associated with higher triglyceride and copeptin levels. Low-dose aspirin (ASA, 81 mg) is routinely prescribed in pregnancy to prevent the development of preeclampsia. However, the mechanism of this remains poorly understood. The objective of this study was to determine if ASA is effective in lowering triglyceride (TG) and copeptin levels in association with preeclampsia.

STUDY DESIGN: In this retrospective case control study, subjects were selected from the Perinatal Family Tissue Bank (IRB#200910784) based on ASA use and preeclampsia diagnosis. Demographics were collected from the electronic health record using the Intergenerational Health Knowledgebase. TG and copeptin were measured using commercial assays. T test, chi square tests, and ANOVA were performed as appropriate. Alpha was set at 0.05.

RESULTS: Preeclampsia pregnancies were associated with a higher rate of ASA use in comparison to controls (47% vs. 25%, $p< 0.001$). Maternal age, race/ethnicity, BMI, and gravida were similar between groups. The combined interaction of ASA use and preeclampsia was significant ($p< 0.05$) demonstrating a larger decrease in mean TG between the first and 3rd trimester with ASA treatment in those with preeclampsia (105.2 ± 25.1 vs 11.1 ± 43.4 mg/dL) vs. controls (71.8 ± 8.4 vs. 88.0 ±26.6 mg/dL). This interaction was not observed in the difference in copeptin levels ($p=0.311$).

CONCLUSION: These data suggest that aspirin may decrease triglycerides in pregnancy in patients who develop preeclampsia. Exploring this mechanism further may lead to a more efficacious preventative for preeclampsia.

310 Risk of hypertension progression after pregnancies complicated by American Heart Association (AHA) stage 1 hypertension

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OBJECTIVE: Data on long-term cardiovascular risks of AHA stage 1 chronic hypertension (CHTN) in pregnancy are limited. We quantified the risk of progression to ≥ stage 2 CHTN among patients with stage 1 CHTN in pregnancy.

STUDY DESIGN: Retrospective cohort study of singleton deliveries at a single US center from 2010- 2022 with at least 2 follow up blood pressures (BP) >12 weeks' postpartum (PP). Stage 2 CHTN (BP≥140/90mmHg) or anti-HTN medication at index pregnancy were excluded. The primary outcome was progression to stage 2 or higher CHTN (BP ≥140/90mmHg, ≥2 occasions, 4 hours apart) at >12weeks PP or at < 20 weeks' gestation in a subsequent pregnancy within 5 years. Secondary outcomes included severe CHTN (BP ≥160/110mmHg). Multivariable logistic regression estimated the yearly cumulative odds of outcomes in patients with stage 1 CHTN compared to normal BP, and identified risk factors for progression.

RESULTS: Of 6,184 included patients, 3,871 (62.6%) had normal BPs and 2,313 (37.4%) had stage 1 CHTN during the index pregnancy. Patients with stage 1 CHTN were older, more likely to be White, privately insured, nulliparous, obese, initiate prenatal care earlier and have medical comorbidities. Over 5 years, 622 (26.9%, 95% CI 25.1-28.8%) with stage 1 CHTN had the primary outcome, compared to 502 (13.0%, 95% CI 11.9-14.1%) with normal BP($p< 0.01$). Median time to ≥ stage 2 CHTN was shorter in patients with stage 1 CHTN, compared to normal BP (1.7 vs. 1.9yrs, $p=0.03$). In each successive year after pregnancy, patients with stage 1 CHTN had approximately 2-fold higher adjusted odds of developing ≥ stage 2 CHTN, compared to normal BP(Table). In contrast, the odds of severe CHTN with stage 1 CHTN only increased after 3 years. Black race (OR 1.88, 95% CI 1.52-2.33), obesity (OR 1.88, 95% CI 1.48-2.40), tobacco use (OR 1.56, 95% CI 1.15-2.12) and prior preeclampsia (OR 1.88, 95% CI 1.38- 2.56) were also risk factors for progression.

CONCLUSION: Pregnant patients with stage 1 CHTN have a significant risk of progression to ≥ stage 2 CHTN as early as the first year postpartum.

Table: Cumulative Prevalence and Adjusted Odds Ratios of ≥ Stage 2 Chronic Hypertension among Patients with American Heart Association Stage 1 Chronic Hypertension and Normal BPs in Pregnancy

	Normal BP (n=3871)	Stage 1 CHTN (n=2313)	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Stage 2 or greater CHTN				
≤1 year	153 (4.0)	206 (8.9)	2.38 (1.92-2.95)	1.89 (1.48-2.42)
≤2 years	258 (6.7)	363 (15.7)	2.61 (2.20-3.09)	2.08 (1.72-2.51)
≤3 years	362 (9.4)	485 (21.0)	2.57 (2.22-2.98)	2.08 (1.76-2.46)
≤4 years	445 (11.5)	570 (24.6)	2.52 (2.20-2.89)	2.05 (1.75-2.39)
≤5 years	502 (13.0)	622 (26.9)	2.47 (2.17-2.82)	2.03 (1.75-2.37)
Severe CHTN				
≤1 year	16 (0.4)	22 (1.0)	2.31 (1.21-4.41)	1.73 (0.84-3.56)
≤2 years	30 (0.8)	38 (1.6)	2.14 (1.32-3.46)	1.50 (0.87-2.59)
≤3 years	41 (1.1)	53 (2.3)	2.19 (1.45-3.30)	1.43 (0.90-2.28)
≤4 years	51 (1.3)	69 (3.0)	2.30 (1.60-3.32)	1.54 (1.02-2.32)
≤5 years	59 (1.5)	82 (3.6)	2.38 (1.69-3.33)	1.54 (1.05-2.25)

Data are N (percentage) or Odds Ratio (95% Confidence Intervals) as appropriate
Models adjusted for age, nulliparous, BMI category, insurance, race, first encounter GA, preeclampsia, aspirin and baseline blood pressure at index (first captured) pregnancy

311 Biomarkers of poor volume handling predict preeclampsia in a symptomatic population

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OBJECTIVE: Copeptin, a marker of vasopressin secretion and fluid volume handling, is robustly predictive of the development of preeclampsia (PreE) in all three trimesters. Other markers of poor volume handling such as Brain Natriuretic Peptide (BNP) and Atrial Natriuretic Peptide (ANP) may also predict PreE. This translational, prospective cohort study aimed to evaluate these markers in a symptomatic population. We hypothesize that BNP, ANP, and Copeptin will be associated with those diagnosed with PreE.

STUDY DESIGN: In this Rule Out PreEclampsia (ROPE) Study (IRB# 201611746), birthing parents who presented for evaluation of PreE in the 3rd trimester due to signs or symptoms at a university medical center provided access to clinical information and plasma samples. Copeptin and ANP were measured using Time Resolved Amplified Cryptate Emission (TRACE) using a Kryptor Clinical Analyzer (ThermoFisher) and BNP was measured by commercial Enzyme-linked immunosorbent assays (ELISA). T tests, chi square, and logistic regression analyses were performed with a=0.05.

RESULTS: A total of 55 control and 104 PreE participants were recruited. Maternal age, race, body mass index, gravida, para, rate of chronic hypertension and diabetes were similar between the 2 groups. Copeptin (14.3 ± 2.9 vs. 7.3 ± 0.7, p=0.02), BNP (362.2 ± 52.1 vs. 182.0 ± 52.1, p=0.03), and ANP (93.8 ± 6.4 vs. 62.4 ± 8.8, p=0.005) values were all significantly higher in those diagnosed with PreE. After controlling for chronic hypertension and diabetes diagnoses, Copeptin (p=0.05), BNP (p=0.04), and ANP (p=0.009) remained significantly associated with the development of PreE. In addition, BNP values (r^2=0.7, p=0.04) was significantly, positively correlated with Copeptin levels.

CONCLUSION: These data suggest that Copeptin, BNP, and ANP may be adjunct diagnostic tools for PreE in a symptomatic population. In addition, the poor fluid handling these analytes indicate in the 3rd trimester provides further evidence that fluid imbalance may provide a molecular mechanism for the later stages of the disease.

312 Assessing immediate-acting antihypertensive therapy on severely elevated peripartum blood pressures through balancing measures

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OBJECTIVE: The timely treatment of severely elevated peripartum blood pressures (BP) within 60 minutes of identification is advocated as a strategy to decrease severe morbidity and mortality from hypertensive disorders of pregnancy. However, concerns about too rapidly decreasing BP results in delays in care as providers do not want to potentially induce hypotension or changes in the fetal status.

STUDY DESIGN: As part of a state-wide quality improvement initiative, 29 hospitals submitted data on an initial severely elevated BP episode, defined as a systolic BP (SBP) ≥160 or diastolic BP (DBP) ≥110 occurring sequentially and 15 minutes apart, and subsequent management of the episode. BPs following treatment were collected to assess the response to immediate-acting antihypertensive therapy with the next three BPs collected at 15-minute intervals. The primary measure was fetal heart rate (FHR) changes within 1 hour of the initial severely elevated BP (among pregnant patients) with secondary measure assessing whether hypotension (SBP < 90 or DBP < 60) occurred among pregnant or postpartum patients.

RESULTS: Overall, 3,230 pregnant or postpartum patients were treated for a severe hypertensive event. Mean initial SBP was 170.9mmHg and mean initial DBP was 96.1mmHg. Following BP treatment and normalization, the mean SBP and DBP decreased to 145.1 and 83.1, respectively. A small proportion of patients (13.8%) had mean arterial pressure (MAP) decrease of ≥30% following treatment. Among 2,396 pregnant patients, those with a MAP decrease of ≥30% (compared to those with MAP decrease of < 30%) were more likely to require intervention for FHR changes (8.5% vs. 4.3%, p=.001). Patients with MAP decrease of ≥30% had higher rates of hypotension compared to those with MAP decrease of < 30% (42.3% vs. 1.6%), p< .001).

CONCLUSION: MAP decreases of ≥30% were associated with FHR changes requiring intervention and hypotension. These findings suggest that strategies towards effective BP control should be cognizant of how rapidly and profoundly BP is decreased to avoid potential harm.

Table 1. Differences in fetal heart rate and hypotension by mean arterial pressure decrease ≥ 30%

	Patients with Severe HTN[i] and MAP decrease≥30% n (%)	Patients with Severe HTN and MAP decrease<30% n (%)	P
Fetal heat rate change that required intervention within one hour from the onset of initially severe HTN[ii]			
No	310 (91.5%)	1,968 (95.7%)	
Yes	29 (8.5%)	89 (4.3%)	
			0.001
Hypotension[iii]			
No	256 (57.7%)	2,740 (98.4%)	
Yes	188 (42.3%)	46 (1.6%)	
			<0.001

HTN= hypertension; MAP = mean arterial pressure

[i] Patients that were pregnant or up to 6 weeks postpartum during their severe hypertensive event (n=3,230)

[ii] Limited to patients that were pregnant during their severe hypertensive event (n=2,396)

[iii] Defined as systolic blood pressure after normalization less than 90mmHg or diastolic blood pressure after normalization less than 60mmHg

313 Is there an association between lateral placenta and pregnancy adverse outcomes?

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OBJECTIVE: Compared to the anterior or posterior uterine walls, the lateral uterine walls may differ in their anatomical curve and blood supply, potentially affecting implantation and pregnancy outcome. The effect of lateral placentation on pregnancy outcomes is controversial, with several studies suggesting an association with small for gestational age (SGA), hypertensive (HTN) disorders, and preterm deliveries. Data regarding its impact on maternal bleeding and residual placenta are scarce. We aimed to evaluate the association between lateral placentation and adverse obstetrics outcomes.

STUDY DESIGN: This retrospective study included all women with singleton pregnancies, who underwent a trial of labor. All patients had a sonographic assessment of the placental location. The study cohort was divided into two groups: those with uterine lateral placentation (lateral placenta group) and those with all other possible placentation types including anterior, posterior, or fundal placentation (control group). Maternal, obstetrics, and neonatal outcomes were compared between the groups. A power analysis determined that a total of 882 women in each group would be sufficient to detect a significant increase in the rate of the primary outcomes, including preterm delivery, HTN disorders, or SGA in the lateral placenta group.

RESULTS: Overall 23,808 women met the inclusion criteria, with 1817 (7.6%) in the lateral placenta group and 21,991 (92.4%) in the control group. No significant differences were found between the groups regarding the rate of HTN disorders, SGA, or preterm delivery. The lateral placenta group had a higher rate of retained placenta (5.7% vs. 4.2%, p=0.002), however, using multivariate regression analysis adjusted for maternal age, nulliparity, second and third stage duration, there was no difference in the rate of retained placenta between the groups.

CONCLUSION: Contrary to previous studies, the lateral location of the placenta is not associated with any clinically significant adverse maternal, obstetric, or neonatal outcome.

	Lateral placentatio n (n=1817)	Control (n=21991)	*P-value*
Maternal age (years± SD)	31.1 ±5.5	30.8 ± 5.3	**0.021**
Gestational age (weeks+ days± SD)	39+3 ± 2	39+2 ± 2	0.107
Preterm delivery (n, %)	73, 4.0	955, 4.3	0.513
Nullipara (n, %)	711, 39.1	9525, 43.3	**0.001**
BMI	24 ± 5	24 ± 5.1	0.810
Diabetes (n, %)	180, 9.9	2481, 11.3	0.074
Smoking (n, %)	95, 5.2	1198, 5.4	0.692
VBAC (n, %)	104, 5.7	1465, 6.7	0.640
Hypertension/ Preeclampsia	65, 3.6	793, 3.6	0.942
Oligohydramnios (n, %)	51 (2.8)	584 (2.6)	0.704
pH ≤ 7.1 (n, %)	27, 1.48	301, 1.36	0.265
Retained placenta (n, %)	104, 5.7	926, 4.2	**0.002**
NICU (n, %)	45, 2.47	464, 2.11	0.693
Neonatal hypoglycemia (n, %)	6, 0.33	128, 0.58	0.156
Respiratory distress with mechanical ventilation (n, %)	7, 0.38	77, 0.35	0.844
Small for gestational age(n, %)	157, 8.6	1855, 8.4	0.761

314 Pilot study to assess non-adherence to daily low dose aspirin in patients with pregestational diabetes

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OBJECTIVE: Daily low-dose 81mg aspirin (LDASA) is recommended for those with pregestational diabetes to reduce risk for hypertensive disorders of pregnancy (HDP). High adherence to daily dosing is necessary to achieve prophylactic benefit. We investigated the non-adherence rate of daily LDASA in gravidas with pregestational diabetes at 28 and 36 weeks gestational age (GA) to determine if an intervention is needed to improve adherence.

STUDY DESIGN: This was a prospective cohort study performed between 1/2022 and 7/2023 of gravidas with type 1 (T1DM) or 2 diabetes (T2DM) enrolled at 12-24 weeks GA. Participants were recommended LDASA per standard of care. Adherence was surveyed using the validated simplified medication adherence questionnaire (SMAQ) at 28 and 36 weeks. Non-adherence was defined as responding "yes" to any survey question or reporting more than two missed doses in the past week or past three months. Demographic and pregnancy data were collected. Univariate analysis was performed utilizing Stata.

RESULTS: Seventy-one participants were enrolled in the study, with a mean age of 31.2±5.0 years and mean GA 15.7±3.96 weeks. The majority had T2DM (77.5% (55/71)) and 22.5% (16/71) had T1DM. Most of the cohort (69% (49/71)) identified as Latinx and 82.6% (57/71) spoke English as a primary language. Of the 58 participants who completed the SMAQ either at 28 or 36 weeks, 40 (69.0%) demonstrated non-adherence to daily low dose aspirin at one or both time points (62.3% at 28 weeks and 69.0% at 36 weeks). This was significantly greater than the expected literature rate of 45% (p=0.0002). Non-adherence did not differ by diabetes type, insulin use or any other demographic factor. The rate of HDP in the delivered participants in this cohort was 48.9% and did not differ by LDASA adherence.

CONCLUSION: In this population of gravidas with diabetes at high risk of HDP who were recommended LDASA, 69% were non-adherent by self-report through SMAQ, which is far higher than expected. A strong intervention is needed to improve adherence to optimize HDP risk reduction in this population.

Survey at 28-weeks gestational age (completed by 53 participants)					
	No	Yes			
Did you ever forget your aspirin?	29 (54.7%)	24 (45.3%)			
Are you careless at times about taking your aspirin?	46 (86.8%)	7 (13.2%)			
When you feel bad, have you ever discontinued your aspirin?	46 (86.8%)	7 (13.2%)			
Have you ever forgotten to take your aspirin during the weekend?	40 (75.5%)	13 (24.5%)			
	Never	1-2 times	3-5 times	6-10 times	More than 10 times
In the last week, how many times did you fail to take your aspirin?	32	19	1	0	1
	Median days (25th, 75th)				
In the last three months, how many days have you not taken your aspirin at all?	2 (0,5)				
Survey at 36-weeks gestational age (completed by 29 participants)					
	No	Yes			
Did you ever forget your aspirin?	14 (48.3%)	15 (51.7%)			
Are you careless at times about taking your aspirin?	26 (89.7%)	3 (10.3%)			
When you feel bad, have you ever discontinued your aspirin?	25 (86.2%)	4 (13.8%)			
Have you ever forgotten to take your aspirin during the weekend?	15 (51.7%)	14 (48.3%)			
	Never	1-2 times	3-5 times	6-10 times	More than 10 times
In the last week, how many times did you fail to take your aspirin?	15	11	3	0	0
	Median days (25th, 75th)				
In the last three months, how many days have you not taken your aspirin at all?	4 (1,7)				

315 Activity in women at risk for early delivery: A prospective observational study

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OBJECTIVE: Activity restriction is commonly employed in pregnancy without evidence that it prolongs pregnancy or improves outcomes. We sought to evaluate whether physical activity in patients at high risk for preterm birth was associated with pregnancy prolongation.

STUDY DESIGN: An ancillary study of preterm birth prevention in patients with a short cervical length. Participants were enrolled from 16.0 to 25.6 weeks and were instructed to wear a wrist accelerometer (Fitbit Flex 2) until delivery. Physical activity data (steps per day) were reviewed weekly by research nurses along with a monthly interview. Sedentary activity is commonly defined as $< 3{,}500$ or $< 5{,}000$ steps per day (SPD). We compared outcomes between < 3500 median SPD vs ≥ 3500 median SPD; and < 5000 median SPD vs. ≥ 5000 median SPD. The primary outcome was time from enrollment to delivery.

RESULTS: Overall 120 patients were enrolled and 117 (97.5%) had accelerometer data. Median gestational age at entry was 22.5 weeks (IQR 21.3, 23.7). At enrollment, a quarter of patients (25.8%) were placed on activity restriction (AR) by their provider. Median cervical length at baseline did not differ by SPD. Time from enrollment to delivery did not differ by SPD group. However, participants with $<$ 3500 median SPD delivered earlier and were more likely to deliver at $<$ 34 weeks vs. $\geq$ 3500 median SPD (Table). Of 104 patients with accelerometer and study visit data, 39 (37.5 %) were ultimately placed on AR. Of patients prescribed AR, 51.3% reported modifying their work schedule vs. 27.7% who were not prescribed on AR.

CONCLUSION: Among individuals with a short cervix in the second trimester, physical activity level was not associated with time to

delivery. However, the risk of preterm delivery at < 34 weeks was significantly higher with less activity (< 3500 steps per day). Patients are still being placed on AR and even when not placed on AR patients are still modifying their work schedules.

Table 1. Activity Level and Delivery Outcomes

	< 3500 median steps per day			< 5000 median steps per day		
	Yes 55 (47%)	No 62 (53%)	Hazard Ratio (95% CI)	Yes 82 (70%)	No 35 (30%)	Hazard Ratio (95% CI)
Primary outcome						
Enrollment to delivery (wks), median IQR	11.6 (5.4, 15.7)	14.6 (12.7, 16.4)	1.46 (0.98, 2.18) (p=0.06)	13.2 (6.9, 16.1)	14.3 (12.7, 16.4)	1.27 (0.83, 1.92) (p=0.27)
Secondary outcomes						
			Median difference or aRR (95%CI)			Median difference or aRR (95%CI)
Gestational age at delivery (wks), median IQR	34.9 (28.6, 37.3)	37.7 (35.7, 39.3)	-1.9 (-3.6 to -0.3), (p=0.02)	36.6 (31.0, 39.0)	37.1 (35.7, 38.7)	-0.4 (-1.8 to 1.0),(p=0.60)
Preterm delivery < 32.0 wks, n (%)	21 (38.2)	9 (14.5)	2.19 (0.95, 5.08)	25 (30.5)	5 (14.3)	2.28 (0.69, 7.58)
Preterm delivery < 34.0 wks, n (%)	26 (47.3)	11 (17.7)	2.30 (1.08, 4.89)	31 (37.8)	6 (17.1)	2.39 (0.86, 6.67)
Preterm delivery < 37.0 wks, n (%)	37 (67.3)	25 (40.3)	1.51 (0.91, 2.49)	46 (56.1)	16 (45.7)	1.43 (0.84, 2.42)
Antepartum length of stay	1 (1, 3)	1 (0, 1)	0.5 (0.3 to 1.0), (p=0.04)	1 (0, 2)	1 (0, 1)	0.2 (-0.3 to 0.6), (p=0.49)
Cesarean delivery, n (%)	26 (47.3)	25 (40.3)	1.12 (0.74, 1.69)	33 (40.2)	18 (51.4)	0.91 (0.49, 1.67)

Models adjusted for maternal age, gestation at enrollment, BMI, prior preterm birth, tobacco use, study, and cervical length.
aRR adjusted Relative Risk

316 Spatial placental PSG4 gene expression profiling in spontaneous preterm labor

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OBJECTIVE: A better understanding of the biology of spontaneous preterm labor (SPTL) could help elucidate new treatments. Accelerated placental senescence (PS) is known to cause certain obstetrical complications, but studies have not clearly demonstrated a relationship between accelerated PS and SPTL. Recently, Pregnancy Specific Beta-1-Glycoprotein 4 (PSG4) has been found to be a potent molecular driver for PS. Our hypothesis is that PSG4 is overexpressed in chorionic villi of SPTL placenta samples compared to those at full term (FT) and may represent one of the key players of SPTL.

STUDY DESIGN: Post-partum placental samples were collected from 18 to 45 year old patients who delivered at a single medical center between 2021 and 2022. Exclusion criteria included multiple gestations, fetal structural anomalies and aneuploidies, and presence of maternal hypertension or diabetes, infectious diseases including COVID-19, and autoimmune diseases. PSG4 RNA in-situ hybridization was then conducted in formalin-fixed paraffin-embedded slides with the use of the RNAScope for Multiplex Fluorescent Reagent Kit v2. RNA expression was then quantified using QuPath software. The mean mRNA signal counts/cell were then obtained and compared between SPTL and FT samples.

RESULTS: 40 samples met inclusion criteria. 31 (77.5%) were SPTL placentas, and 9 (22.5%) were FT controls. The mean PSG4 mRNA signal counts/cell in the SPTL samples was 7.1 ± 4.5 compared to 0.6 ± 0.3 in the FT samples ($p < 0.05$). Of the SPTL placentas, 21 (68%) were < 34 weeks, 10 (32%) were 34-37 weeks. The mean PSG4 mRNA signal counts/cell was not different in those 2 subgroups: 7.5 ± 4.7 v. 6.4 ± 4.1, p=0.49 (Figure 1). PSG4 mRNA signals were predominantly detected in syncytiotrophoblast as well as the discontinuous monolayer of cytotrophoblast.

CONCLUSION: PSG4, a known potent molecular driver of PS, is overexpressed in SPTL placentas compared to FT placentas. Thus, accelerated PS may play an important role in the pathophysiology of SPTL and may serve in the future as a target for novel therapeutics.

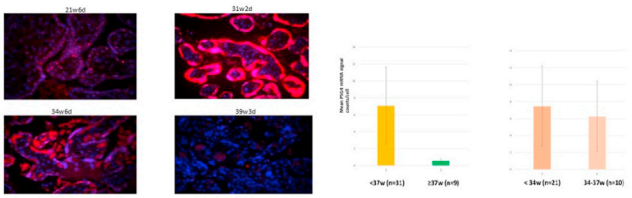

Figure 1: Quantification of PSG4 mRNA signal counts per cell in SPTL and FT placentas and representation of PSG4 mRNA expression (Red) in SPTL and FT placentas

317 A 3D printed device for electrophysiological measurement of myometrial smooth muscle cell contractions in vitro

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OBJECTIVE: Current methods for determining uterine cell contractions using in vitro cell models are insufficient for preclinical drug trials as the 2D environment do not mimic intercellular interactions. To address this, we developed a non-invasive and functional model for recording uterine muscle contractions using a 3D-printed device incorporated with an isometric force transducer and measured real-time contractions and assessed the device's functionality in vitro.

STUDY DESIGN: Myometrial cells were 3D printed using a combination of GelMA (gelatin methacryloyl) and collagen, along with an isometric force transducer to enable real-time recording of uterine muscle contractions. Cell viability within the different biocompatible materials (GelMA and Collagen) was assessed using live-dead staining. In vitro, experiments were conducted with the device to evaluate myometrial cell contractility by stimulating the cells with acetylcholine at a concentration of 1μM.

RESULTS: The 3D-printed device model provided a suitable platform for culturing uterine muscle cells and mimicking their physiological environment. Myometrial cells were viable (green) in biocompatible materials like GelMA and collagen-1 (**Fig 1A**). With a 3D printed device (Fig 1B), we could record the cyclical contraction and relaxation of the 3D myometrial cell culture, using an isometric transducer and LabChart software (Fig 1B). The device successfully replicated the architectural and contractile properties of the native myometrial tissue, providing a conducive environment for culturing uterine muscle cells.

CONCLUSION: This non-invasive tool presents a promising avenue for studying uterine physiology and conducting preclinical trials, such as uterotonics, tocolytics, and treatments for postpartum bleeding. The tool allows real-time monitoring of drug responses to uterine contractions, enabling researchers to study drug efficacy and safety more effectively. Further research and validation will contribute to obstetric advancements, benefitting maternal and fetal healthcare and the development of new therapeutics.

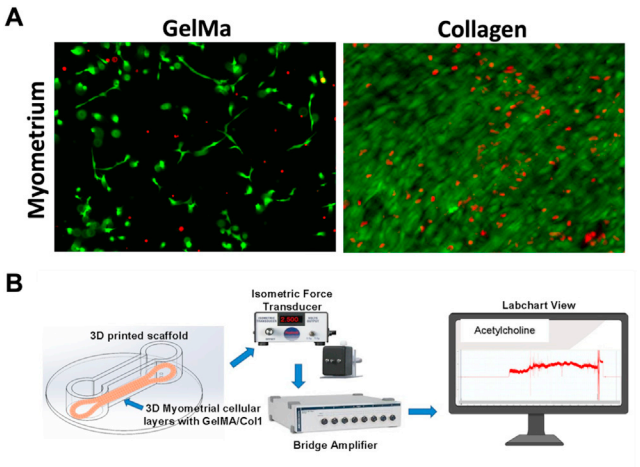

Table – Neonatal and perinatal outcomes, comparing participants with and without metformin use during the current pregnancy. Significance denoted by **bold** type.

Outcome	Metformin (n=170, 37.6%)	No Metformin (n=282, 62.4%)	P value
Neonatal Weights and Biometry			
SGA < 5th Perc., n (%)	6 (3.5%)	11 (3.9%)	0.84
SGA, <10th Perc. , n (%)	13 (7.7%)	17 (6.0%)	0.50
Birth weight (g), (Mean ± SD)	3064 ± 798	2958 ± 764	0.16
Birth weight < 2500g, n (%)	33 (19.4%)	58 (20.6%)	0.76
Birth length (cm), (Mean ± SD)	46.2 ± 8.7	47.5 ± 6.7	0.48†
Head Circumference (cm), (Mean ± SD)	33.7 ± 2.8	33.2 ± 2.5	0.09†
Neonatal Outcomes			
Apgar at 5 min, (Mean ± SD)	8.1 ± 1.5	8.5 ± 1.3	**<0.01†**
Apgar < 7 at 5 min, n (%)	22 (12.9%)	18 (6.4%)	**0.02**
Neonatal morbidity composite, n (%)	3 (1.8%)	10 (3.6%)	0.39‡
Bronchopulmonary dysplasia	1 (0.6%)	5 (1.8%)	0.42‡
Retinopathy of prematurity (any)	2 (1.2%)	4 (1.4%)	1.00‡
Necrotizing enterocolitis	0 (0%)	2(0.7%)	0.53‡
Intraventricular hemorrhage (any)	1 (0.6%)	2 (0.7%)	1.00‡
Placental Growth			
Placental weight (g), (Mean ± SD)	484 ± 167	451 ± 157	0.09
Placental length (cm), (Mean ± SD)	18.6 ± 3.3	19.1 ± 5.7	0.72†
Placental width (cm), (Mean ± SD)	15.6 ± 2.6	15.5 ± 3.3	0.87†

†Wilcoxon rank sum test. ‡Fisher's exact test SGA: Small for gestational age. Perc: percentile, SD: standard deviation.

318 Association between prenatal metformin exposure and birthweights in a cohort of gravidae with mild hypertension

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OBJECTIVE: Metformin is currently the most commonly used oral antihyperglycemic agent for diabetes (DM) in pregnancy. Metformin crosses the placenta and is associated in several trials with a higher incidence of small for gestational age (SGA) births. Given the elevated risk of adverse outcomes with multiple maternal comorbidities, we hypothesized that in the setting of maternal chronic hypertension (cHTN) and DM, metformin use during pregnancy would be associated with decreased birthweights and risk of adverse outcomes.

STUDY DESIGN: This was a secondary analysis of the CHAP trial, a multi-center randomized trial where pregnant participants with cHTN were randomized to antihypertensive agents to maintain goal blood pressure (BP) < 140/90 mm Hg (active treatment) or deferred treatment until BP ≥160/105 mm Hg (control). Participants in the CHAP trial with DM (gestational or type 2) with and without metformin use were compared. Participants were included if their metformin exposure was known, and excluded if enrolled in a metformin and diabetes management trial. The primary outcome was birthweight and secondary outcomes included neonatal & placental outcomes.

RESULTS: 452 gravidae with DM were included, n=170 (37.6%) exposed to metformin and n=282 not. Participants with and without metformin exposure were similar at baseline. While neither birthweights nor incidence of SGA significantly differed with metformin exposure (Table), neonatal outcomes & placental morphology did. Specifically, the proportion of neonates with a 5-minute Apgar < 7 was higher with metformin exposure (12.9% vs 6.4%, p=0.03). Placental thickness was increased with metformin use, but placental weights were not different.

CONCLUSION: Among a cohort of gravidae with cHTN and DM, metformin use during pregnancy was not associated with a significant change in birthweight, but was associated with an increase in the amount of neonates with 5 minute Apgar of < 7. Further work regarding the long-term safety of fetal metformin exposure is warranted.

319 Impact of the oxytocin shortage on postpartum bleeding outcomes

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OBJECTIVE: National oxytocin shortages led our institution to modify our postpartum (PP) oxytocin protocol. Our objective was to compare rates of postpartum hemorrhage (PPH) and the need for additional PPH interventions before and during the oxytocin shortage.

STUDY DESIGN: We performed a retrospective cohort study of all deliveries >22 weeks at a large academic referral center from 4/2022-1/2023. Prior to oxytocin shortages, we utilized a high-dose PP oxytocin regimen of 80 units/500 mL after vaginal deliveries and two bags of 80 units/500 mL after cesareans. With the shortage, we transitioned on 10/12/22 to 60 units/1000 ml after vaginal deliveries and one bag of 80 units/500 ml after cesareans. The primary outcome was a composite of activation of the institution's quantitative PPH protocol, any uterotonic use, any blood transfusion, and PPH based on EBL (see Table footnote). Secondary outcomes included individual constituents in the composite and other bleeding outcomes (Table). Outcomes were compared between pre-shortage and during shortage groups and logistic regression was used to estimate adjusted odds ratios (aORs) and 95% confidence intervals (CI) using the pre-shortage group as reference.

RESULTS: Of 2988 deliveries in our study period, 2422 deliveries were included- 1747 pre-shortage and 675 during. Individuals before the shortage were more likely to have a BMI >30, be nulliparous, have a prior cesarean, undergo cesarean, have antepartum magnesium use, have preeclampsia, and less likely to have intrapartum oxytocin. There was no significant difference in the primary composite outcome between time periods (pre-shortage 15.0% vs shortage 12.2%; aOR 0.92 [0.70-1.22]) (Table). Secondary outcomes were also similar between groups. Results were unchanged when stratified by delivery mode.

CONCLUSION: Rates of PPH and postpartum bleeding interventions were unchanged after PP oxytocin dose reduction during the oxytocin shortage at our institution. When using a high-dose

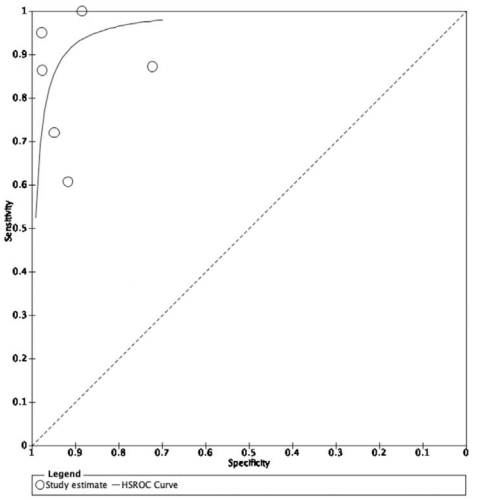
postpartum prophylactic oxytocin regimen, slight reductions in oxytocin did not alter bleeding outcomes.

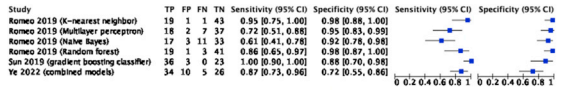
Table. Primary and secondary outcomes before and during the oxytocin shortage

	Prior to oxytocin shortage (n=1747) n (%)	During oxytocin shortage (n=675) n (%)	aOR† (95% CI)
Primary composite	262 (15.0%)	82 (12.2%)	0.92 (0.70-1.22)
Activation of the PPH protocol*	152 (8.7%)	46 (6.8%)	0.90 (0.63-1.29)
Any uterotonic administered **	73 (4.2%)	31 (4.6%)	1.17 (0.75-1.82)
Transfusion of any blood product	101 (5.8%)	25 (3.7%)	0.75 (0.47-1.21)
Postpartum hemorrhage***	78 (4.6%)	25 (3.8%)	0.85 (0.52-1.36)
Hematocrit decline >6%	25 (5.7%)	4 (2.9%)	0.37 (0.11-1.28)

†Reference group: Prior to oxytocin shortage. Odds ratios are adjusted for BMI >30, prior cesarean delivery, nulliparity, magnesium sulfate use, intrapartum oxytocin use, and mode of delivery.
*Activation of the PPH protocol occurred if any of the following were met – vaginal delivery with EBL >500 and/or >5 surgical laps used, cesarean section with EBL >1000 and/or >30 surgical laps used, or any provider with clinical concern/desire for closer patient monitoring. Patients on protocol received more frequent vital and lab monitoring.
**Any uterotonic administered included any dose of carboprost, methylergonovine, or vaginal misoprostol
***Postpartum hemorrhage was defined as an EBL >500 mL for vaginal delivery and EBL >1000 mL for cesarean section

Figure: ROC plot





320 Machine learning for the prediction of placenta accreta spectrum- systematic review and diagnostic meta analysis

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OBJECTIVE: Antenatal detected placenta accreta spectrum disorder (PAS) is associated with improved outcomes compared with first recognized PAS at delivery. We conducted a systematic review and diagnostic meta-analysis assessing the ability of machine learning (ML) for the prediction of placenta accreta spectrum disorders (PAS) from MRI-based texture data.

STUDY DESIGN: Systematic review was conducted using PRISMA guidelines. MEDLINE, Scopus, the Cochrane Library, and ClinicalTrials.gov were searched from inception to June 30, 2023, for studies that described the use of ML for the prediction of PAS. We then conducted a diagnostic meta-analysis to assess the validity of ML algorithms for prediction PAS and reported their respective sensitivity and specificity. Finally, a pooled sensitivity and specificity and area under the curve (AUC) were computed as well as diagnostic odds ratio (OR) with 95% confidence intervals (CI) using a random effects model.

RESULTS: Among 15 studies initially retrieved, three were included with a total of 201 patients. We were able to identify five different ML algorithms used to predict PAS from MRI-based texture data points. The five algorithms and their respective sensitivities and specificities are reported in Figure 1. In the reported trials, the ML algorithm successfully predicted 88 patients and successfully excluded 87 patients. The ML algorithm falsely predicted 15 patients and falsely excluded 11 patients. The AUC of the pooled trial was (diagnostic OR: 47; 95% CI 20.42,107.87).

CONCLUSION: ML-base MRI texture algorithms were predictive of PAS with high specificity. Our findings suggest that ML-based MRI texture algorithms have the potential to improve antenatal detection and ultimately pregnancy outcomes.

321 Alloimmunization in pregnancy: Patient-reported quality of care, mental health effects, and impact upon daily life

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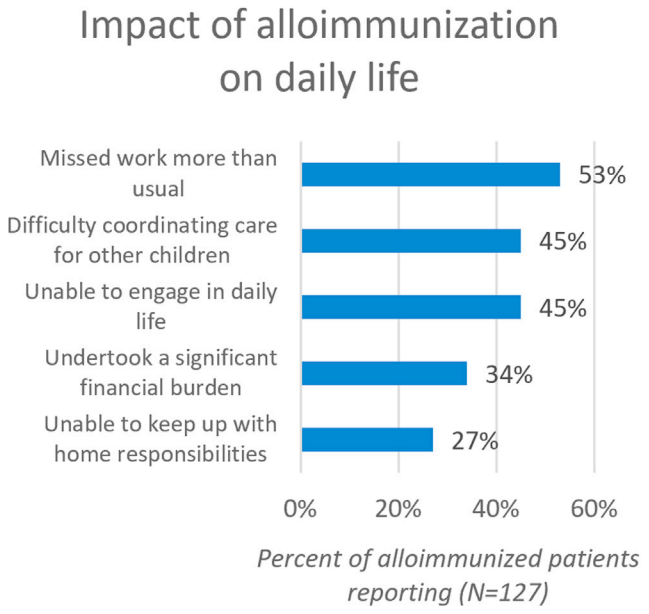
OBJECTIVE: The objective of this study was to examine the perceived quality of care and impact upon mental health and daily living in pregnancies complicated by red blood cell alloimmunization.

STUDY DESIGN: This investigation was an IRB-approved structured survey of individuals reporting a history of alloimmunization in pregnancy. Recruitment took place November 2022 to February 2023 through Allo Hope Foundation's social media channels and private patient support group. In addition to inquiring about disease presentation, management and outcomes, respondents were asked about their perceived quality of care and the impact of their condition on their mental health and daily lives.

RESULTS: **127** respondents detailing 200 pregnancies reported new or worsening feelings of anxiety (91%), guilt (75%), self-doubt (68%), isolation (71%), depression (68%) and symptoms of PTSD (61%) during their pregnancies. When asked to rate the quality of care they received during their pregnancies, individuals who rated their care as 8/10 or above reported significantly lower rates of guilt (p=0.004), self-doubt (p=0.003), depression (p=0.011), and symptoms of PTSD (p=0.006) compared to those with quality care ratings of 7/10 or below. Respondents were offered mental health support in 25% of alloimmunized pregnancies. Respondents were satisfied with the continuity of care across providers in 40% of pregnancies, with 37% and 67% reporting satisfaction with obstetrician/midwife and maternal fetal medicine specialist knowledge of alloimmunization respectively. 53% of respondents reported changing doctors to find better care. Self-reported impact upon daily living is depicted in the Figure.

CONCLUSION: Alloimmunization imposes a high emotional burden on patients. The obstetric and high-risk fetal medicine community must turn its attention to offering mental health support and bolstering its understanding of this complicated disease to minimize the patient burden.



322 A randomized trial of a simulation-based resuscitation curriculum for maternal cardiac arrest

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OBJECTIVE: Obstetric Life Support (OBLS) is a simulation-based blended learning curriculum on managing maternal cardiac arrest that consists of self-guided pre-course work and an instructor-led simulation course using a customized low-fidelity simulator. Our objective was to assess course pass rates and performance on cognitive and Megacode assessments following completion of the course.

STUDY DESIGN: We performed a randomized, controlled, single-blinded trial of the OBLS curriculum versus no education between May 2022 - July 2023. Eligible participants were healthcare professionals in active practice in prehospital and hospital-based settings who respond to maternal medical emergencies, were English-speaking, and were at least 18 years old. Megacode evaluators were blinded to assignment groups. Our primary outcomes were overall course pass rates determined by performance on validated cognitive and Megacode assessments. The secondary outcome was self-efficacy in clinical, procedural, knowledge, and communication skills following completion of the course.

RESULTS: We consented and randomized 49 participants. Seven participants withdrew before the intervention. The final analysis included 42 participants, 22 in the control group (c-OBLS) and 20 in the intervention group (i-OBLS). c-OBLS participants were older than i-OBLS participants (46.1 versus 33.6 years old, P=0.0182). There was no other difference in baseline demographics, and all but one c-OBLS participant had current training in basic (BLS) and advanced cardiac life support (ACLS). OBLS course pass rates were higher in the i-OBLS compared with c-OBLS (90.5% and 9.5%, P< 0.0001), Table 1. Mean cognitive scores were higher in i-OBLS than in c-OBLS (78.5 versus 64.9%, P=0.0003). Mean confidence scores were higher in i-OBLS versus c-OBLS (192.5 versus 160.4, P=0.0016).

CONCLUSION: OBLS-trained participants achieved higher course pass rates and cognitive and Megacode scores as team leaders than participants without additional training. Self-efficacy scores were much higher in those completing OBLS training than those without additional training.

Table. Baseline Characteristics and Outcomes of Obstetric Life Support Participants.

Baseline Variable	Summary Statistic[1]	All (N=49)	Control (N=26)	Intervention (N=23)	P-value[2]
Age (years)	n (n missing)	36 (13)	19 (7)	17 (6)	
	Mean (sd)	40.2 (16.1)	46.1 (18.6)	33.6 (9.5)	0.0182
Gender identity	n (n missing)	47 (2)	25 (1)	22 (1)	0.2864
Woman	n (%)	24 (51.1%)	15 (60%)	9 (40.9%)	
Man	n (%)	22 (46.8%)	10 (40%)	12 (54.5%)	
Non-binary	n (%)	1 (2.1%)	0 (0%)	1 (4.5%)	
Race/ethnicity	n (n missing)	37 (12)	19 (7)	18 (5)	0.6134
Asian	n (%)	3 (8.1%)	1 (5.3%)	2 (11.1%)	
Black or African American	n (%)	3 (8.1%)	2 (10.5%)	1 (5.6%)	
White	n (%)	29 (78.4%)	15 (78.9%)	14 (77.8%)	
Hispanic/Latinx	n (%)	1 (2.7%)	1 (5.3%)	0 (0%)	
Prefer not to answer	n (%)	1 (2.7%)	0 (0%)	1 (5.6%)	
Experiences as a simulation instructor	n (n missing)	47 (2)	25 (1)	22 (1)	0.7980
No	n (%)	29 (61.7%)	15 (60%)	14 (63.6%)	
Yes	n (%)	18 (38.3%)	10 (40%)	8 (36.4%)	
ACLS cerfication	n (n missing)	48 (1)	25 (1)	23 (0)	0.8377
Currently certified	n (%)	25 (52.1%)	12 (48%)	13 (56.5%)	
Never certified	n (%)	14 (29.2%)	8 (32%)	6 (26.1%)	
Previously certified	n (%)	9 (18.8%)	5 (20%)	4 (17.4%)	
BLS (basic life suport) certification	n (n missing)	48 (1)	25 (1)	23 (0)	0.3519
Currently certified	n (%)	39 (81.3%)	20 (80%)	19 (82.6%)	
Never certified	n (%)	2 (4.2%)	2 (8%)	0 (0%)	
Previously certified	n (%)	7 (14.6%)	3 (12%)	4 (17.4%)	
PHTL (Pre-hospital trauma life support)	n (n missing)	41 (8)	20 (6)	21 (2)	0.7849
Currently certified	n (%)	7 (17.1%)	3 (15%)	4 (19%)	
Never certified	n (%)	31 (75.6%)	16 (80%)	15 (71.4%)	
Previously certified	n (%)	3 (7.3%)	1 (5%)	2 (9.5%)	
Outcome Variable	**Summary Statistic[1]**	**All (N=42)**	**Control (N=22)**	**Intervention (N=20)**	**P-value[2]**
Cognitive Score	n (n missing)	43 (0)	22 (0)	21 (0)	
	Mean (sd)	0.715 (0.131)	0.649 (0.129)	0.785 (0.091)	0.0003
Megacode score	n (n missing)	42 (0)	21 (0)	21 (0)	
	Mean (sd)	0.76 (0.18)	0.61 (0.12)	0.91 (0.05)	<0.0001
Confidence score	n (n missing)	42 (0)	22 (0)	20 (0)	
	Mean (sd)	175.6 (34.4)	160.4 (34)	192.5 (26.5)	0.0016

[1]Categorical variables are summarized by frequencies (%). Continuous measures are summarized by mean (sd).
[2]P-value for parameteric analysis using Chi-Square test or t-test/ANOVA and nonparametric analysis using Fisher's exact test or Wilcoxon rank sum test (t-approximation with continuity correction)/Kruskal-Wallis test (chi-square approximation).

323 Satisfaction with continuous glucose monitoring in pregnant patients with type 1 and type 2 diabetes

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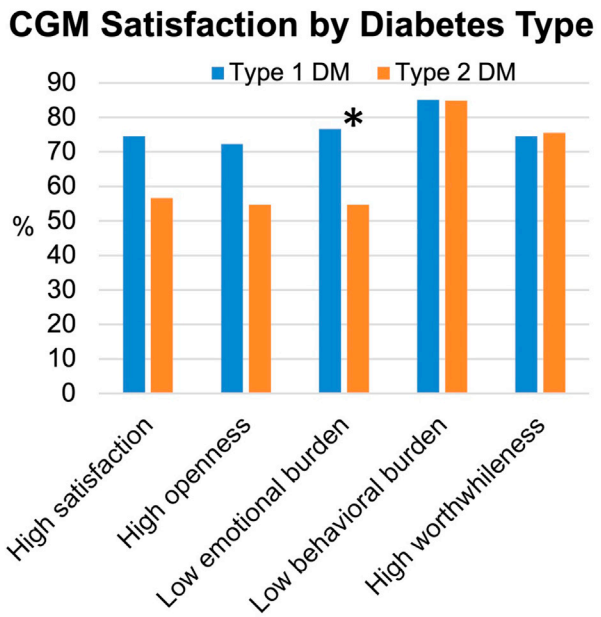
OBJECTIVE: Continuous glucose monitoring (CGM) improves pregnancy outcomes in type 1 diabetes. Given rapid uptake of CGM in pregnancies complicated by both type 1 and type 2 diabetes, our objective was to determine if CGM satisfaction and use differed between type 1 and type 2 diabetes.

STUDY DESIGN: Cross-sectional survey study of 100 patients with pregestational diabetes who used Dexcom G6 CGM during pregnancy and received prenatal care at a single tertiary care center (2021-2023). Participants completed the validated 15-question Glucose Monitoring Satisfaction Survey (GMSS) and other questions about CGM use. The primary outcome was high satisfaction with

CGM, defined as total GMSS score of 4 or greater (calculated as average of all questions on 5-point Likert scale). Secondary outcomes included GMSS subscales, frequency of CGM app use (< 6 times/day, 6-10 times/day, all the time), and CGM features used (numbers only, arrows or graphs, both arrows and graphs). Outcomes were compared between type 1 and type 2 diabetes, and logistic and ordinal regression estimated the association between type 2 diabetes and outcomes.

RESULTS: Of 100 surveyed patients, 45 had type 1 and 55 had type 2 diabetes. Patients with type 1 diabetes were more likely to use CGM before pregnancy and use insulin pump. CGM satisfaction did not differ between type 1 and type 2 diabetes (74.5% vs 56.6%; aOR 0.54, 95%CI 0.21-1.36; Figure). High openness, low behavioral burden, low emotional burden, and high worthwhileness also did not differ between groups after adjustment for CGM use before pregnancy (Figure). Reported CGM app use was high and did not differ between groups (aOR 0.80, 95%CI 0.33-1.95). Patients with type 2 diabetes were less likely to use arrows and/or graphs on CGM app compared to type 1 diabetes (aOR 0.34, 95%CI 0.11-0.98).

CONCLUSION: In this cohort, patients with type 2 diabetes appear to be similarly satisfied with CGM compared to those with type 1 diabetes. Future efforts focused on CGM education for new users may help increase use of CGM app features, maximize satisfaction and minimize technology burden.



	OR (95%CI)	aOR (95%CI)
High total satisfaction	0.45 (0.19-1.05)	0.54 (0.21-1.36)
High openness	0.46 (0.20-1.07)	0.46 (0.18-1.16)
Low emotional burden	0.37 (0.16-0.88)	0.49 (0.19-1.24)
Low behavioral burden	0.98 (0.33-2.96)	0.79 (0.22-2.79)
High worthwhileness	1.05 (0.43-2.61)	1.22 (0.45-3.29)
*Adjusted for CGM use before pregnancy. Referent=T1DM.		

324 Assessing provider confidence in counseling patients about peripartum toxicology testing

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OBJECTIVE: To evaluate provider comfort in discussing peripartum toxicology testing with patients.

STUDY DESIGN: Semi-structured virtual interviews were performed with a convenience sample of obstetric providers in a single hospital system. Interviews assessed provider comfort with consenting for testing, disclosing toxicology test results, reviewing implications for maternal and infant health, and referring to treatment. Responses were assessed using descriptive statistics.

RESULTS: Of 20 participants, 5 (25%) were trainees, 6 (30%) were attending midwives, and 11 (55%) were attending obstetricians. 10 (50%) had been in practice for at least 10 years. Most participants reported that they counsel patients about substance use in pregnancy less than once per week (15/20, 75%), and 6/20 (30%) of participants reported that they do not always obtain consent before toxicology testing in pregnancy, despite a hospital policy and the United States Supreme Court ruling requiring such consent. While participants expressed high confidence in counseling peripartum patients on the implications of positive toxicology test results on neonatal health, only half reported that they understood the implications of a positive test on maternal health and breastfeeding or that they understood the treatment options available to patients with a positive toxicology test (Figure). Only two participants (10%) agreed that they understood and could counsel patients on the implications of a positive toxicology test on child welfare reporting.

CONCLUSION: Providers expressed low confidence in counseling pregnant patients on the implications of a positive toxicology test for maternal health, breastfeeding, treatment referrals, and child welfare, which may explain the suboptimal rates of providers obtaining consent for toxicology testing in this cohort. Educational initiatives to improve provider comfort with discussing implications of a positive test are imperative and planned by these authors.

325 Adverse pregnancy outcomes in patients with congenital uterine anomalies: evaluation of a large population database

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OBJECTIVE: Published literature has established an increased risk of some adverse pregnancy outcomes in patients with congenital uterine anomalies (CUA); however, prior studies are limited by small sample sizes. Our aim was to better characterize the risk of adverse pregnancy outcomes among patients with CUA.

STUDY DESIGN: We performed a retrospective cohort study of female patients aged 10-55 with a documented pregnancy outcome in the TriNetX Analytics Research Network. Congenital uterine anomalies were identified using ICD-10 codes Q51.x and O34.0. Patients with multiple conflicting diagnosis codes were excluded from analysis. We assessed the risk of adverse pregnancy outcomes in patients with and without an encounter diagnosis of CUA. Outcomes of interest included pregnancy outcome (i.e. abortion, ectopic pregnancy, live birth, stillbirth) and Severe Maternal Morbidity (SMM), using ICD-10 indicator codes selected by the Centers for Disease Control and Prevention (CDC). Descriptive statistics and chi-squared tests were used to analyze differences between groups.

RESULTS: 2,217,222 patients met inclusion criteria, 16,413 of whom had a one or more encounter diagnoses codes for CUA. Baseline differences between groups are shown in Table 1. Compared to patients with no encounter diagnoses for CUA, patients with CUA had higher rates of spontaneous abortion (14% vs 6.8%, $p < 0.001$) and stillbirth (1.2% vs 0.45%, $p < 0.001$). SMM was also increased in patients with CUA. Specifically, these patients had statistically significantly higher rates of blood products transfusion (1% vs 0.79%) hysterectomy (0.21% vs 0.10%), and DIC (0.46% vs 0.26%, all $p < 0.001$) within 30 days of delivery.

CONCLUSION: Patients with CUA are at higher risk of adverse pregnancy outcomes compared to patients with normal uterine anatomy, including for SMM and severe hemorrhage. Patients with CUA should be counseled about these pregnancy-associated risks, and CUA should be incorporated into risk-stratification and prevention strategies.

Table 1: Baseline Characteristics

	CUA (16,413 patients)	Control group (2,200,809 patients)
Mean Age	29.1 years (SD 6.0)	28.8 years (SD 6.3)
Chronic hypertension	870 (5.3%)	82,507 (3.7%)
Maternal BMI > 30	951 (5.8%)	96,048 (4.4%)
Type I Diabetes	119 (0.7%)	10,581 (0.5%)
Type II Diabetes	365 (2.2%)	35,771 (1.6%)
Gestational diabetes	1,171 (7.1%)	135,867 (6.2%)
History of uterine scar	1,016 (6.2%)	72,932 (3.3%)
History of preterm labor	206 (1.3%)	11,240 (0.5%)

326 Postpartum complications and delivery costs associated with births at term in the United States

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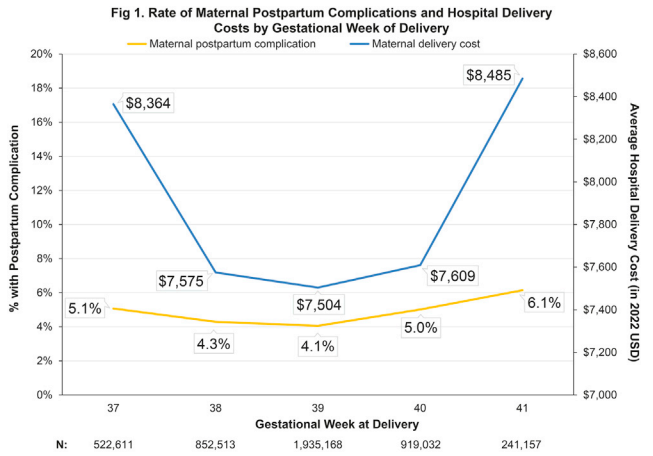
OBJECTIVE: To assess maternal postpartum (PP) complication rates and delivery costs for individuals delivering across the spectrum of gestational age (GA) at term (37–41 weeks GA [wGA]) in the United States.

STUDY DESIGN: A population-based cohort study of the Premier Healthcare Database (Jan 2016–Sep 2021) was conducted. Eligible individuals aged 12–55 years old who had a live birth at $\geq$ 37 wGA were included; trends in rates of maternal PP complications and cost of care during the delivery hospitalization were examined. Severe maternal morbidity (SMM) scores were calculated using the expanded obstetric comorbidity scoring system (Leonard et al, Obstet Gynecol 2020). Maternal PP complications were a composite of sepsis, shock, acute renal failure, cardiac and thromboembolic events, acute respiratory distress, or hemorrhage. Trends by maternal age were explored.

RESULTS: A total of 4,470,481 term deliveries were included. Mean±SD age at delivery was 28.9±5.7 years; the obstetric comorbidity score for SMM was 11.0±15.2. U-shaped trends were observed in the frequency of complications and per-person costs for 37 to 41 wGA (Fig 1), with inflection points at 39 wGA: 4.1% of individuals delivering at 39 wGA had a complication; associated per-person costs were $7,504. Complications and costs increased after 39 wGA, with estimates highest at 41 wGA: 6.1% had a complication; per-person costs were $8,485. Compared to individuals $\leq$ 35 years old at delivery, costs were consistently highest across all wGA for individuals > 35 years old. PP complication frequency was consistently highest among individuals < 17 years old and lowest among individuals 17–35 years old.

CONCLUSION: Late-term deliveries exhibited the highest level of patient and hospital cost burden. Individuals > 35 years old at delivery did not have the highest frequency of complications, but their cost of care was consistently the highest, suggesting perhaps more severe complications were experienced.



327 Amphiregulin downregulation during preeclampsia may have long lasting cardiovascular effects

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OBJECTIVE: There are fundamental knowledge gaps in the molecular mechanisms underlying preeclampsia pathogenesis. Even less is understood on how dysregulated signaling contributes to adverse cardiovascular outcomes postpartum. We hypothesize that macrophages, which regulate vascular function and inflammation play a key role.

STUDY DESIGN: Serum (n=80) and fresh full thickness placental biopsies (n=60) were obtained from our institution's biorepository. Serum was obtained 2 years postpartum (n=40) in individuals with a hypertensive disorder of pregnancy (HDP). Chorionic villi were dissected and used to generate placental conditioned media (CM) as previously described or fixed in formalin. THP-1 macrophages were incubated with CM for 24 hours to generate placental conditioned macrophages (PCM). Cytokine concentration was measured with ELISA. Immunofluorescence and confocal microscopy were used to localize proteins in samples. Clinical variables collected include: HDP diagnosis, blood pressure (BP). Ordinary one-way ANOVA was used to compare serum amphiregulin across HDP severity and diagnoses.

RESULTS: AREG was the most induced gene in placental conditioned macrophages (Figure 1a). PCM expression of AREG was reduced with HDP. Amphiregulin was present in the serum of HDP patients and strongly correlated strongly with disease severity ($p< 0.0001$), Figure 1b. These differences persisted 2 years postpartum ($p=0.03$), Figure 1c, but did not correlate with BP. Amphiregulin was abundant in placental conditioned media; however, levels did not correlate with HDP severity. Macrophage secretion of amphiregulin was not dependent on placental amphiregulin, suggesting an alternative pathway of regulation. Immunofluorescence localized amphiregulin to maternal macrophages on the surface of the syncytiotrophoblast in placental explants (Figure 1d).

CONCLUSION: Our data implicate macrophage-dependent regulation of amphiregulin in the development of hypertensive disorders during pregnancy with persistence postpartum. Future studies examining amphiregulin as a predictor of HDP and postpartum endothelial dysfunction are warranted.

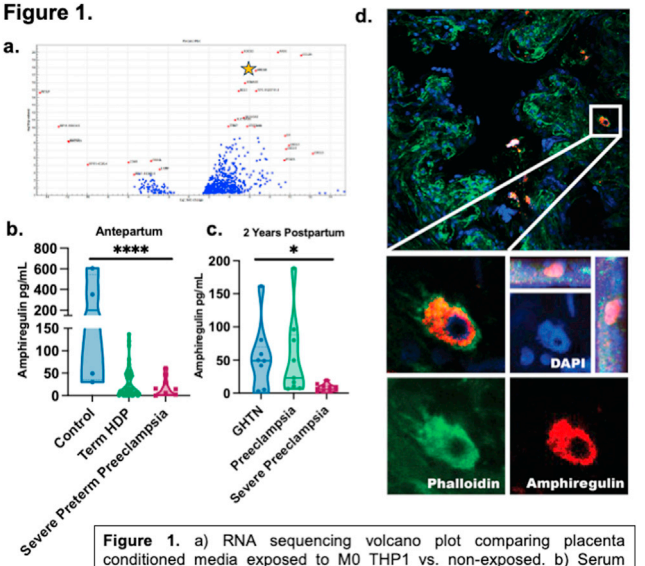

Figure 1. a) RNA sequencing volcano plot comparing placenta conditioned media exposed to M0 THP1 vs. non-exposed. b) Serum amphiregulin concentration at time of delivery by HDP severity. c) Serum amphiregulin concentration at 2 years postpartum by HDP diagnosis. d) Immunofluorescence staining of fixed chorionic villi tissue.

328 Activin A as a marker of postpartum hypertension following a hypertensive disorder of pregnancy.

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OBJECTIVE: Activin A is a pleotropic protein and marker of endothelial dysfunction and cardiac fibrosis in pregnant and non-pregnant individuals. We sought to assess the relationship between maternal serum activin A concentration at delivery, severity of hypertensive disorder of pregnancy (HDP) and postpartum blood pressure (BP) following a HDP.

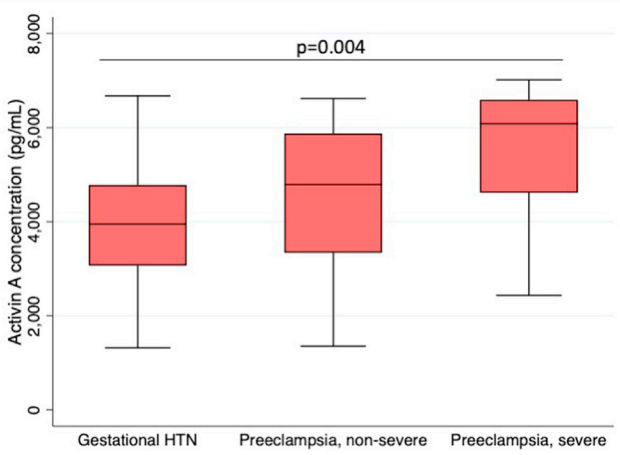
STUDY DESIGN: We conducted a cohort study of individuals with a HDP who delivered between 3/2019 and 3/2022 co-enrolled in our institution's biospecimen repository and our remote (BP) monitoring program. Eligible individuals had a physician adjudicated HDP diagnosis, no pre-pregnancy hypertension, a serum specimen collected at the time of delivery and reported at least five home BPs in the first six weeks postpartum. Serum activin A was measured by R&D Systems ELISA. Aspirin use during pregnancy was ascertained from the medical record. We used nonparametric Spearman correlations to compare activin concentrations and continuous variables and Wilcoxon rank sum and non-parametric test for trend to compare concentrations across categorical variables.

RESULTS: We included 76 individuals who contributed 2121 home BPs to this analysis. Maternal serum activin concentration increased in a stepwise fashion with severity of HDP (non-parametric test for trend $p< 0.01$) but did not differ significantly by aspirin use in

pregnancy. Activin concentration was also significantly correlated with peak systolic (r:0.33, p< 0.01) and diastolic (r: 0.24, p=0.03) postpartum BP, but was not correlated with pre-delivery peak systolic (r: 0.11, p=0.35) or diastolic BP (r: 0.06, p=0.58). Individuals requiring initiation of anti-hypertensive medications had higher activin concentrations compared to those never requiring medications (p=0.001).

CONCLUSION: In our study, higher serum activin concentrations at the time of delivery were related to increasing severity of HDP, higher peak postpartum BP and need for anti-hypertensive medication. Our results suggest the potential of activin A as a promising biomarker for improving postpartum risk stratification among individuals with HDP.

Figure 1. Activin concentration by HDP severity.



329 Prenatally identified congenital aqueductal stenosis: short- and long-term neurodevelopmental outcomes

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OBJECTIVE: Assess short- and long-term neurodevelopmental outcomes in patients with prenatally identified congenital aqueductal stenosis (CAS) with and without ventricular rupture to improve counseling for patients and families.

STUDY DESIGN: This was an IRB-approved, retrospective-cohort study of 140 CAS patients who underwent fetal MRI (87 also received postnatal brain imaging) at Cincinnati Children's Hospital Medical Center between 2003 and 2023. Patients were grouped according to etiology and ventricular rupture status. Patients were deemed to have "syndromic CAS" if there was a coexisting diagnosis of a malformation (e.g., rhombencephalosynapsis, Dandy-Walker malformation, etc.) or genetic syndrome (e.g., X-linked hydrocephalus, Walker-Warburg, etc.). Otherwise, they were classified as "isolated CAS." Patient records were analyzed for metrics such as length of NICU stay, seizures, respiratory and feeding support, speech capabilities, and gross motor function score (GMFCS).

RESULTS: Of 140 patients with fetal imaging, 18 died in the fetal or immediate neonatal period, and 14 pregnancies were terminated. 108 and 88 patients were available to analyze short- and long-term outcomes, respectively. The mean age was 7.23 years (range: [1.04, 18.74]) for long-term outcomes. Long-term motor outcomes were not correlated with ventricular rupture. There were no differences when comparing patients with rupture to those without rupture. However, poor motor outcomes were correlated with syndromic CAS with a statistically significant difference ($p< .001$) in GMFCS compared to isolated CAS; 65.9% of syndromic CAS required assistance with ambulation vs. 6.67% of those with isolated CAS. Similarly, the risk for future epilepsy and the requirement for feeding assistance was significantly increased with syndromic CAS.

CONCLUSION: These findings challenge the conventional counseling that ventricular rupture is a reliable predictor of poor prognosis. Instead, distinguishing syndromic from isolated CAS is more fruitful for personalizing treatment and informing care decisions.

330 Anxiety and depression treatment in birthing people experiencing antepartum hospitalization: a systematic review and meta-analysis

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OBJECTIVE: Birthing people who experience pregnancy complications are at a higher risk of developing perinatal anxiety or depression. Antepartum hospitalization due to these complications enhances the risk, with one in every three birthing people hospitalized reporting anxiety or depression. Our objective was to evaluate interventions for anxiety or depression for birthing people experiencing antepartum hospitalization for perinatal or fetal complications.

STUDY DESIGN: Searches were conducted in Ovid MEDLINE, Embase, CINAHL Plus, Cochrane CENTRAL, and PsycINFO to identify randomized controlled trials (RCTs) comparing any intervention against treatment as usual (TAU) for management of anxiety or depression among birthing people admitted to a hospital's antepartum unit for pregnancy complications. Two authors independently reviewed abstracts for eligibility and potentially eligible full-text articles for inclusion. The primary outcome was a measurement of anxiety or depression symptoms using a validated scale following the intervention. The Hedges method was used to detect standardized mean difference (SMD) in studies using different psychometric scales.

RESULTS: Of 877 articles identified, two RCTs—consisting of total of 161 and 123 participants randomized to intervention and TAU, respectively—were included. The pooled intervention group included daily meditation programs or other mind-body interventions such as education on stress reduction techniques and individualized patient support. Compared to TAU, interventions significantly reduced mean scores assessing anxiety and depression symptoms (Figure 1).

CONCLUSION: Few RCTs have been published examining the effect of interventions on symptoms of anxiety or depression among birthing people who experience antepartum hospitalization. Nevertheless, mental health interventions yielded modest yet significant reduction in both perinatal anxiety and depression symptoms in this

population. These promising results and shortage of data highlight a need for further high-quality trials to support the mental health needs of this high-risk population.

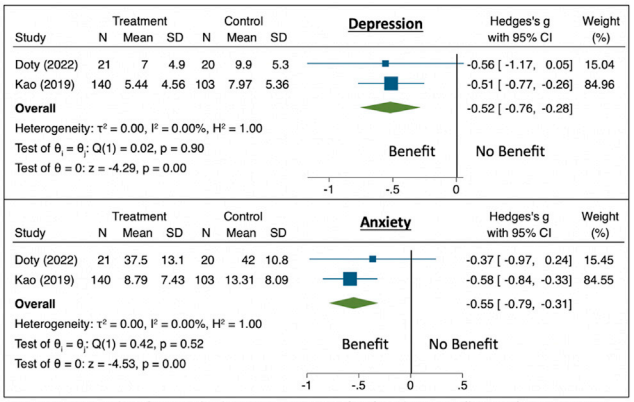

Figure 1: Forest plots for standard mean Depression (top) and Anxiety (bottom) symptoms as assessed on validated scales

331 Subsequent pregnancies after conservative placenta accreta management: systematic review and meta-analysis

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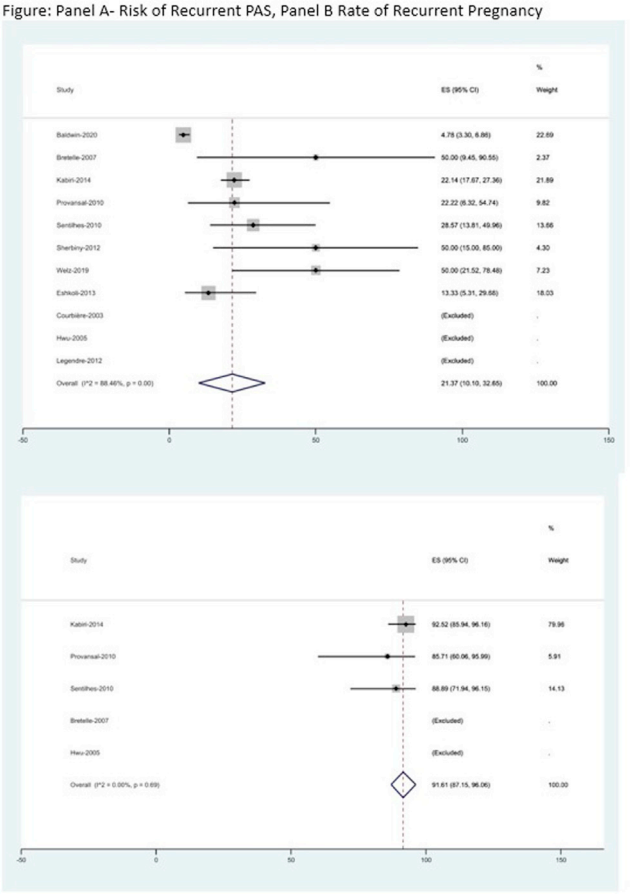
OBJECTIVE: This study aimed to assess the recurrence rate and obstetric outcomes in patients with a history of placenta accreta spectrum (PAS) who underwent conservative management with uterine preservation.

STUDY DESIGN: This systematic review and meta-analysis was conducted according to PRISMA guidelines. Titles and abstracts retrieved by a trained research librarian were screened by two authors. Studies were included that reported subsequent pregnancy outcomes including recurrence rate of PAS for patients who underwent conservative uterine-sparing management of PAS in the index pregnancy. Studies that did not report subsequent pregnancies were excluded. The primary outcome was the risk of recurrent PAS in subsequent pregnancies. The secondary outcomes were rates of achieved pregnancies and rates of pregnancies resulting in live births. Random effects meta-analysis was used to compute the rates of recurrent PAS and other pregnancy outcomes.

RESULTS: There were 1020 studies screened, and the final analysis included eight studies with 888 live births. There was heterogeneity with respect to the type of conservative management performed, length of follow up time, and definitions of PAS. Of the 888 patients there were 105 (21.4%, 95%CI (10.1, 32.7)) cases of recurrent PAS (Figure). There were six studies which reported a total of 152 women who attempted pregnancy, 140 of whom (91.6%, 95%CI (87.2, 96.1)) achieved pregnancies including some with multiple subsequent pregnancies: however, not all of these studies reported the outcomes of these pregnancies. There were six studies that reported the outcomes of subsequent pregnancies including 51 pregnancies resulting in 33 live births, 13 spontaneous abortions, 3 termination of pregnancies, and 2 ectopic pregnancies.

CONCLUSION: The quality of existing literature on recurrent PAS is low. There is a high pregnancy rate after conservative treatment of PAS with a risk of recurrent PAS of 21%. Patients undergoing conservative management of PAS should be appraised of these risks.

Figure: Panel A- Risk of Recurrent PAS, Panel B Rate of Recurrent Pregnancy



332 IGF-1 mediates ID2 in trophoblast differentiation

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OBJECTIVE: In preeclampsia (PE), impaired trophoblast proliferation and differentiation is thought to cause abnormal placentation and consequent fetal growth restriction. Insulin-like growth factor 1 (IGF-1) promotes trophoblast proliferation and differentiation, however the mechanisms of these processes are not well understood. The IGF-1 receptor regulates inhibitor of DNA binding 2 (ID2), but it is unclear how. ID2 functions as a negative regulator of bHLH transcription factors. ID2 is involved in trophoblast differentiation and implicated in many processes disrupted in PE—placental development, vascular differentiation, and angiogenesis. We hypothesize that IGF-1 promotes trophoblast differentiation via ID2—a relationship that has not been tested before in trophoblasts.

STUDY DESIGN: Immortalized human first trimester trophoblast cells (HTR-8/SVneo) were treated with IGF-1 for 24 hours after serum starvation. ID2 and MKI67 (marker of proliferation Ki67) expression was quantified by qRT-PCR and Western blot. Treated cells were visualized for tube formation as an index of differentiation. A wound healing assay was used to visualize cell migration and CCK-8 was used to enzymatically quantify viable cells.

RESULTS: Cell viability, migration, and differentiation were significantly increased in high doses (100 and 1000 ng/mL) of IGF-1 compared to low doses (0 and 10 ng/mL). *ID2* and *MKI67* mRNA levels were significantly lower in high *IGF-1* doses compared to lower doses. As IGF-1 increased from 0 to 100 ng/mL, ID2 protein increased significantly. But when IGF-1 increased from 100 to 1000 ng/mL, ID2 protein decreased significantly.

CONCLUSION: These data suggest IGF-1 may regulate trophoblast proliferation and differentiation through ID2. Increased IGF-1 may increase differentiation by decreasing ID2 expression. Futures studies will investigate mechanisms by which IGF-1 influences ID2, and if there are ID2-independent pathways of IGF-1 trophoblast regulation.

333 A molecular diagnostic assay for syphilis infection among a high-risk pregnant cohort.

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OBJECTIVE: Recommended syphilis screening during pregnancy relies on a serologic test to determine the host response towards antigenic components of the causative agent, *Treponema pallidum*. A novel research-use only transcription mediated amplification assay (TMA) targeting 16S rRNA of *T. pallidum* collected from mucosal tissue has demonstrated organism detection prior to seroconversion in rectal swabs collected from men. The aim of this pilot study is to determine detection rates of *T. pallidum* in provider or self-collected vaginal swab samples from pregnant women with syphilis.

STUDY DESIGN: A prospective cohort study was conducted for all pregnant individuals who underwent routine syphilis screening via the recommended reverse or traditional screening methods between 01/23-06/23 at a high-risk obstetrical clinic. Vaginal swabs were collected by the provider or the patient at the same visit the syphilis screen was performed. All swabs were subjected to automated *T. pallidum* TMA (Hologic,Inc). Syphilis status was confirmed with the health department.

RESULTS: Of 210 eligible patients, 191 (90%) underwent a provider collected or self-collected vaginal swab. Of those, 32 (16.7%) had detectable T. pallidum rRNA. Of these, 5 (15.6%) patients were positive for syphilis using the reverse algorithm with a reactive treponemal antibody and a confirmatory nontreponemal (NT) titer. The stage of syphilis varied, and NT titers ranged from 1:1-1:128. Nine (28.1%) with detectable T. pallidum RNA were screened by the traditional algorithm and yielded a nonreactive NT titer, and 8 (25%) were negative by the reverse algorithm (nonreactive treponemal antibody). The remaining 10 (31%) are pending testing for discordant results. None of the patients with nondetectable T. pallidum RNA tested positive using syphilis serology, yielding a 100% positive predictive value and 85% specificity.

CONCLUSION: The research-use only TMA test targeting 16S rRNA of *T. pallidum* demonstrated pathogen detection from vaginal mucosal specimens in pregnant individuals with syphilis. Further research is needed to determine its utility as a screening test.

334 Is there clinical utility of PAPP-A in the age of cell free DNA?

Tirtza Spiegel Strauss[1], Phuong Chi Nguyen[2], Dhara Kadakia[3], Anna Eberwein[3], Alexandra N. Mills[4], Shobha Jagannatham[5], Ariel Coughlin[3], Olivia Grubman[6], Thomas Owens[7], Guillaume Stoffels[8], Farrah N. Hussain[6], David Cole[9], Graham Ashmead[10], Zainab Al-Ibraheemi[11], Lois Brustman[12]

[1]Maimonides Medical Center, New York, NY, [2]Mount Sinai South Nassau, Oceanside, NY, [3]Mount Sinai West, Icahn School of Medicine at Mount Sinai, New York, NY, [4]Icahn School of Medicine at Mount Sinai, New York, NY, [5]Icahn School of Medicine at Mount Sinai West/Morningside, New York, NY, [6]Mount Sinai West, New York, NY, [7]Mount Sinai West, New York, NY, [8]Mount Sinai Hospital, New York, NY, [9]Mt. Sinai West, New York, NY, [10]Roosevelt Hospital, New York, NY, [11]Mount Sinai West, N Caldwell, NJ, [12]St. Luke's Roosevelt Hospital Center, New York, NY

OBJECTIVE: SMFM recommends against performing first trimester screen(FTS) with cell free DNA(cfDNA). However PAPP-A≤0.4 multiples of the mean(MoM) has been associated with adverse perinatal outcomes. We aimed to prove there was additional clinical utility of analytes, specifically PAPP-A, in FTS. We hypothesized that FTS+cfDNA, compared to NT+cfDNA, would increase sensitivity to detect adverse outcomes, guide aspirin initiation, and thus decrease rates of adverse maternal outcomes such as preeclampsia and placental abruption.

STUDY DESIGN: This was a prospective observational cohort study comparing patients at 2 hospitals from 2021-2022. Site 1 received NT+cfDNA, while site 2 received FTS+cfDNA or NT+cfDNA. Those with PAPP-A≤0.4 were recommended aspirin and fetal surveillance. Demographics, aspirin use, and outcomes were reviewed. The McNemar test was performed on FTS+cfDNA group to determine additional sensitivity that PAPP-A≤0.4 had to detect adverse outcomes, while adjusting for treatment.

RESULTS: FTS+cfDNA was sent on 688 and NT+cfDNA on 701 patients. In the FTS+cfDNA group patients were older, lower BMI, predominantly White, more in vitro fertilization(IVF), less hypertension, more nulliparous, and less publicly insured compared to NT+cfDNA group ($p < 0.01$). After adjusting for hypothetical proportions of prevented outcomes with the McNemar test in FTS+cfDNA group, PAPP-A added additional sensitivity to detect adverse maternal outcomes compared to only NT+cfDNA(Table 1). 78% PAPP-A≤0.4 took aspirin compared to 33% of those recommended aspirin for ACOG risk factors. Adverse maternal outcomes were similar between FTS +cfDNA group and NT+cfDNA group (10.6% vs 11.8%, p=0.46).

CONCLUSION: Our data suggests PAPP-A has additional sensitivity to detect adverse maternal outcomes and increases aspirin compliance. Though we anticipated decreased adverse outcomes in the FTS+cfDNA group, it is possible that differing group demographics lead to similar rates of adverse maternal outcomes. As preeclampsia causes maternal and fetal morbidity, all known noninvasive interventions to increase detection should be considered.

Table 1: McNemar Test for screening performance of PAPP-A among the FTS+cfDNA group

Outcome	Hypothetical proportion of prevented outcomes‡	Sensitivity		
		No PAPP-A	PAPP-A	P value†
Maternal adverse outcome	0%	0.01 (1/73)	0.15 (11/73)	0.002
	10%	0.01-0.03 (1-2/74)	0.16 (12/74)	0.001-0.002
	20%	0.01-0.05 (1-4/76)	0.18 (14/76)	0.0002-0.001

† Sensitivity was compared using the McNemar test on case patients.
‡ The hypothetical proportion of prevented outcomes corresponds to the proportion of cases that would have been avoided by treatment after PAPP-A<0.4 MoM. Note that 10% and 20% of prevented outcomes were equivalent to 1 and 3 cases, respectively.

335 Efficacy of glycated albumin in the management of gestational diabetes

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OBJECTIVE: While glycated albumin (GA) can be used for blood glucose management in patients with diabetes, the role of GA in assessing glycemic status in gestational diabetes (GDM) has been controversial. This study aimed to investigate the efficacy of GA measurements in predicting the need for insulin therapy at GDM diagnosis and assessing glycemic status during the early third trimester in women with GDM.

STUDY DESIGN: This retrospective study included singleton pregnant women with GDM who had both GA and self-monitoring of blood glucose (SMBG) measured at the time of diagnosis and between 31-33 weeks' gestation. SMBG measurements were taken four times a day (before breakfast [fasting] and 2 hours after each meal), and the respective mean values of fasting and postprandial glucose measurements over consecutive seven days were calculated. We investigated whether GA was correlated with SMBG values and whether GA values at diagnosis and during the early third trimester effectively predicted insulin therapy and poor glycemic control (defined as fasting ≥95 mg/dL and postprandial ≥120 mg/dL, respectively.

RESULTS: We measured GA in 190 patients at diagnosis and in 153 patients during the early third trimester. While GA values were significantly and negatively associated with prepregnancy body mass index (BMI) (p< .0001), they did not show significant associations with mean fasting or postprandial glycemic values of the SMBG measurements, either at diagnosis or during the early third trimester after controlling BMI. GA did not differ significantly between women with and without insulin therapy or those with poor and good control (**Table**).

CONCLUSION: GA measurements seem to be ineffective in assessing glycemic control status in women with GDM and therefore should be abandoned.

Table. Comparison of GA values in the various glycemic statuses

(A) At diagnosis of GDM				
	Insulin therapy (n=82)	Diet alone (n=108)	Crude p value	BMI-adjusted p value
GA value (%)	13.4±1.2	13.4±1.1	0.79	0.20
(B) Between 31-33 weeks' gestation				
Fasting	Poor control (n=24)	Good control (n=129)	Crude p value	BMI-adjusted p value
GA value (%)	12.8±1.1	13.1±1.1	0.24	0.45
Postprandial	Poor control (n=82)	Good control (n=71)	Crude p value	BMI-adjusted p value
GA value (%)	13.1±1.1	13.0±1.1	0.58	0.30

336 Differences in pharmacologic management of postpartum hemorrhage in patients with and without thrombocytopenia

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OBJECTIVE: Low platelet count at delivery is a risk factor for postpartum hemorrhage (PPH). We sought to evaluate if patients with thrombocytopenia < 150,000 platelets/μl require different uterotonic management in the setting of postpartum hemorrhage (PPH).

STUDY DESIGN: We performed a single-institution, retrospective cohort study on patients whose deliveries were complicated by PPH from 8/2020-11/2021. Inclusion criteria included quantitative blood loss ≥1000ml within 24 hours of delivery as defined by ACOG's reVITALize criteria for PPH. Patients were stratified into two groups: those with thrombocytopenia on delivery admission with platelets < 150,000 per μl and those with platelets ≥150,000 per μl. The primary outcome was number of types of uterotonics used and number of administered doses for each uterotonic in PPH management. The secondary outcome was number of doses of tranexamic acid (TXA). All patients received standardized postpartum oxytocin regimen per institutional protocol.

RESULTS: μOf the 4298 patients who delivered during the study period, 529 (12%) patients experienced PPH. In patients who experienced PPH, 61 (11.5%) met definition for thrombocytopenia on admission. Body mass index was significantly lower in patients with thrombocytopenia, but otherwise, all other demographics were similar. Patients with thrombocytopenia were more likely to require 4 different types of uterotonics only if they underwent CD (14% vs 3%, p = 0.008). In addition, they were more likely to require more doses of carboprost (0 [0, 1.75] vs 0 [0, 0], p=0.04) and methylergonovine (0 [0, 1] vs 0 [0, 1], p=0.007) compared to patients without thrombocytopenia only if they required CD. There were no differences in the number of types of uterotonics used or doses of each uterotonic administered when patients underwent SVD. Rates of TXA administration were similar between groups.

CONCLUSION: Patients with thrombocytopenia (platelets < 150,000 per μl) require significantly more types of uterotonics and doses of carboprost and methylergonovine for pharmacologic management of PPH when undergoing CD.

Table. Number of types of uterotonics* used and number of doses of each uterotonic administered in the thrombocytopenia v non-thrombocytopenia cohorts

	Spontaneous Vaginal Delivery			Cesarean Delivery		
	Thrombocytopenia (n=25)	Non-thrombocytopenia (n=192)	P value	Thrombocytopenia (n=37)	Non-thrombocytopenia (n=275)	P value
1	9 (36)	67 (35)	>0.99	15 (41)	168 (61)	0.02
2	5 (20)	57 (30)	0.36	9 (24)	67 (24)	>0.99
3	9 (36)	37 (19)	0.06	7 (19)	31 (11)	0.18
4	2 (8)	28 (15)	0.54	5 (14)	7 (3)	0.008
Misoprostol	0 [0, 0]	0 [0, 1]	0.35	5 (14)	22 (8)	0.34
Carboprost	1 [0, 2]	0 [0, 1]	0.13	0 [0, 1.75]	0 [0, 0]	0.04
Methylergonovine	1 [0, 1]	0 [0, 1]	0.75	0 [0, 1]	0 [0, 1]	0.007
TXA	1 [0, 1]	1 [0, 1]	0.34	0 [0, 1]	0 [0, 1]	>0.99

*Uterotonics include oxytocin, carboprost, methylergonovine, and misoprostol. TXA=Tranexamic acid.
Chi-squared and Fisher's exact test for categorical variables
Mann Whitney used for continuous variables
Bold values suggest p <0.05

337 Acute inflammation is associated with reduced basal decidua progesterone receptor density in spontaneous preterm birth

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OBJECTIVE: A functional progesterone withdrawal has been thought to contribute to the pathophysiology of preterm birth (PTB), a process potentially mediated in part by alterations in the progesterone receptor (e.g. isoform abundance, tissue distribution,

quantity). We sought to understand the relationship between density of progesterone receptor in the decidua and placental pathology patterns.

STUDY DESIGN: This is a retrospective cohort study leveraging a prior null result case-control study of 40 patients with spontaneous PTB < 37 weeks. The exposure of placental pathology was evaluated as absence/ presence of each of the major recognized patterns of placental injury including acute inflammation, chronic inflammation, maternal vascular malperfusion, and fetal vascular malperfusion. Slides containing basal decidua were stained for progesterone receptor (mouse monoclonal anti-human progesterone receptor antibody Clone PgR 1294, diluted 1:50), which stains for both PR-A and PR-B. 10 representative images were obtained for each sample and QuPath was utilized to determine the outcome of % positive stained cells for progesterone receptor. The average percentage of positive cells across the representative images was compared by t-tests for each pattern of placental injury.

RESULTS: Average gestational age at index birth was 31 weeks per design of primary study. Among patients with acute inflammation (AI), there was a lower density of progesterone receptor staining (% positive cells 12.9 without AI vs 9.1 with AI, p= 0.03). There was no difference based on chronic inflammation, maternal vascular malperfusion, or fetal vascular malperfusion (Table 1).

CONCLUSION: The presence of acute inflammation may be associated with lower density of progesterone receptor expression in the basal decidua. Further research is needed to investigate these findings in the context of spontaneous PTB and potential prevention of preterm birth. These findings may also be further explored in the setting of progesterone supplementation in pregnancies threatened by PTB.

338 Application of the solomon laser technique to dichorionic-triamniotic triplet gestations with twin-to-twin transfusion syndrome

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OBJECTIVE: The Solomon technique for laser surgery in monochorionic (MC) twins with twin to twin transfusion syndrome (TTTS) may be associated with higher survival but also an increased risk for placental abruption. Dichorionic triamniotic (DCTA) triplets with TTTS are candidates for Solomon laser surgery, however, Solomon outcomes have not been directly studied for triplet gestations. We evaluated the outcomes of Solomon laser in DCTA triplets compared to MCDA twins.

STUDY DESIGN: Triplets were matched 4:1 with twins for TTTS Stage III, co-existing selective fetal growth restriction (sFGR), cervical length (CL) (< 20 or ≥20 mm), and gestational age (GA) at laser (< 18, 18-24, >24 weeks). Patients were compared for maternal demographics, pretreatment characteristics, procedural details, and post-treatment outcomes. Our primary outcome was gestational age (GA) at birth. Continuous data were analyzed using student's t or Wilcoxon Rank-Sum test. Categorical data were analyzed using Pearson's chi squared or Fisher's Exact test.

RESULTS: Ten triplets were matched to 40 twins after Solomon laser. The median GA at delivery was lower in triplets (30.6 vs 33.3 weeks, p=0.04) and the interval from laser to delivery was shorter (9.1 vs 12.3 weeks, p=0.04). There was no difference in laser energy, fetoscopy time, PPROM, fetal demise within 48 hours of laser, septostomy, birth survival, or abruption (see table).

CONCLUSION: When matched for known TTTS risk modifiers such as stage, sFGR, CL and GA at laser, DCTA triplets undergoing Solomon laser for TTTS deliver about 3 weeks earlier than MCDA twins due to a shorter laser to delivery interval. However, intraoperative parameters and survival are similar and overall favorable for both groups after Solomon laser.

	MCDA Twins N=40	DCTA Triplets N=10	p
Maternal Age, mean (SD)	31.9 (5.8)	32 (3.1)	0.9
GA laser (weeks), mean (SD)	19.8 (2.6)	20.7 (3.2)	0.4
Total anastomoses, mean (SD)	17.8 (10.3)	16.1 (6.3)	0.6
Total joules, median (IQR)	6539 (4005-10900)	10169 (4282-17780)	0.3
Septostomy, n (%)	1 (2.5)	1 (10)	0.4
Total fetoscopy time (minutes), mean (SD)	48.8 (22.5)	60.9 (24.5)	0.2
PPROM, n (%)	17 (42.5)	6 (60)	0.5
Demise of 1 or more fetuses, n (%)	7 (17.5)	3 (30)	0.4
GA at birth (weeks), median (IQR)	33.3 (29.3-34)	30.6 (27.6-31.4)	0.04
Laser to delivery interval (weeks), Mean (SD)	12.3 (3.8)	9.1 (5)	0.04
Abruption, n (%)	4 (10)	3 (30)	0.1
Total Perinatal Survival	68/80 (85)	25/30 (83.3)	--

339 An evolving epidemic: xylazine incidence in opioid-positive drug screens in an inpatient pregnant population

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OBJECTIVE: Opioid use disorder (OUD) is associated with significant maternal morbidity. Recent reports have highlighted the rise of xylazine, a non-opioid veterinary sedative, in the nonprescribed fentanyl supply. Outside of pregnancy, complications of xylazine exposure may include naloxone-refractory respiratory depression, prolonged loss of consciousness, and skin ulcers. The frequency with which pregnant patients with opioid use disorder are exposed has not been characterized. We sought to describe the incidence of xylazine detected in urine drug screens (UDS) from obstetric patients admitted to a labor unit.

STUDY DESIGN: We performed a cross sectional study of all UDS results from an inpatient obstetric unit at an urban tertiary care center from December 2022, when xylazine was added to the detection panel, through July 2023. Urine drug screening is performed based on verbal screening of all admitted patients. The trend of opioid-positive urine drug screens also positive for xylazine from December to July was measured with the Cochran-Armitage test.

RESULTS: Of 138 UDS sent, 98 (71%) were positive for nonprescribed substances. Of positive UDS, 36 (37%) were positive for nonprescribed opioids, and of these, 16 (44%) were positive for xylazine. The trend of UDS positive for opioids that are also positive for xylazine increased significantly over time (Figure 1, p=0.009), from 0% in the first month to 100% in the last month.

CONCLUSION: In less than one year, xylazine has significantly increased in prevalence among patients admitted to an obstetric inpatient unit who have UDS positive for nonprescribed opioids. This is consistent with national trends, with increasing rates of xylazine identified on post-opioid overdose autopsy. These results underscore the critical need to further study the impact of xylazine on obstetric outcomes.

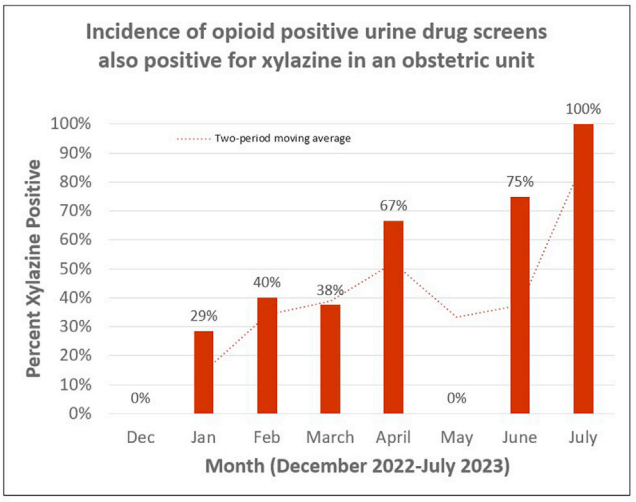

Figure 1: Incidence of xylazine positivity in opioid-positive urine drug screens by month. Testing began December 2022. Statistically significant increase by Cochran-Armitage test, p=0.009.

340 Implementation and clinical impact of evidence-based induction of labor practices

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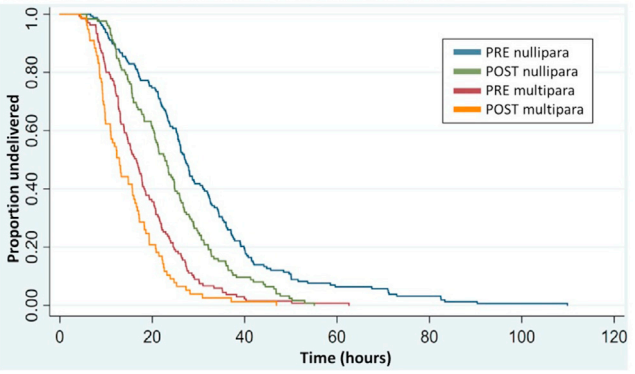
OBJECTIVE: To assess effectiveness and implementation outcomes after standardizing induction of labor (IOL) practices.

STUDY DESIGN: We conducted a quality improvement project in a high volume, academic medical center to increase utilization of 3 evidence-based IOL practices: 1) dual agent ripening; 2) vaginal misoprostol instead of buccal; 3) early amniotomy (≤ 4 cm). Singletons with intact membranes and initial cervical dilation ≤2 cm were included. Prior cesarean and stillbirth were excluded. We assessed effectiveness (IOL length, cesarean birth) and implementation outcomes (utilization, adoption by admitting services) pre-implementation (PRE; 11/1/21-1/31/22) vs. post-implementation (POST; 3/1/22-4/30/22). Cox proportional hazards models, stratified by parity, and adjusted for age, BMI, dilation, and epidural, were used to test the association between time period and IOL length.

RESULTS: Among 495 patients (PRE, n=293, POST, n=202) there were no differences in baseline characteristics other than epidural use (66.9% vs. 78.2%, p=0.006). IOL length was shorter POST (22.0 vs. 18.3 h, p=0.003) with no difference in cesarean (27.7 vs. 26.7%, p=0.82). Time to delivery was faster POST for nulliparas (HR 1.5, 95% CI 1.2-1.9; **Figure**) and multiparas (HR 1.5, 95% CI 1.1-2.0). Use of each practice increased POST: dual ripening (31.1 vs. 42.6%, p=0.009), vaginal misoprostol (34.5 vs. 68.3%, p< 0.001), and early amniotomy (19.1 vs. 31.7%, p=0.001). Adoption differed across services: Obstetrics increased use in all practices (32.1 vs. 43.5%, p=0.02; 37.1 vs. 70.8%, p< 0.001; 20.4 vs. 33.9%, p=0.003, respectively); Family Medicine increased use of dual ripening (0.0 vs. 40.0%, p=0.001) and vaginal misoprostol (11.1 vs. 60.0%, p=0.001), but not early amniotomy (11.1 vs. 20.0%, p=0.43); and Midwifery did not increase use of any practice (44.4 vs. 36.8%, p=0.57; 35.6 vs. 52.6%, p=0.20; 17.8 vs. 21.1%, p=0.76, respectively).

CONCLUSION: Standardizing IOL practices leads to shorter IOL without increasing cesarean birth providing the opportunity to improve obstetric outcomes, decrease morbidity, and maximize system efficiency.

Figure. Time to delivery after induction of labor by period and parity



341 Amylase and phospholipase A2 levels in human amniotic fluid of fetuses with open spina bifida

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OBJECTIVE: Fetuses with open spina bifida (OSB) incur ongoing neurologic injury throughout gestation. We previously demonstrated elevated levels of Phospholipase A2 (PLA2) and Amylase in the amniotic fluid (AF) of a fetal rat Retinoic Acid Induced (RA) OSB model. The objective of this study was to determine whether levels of amylase and PLA2 were similarly elevated in the AF of human fetuses with OSB.

STUDY DESIGN: AF was collected at the time of diagnosis (Early 21-22 weeks, n=6) or immediately prior to fetoscopic repair (Late 26-27 weeks, n=7). Control samples (21-22 weeks, n=3) were amniocentesis samples collected for advanced maternal age and did not have OSB. Activity levels of amylase and PLA2 were measured in control, early gestation, and late gestation groups utilizing commercial assay kits. The Wilcoxon-Signed Rank Test was used to compare amylase activity in the control vs. early groups and the early vs. late groups. A one-sided T-Test was used to compare PLA2 activity the control vs. early groups and the early vs. late groups.

RESULTS: The Amylase Activity of the early group (median=0.204 nmol/ml/min) was not significantly different from that of the control group (median= 0.183 nmol/ml/min); p=0.4, but was significantly less than that of the Late Group (median=0.253 nmol/ml/min); p< 0.0045. The PLA2 Activity of the early group (mean=3.84 nmol) was not significantly different from that of the control group (mean=4.1 nmol); p=0.3, and was not significantly less than that of the Late Group (mean=5.09 nmol); p=0.892.

CONCLUSION: Amylase activity levels in the AF of human fetuses with MMC appear to increase throughout the 2nd trimester. The increase in PLA2 activity did not reach statistical significance and may be due to a lack of power. These, as well as other neurotoxic enzymes may contribute to the "second hit" of OSB and suggest the RA rat as a valid model for the human defect.

342 Fetal outcomes in growth restriction with expansion of abdominal circumference diagnostic criteria

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OBJECTIVE: This retrospective cohort study assessed the effect of changing fetal growth restriction (FGR) diagnostic criteria to include abdominal circumference (AC) less than the 10th %ile on the occurrence of adverse neonatal outcomes (ANO) in a single institution. We hypothesized that this protocol change would not affect ANO rates.

STUDY DESIGN: We utilized the Intergenerational Health Knowledgebase (IHK) which extracts clinical data from electronic health record with high fidelity (IRB# 201902830). Demographic and pregnancy outcome data were extracted for birth parents and babies. AC< 10th percentile was added as diagnostic criteria for FGR on 6/22/20. Pregnancy episodes with a known diagnosis of FGR were categorized as pre-protocol (delivered prior to 6/22/20) and post-protocol (delivered after 1/1/21). Pre-protocol criteria included EFW< 10%ile and/or AC< 5%ile. Post-protocol criteria included EFW< 10%ile and/or AC< 10th %ile. A combined ANO variable included admission to NICU, PTX, RDS, IVH, PVL, NEC, Pulm HTN, sepsis, and HIE. T tests, chi square, and logistic regression analyses were performed with a=0.05.

RESULTS: 1548 pre-protocol and 242 post-protocol unique FGR pregnancies were identified. Maternal age, race, rate of hypertensive disease in pregnancy (HDP) and diabetes were similar between cohorts. Birthweights, 1 and 5 min. APGARs, gestational age of delivery (37.1 vs. 36.6, p=0.9), and ANO rate (49% vs. 43%, p=0.1) were also similar between groups. When controlling for HDP, DM, and maternal age, change in FGR diagnostic protocol (OR 0.795, P = 0.13) was not associated with increased development of ANO in FGR fetuses. The model did identify a statistically significant increase in ANO among FGR neonates where HDP was also present in the pregnancy episode (OR 2.12, P < 0.001).

CONCLUSION: Expansion of FGR diagnostic criteria to include AC< 10th %ile demonstrated no difference in fetal outcomes despite increased surveillance and ultrasound burden. Further work to evaluate the cost effectiveness of this strategy will further elucidate the potential effects of this FGR diagnostic criteria change.

343 Timing of delivery in women with pre-existing hypertension and stillbirth risk: A retrospective population-based study

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OBJECTIVE: To evaluate the risk of stillbirth at term, in women with pre-existing hypertension, to determine if earlier induction of labour (IOL) decreases the risk of stillbirth.

STUDY DESIGN: A retrospective population-based cohort study was conducted using the CDC's Fetal Death Public Use Files and linked data from Period Linked Birth-Infant Death Public Use Files, including all births between 2010 and 2019. Maternal and fetal outcomes among deliveries to women with pre-existing hypertension (exposed) were compared to women without pre-existing hypertension (unexposed). Multivariate logistic regression models, adjusted for maternal age, race, education and smoking were used to estimate the risk of stillbirth and the risk of IOL at each gestational age, as of 37 weeks, compared to women without pre-existing hypertension at the same gestational ages.

RESULTS: Of 39,757,769 births in our cohort, 98.42% were to women without pre-existing hypertension and 1.58% were to women with pre-existing hypertension. Pre-existing hypertension was associated with an increased risk of adverse maternal and fetal outcomes. The incidence of stillbirth amongst the general population experienced a marginal decrease from 1.43 in 2010, to 1.21 in 2019. The risk of stillbirth increased with gestational age in women with pre-existing hypertension compared to women without, of the same gestational age. The most pronounced rises in risk began at 39 weeks (OR 1.92, 95% CI 1.64-1.24), 40 weeks (OR 1.86 95% CI 1.50-2.35) and 41 weeks (OR 2.74, 95% CI 2.30-3.27). In turn, rates of IOL amongst women with pre-existing hypertension were most elevated between 37 and 39 weeks: 37 weeks (OR 2.46, 95% CI 2.43-2.49), 38 weeks (OR 2.84, 95% CI 2.81-2.87), 39 weeks (OR 2.42, 95% CI 2.39-2.44).

CONCLUSION: While women with pre-existing hypertension, with no other complications at term, have increased risk of stillbirth as of 39 weeks, American practice has developed such that this population is undergoing preventive IOL earlier (37-39 weeks), reflecting an overall decrease in stillbirths.

344 Adverse pregnancy outcomes and predicted 30-year risk of maternal cardiovascular disease 2-7 years after delivery

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OBJECTIVE: To determine whether adverse pregnancy outcomes (APOs) are associated with higher 30-year predicted risk of cardiovascular disease (CVD) 2-7 years after delivery.

STUDY DESIGN: This was a secondary analysis from the prospective Nulliparous Pregnancy Outcomes Study-Monitoring Mothers-to-Be Heart Health Study cohort. The primary exposures included APOs modelled individually: abnormal fetal growth (i.e., either SGA (< 10th percentile) or LGA (≥ 90th percentile)), hypertensive disorder of pregnancy (HDP), gestational diabetes (GDM), and preterm birth (PTB) < 37 weeks; and secondarily, we examined the total number of APOs (0, 1, ≥2) that were found to be significantly associated with CVD risk. The primary outcome was high predicted 30-year

CVD risk defined ≥10%; secondarily, we evaluated CVD risk as a continuous measure. Predicted risk was quantified by the Framingham Risk Score for atherosclerotic CVD (i.e., coronary heart disease and/or stroke).

RESULTS: Among 4,299 individuals, 12.8% had an SGA infant, 7.6% had a LGA infant, 13.4% developed HDP, 4.3% developed GDM, and 8.3% had a PTB. At 2-7 years after delivery (median: 2.7 years), the median predicted 30-year ASCVD risk was 2.2% (IQR: 1.4, 3.4). Individuals who experienced HDP (aRR: 1.88; 95% CI: 1.15, 3.07), GDM (aRR: 1.95; 95% CI: 1.10, 3.47), and PTB (aRR: 2.26; 95% CI: 1.32, 3.88) were more likely to have a high predicted risk for CVD (i.e., ≥10%) 2-7 years postpartum. High CVD risk increased with the number of APOs experienced (1: aRR: 2.32; 95% CI: 1.40, 3.85; ≥2: aRR: 3.45; 95% CI: 1.76, 6.76). These results were similar when the predicted probability was analyzed as a continuous outcome. Neither having a LGA nor an SGA infant was associated with CVD risk.

CONCLUSION: Two-to-seven years after a first pregnancy, individuals who had APOs, including HDP, GDM, and PTB, were more likely to have a higher predicted 30-year risk of CVD. High risk status increased with the number of APOs experienced. These results suggest research is needed to examine the value of APO history in CVD risk scores.

TABLE. Association between adverse pregnancy outcomes and predicted 30-year risk of maternal cardiovascular disease 2-7 years after delivery

		Unadjusted analysis[1]	Adjusted analysis[1,2]
Outcome: 30-year CVD risk ≥ 10% (binary)			
	≥10% CVD risk, %	RR (95% CI)	aRR (95% CI)
Abnormal fetal growth vs. AGA			
SGA	0.7	0.41 (0.15, 1.11)	0.48 (0.18, 1.33)
LGA	3.1	1.71 (0.88, 3.30)	1.12 (0.57, 2.21)
HDP	4.3	**3.17 (1.98, 5.08)**	**1.88 (1.15, 3.07)**
GDM	8.7	**5.96 (3.51, 10.15)**	**1.95 (1.10, 3.47)**
PTB	5.1	**3.44 (2.05, 5.77)**	**2.26 (1.32, 3.88)**
Composite APO (HDP, GDM, PTB)			
1	3.8	**3.99 (2.45, 6.51)**	**2.32 (1.40, 3.85)**
≥ 2	8.7	**9.04 (4.85, 16.87)**	**3.45 (1.76, 6.76)**
Outcome: 30-year hard CVD risk by 1% increase (continuous)			
	Median (IQR), %	Beta Coef. (95% CI)	Adj. Beta Coef. (95% CI)
Abnormal fetal growth vs. AGA			
SGA	2.1 (1.3, 3.2)	-0.28 (-0.50, -0.06)	-0.24 (-0.43, -0.06)
LGA	2.5 (1.7, 3.9)	**0.39 (0.12, 0.67)**	0.17 (-0.06, 0.41)
HDP	2.6 (1.7, 4.2)	**0.82 (0.61, 1.03)**	**0.49 (0.30, 0.67)**
GDM	3.7 (2.2, 6.5)	**2.26 (1.91, 2.61)**	**1.44 (1.14, 1.75)**
PTB	2.6 (1.4, 4.0)	**0.74 (0.47, 1.00)**	**0.50 (0.28, 0.73)**
Composite (HDP, GDM, PTB)			
1	2.6 (1.7, 4.2)	**0.95 (0.77, 1.14)**	**0.61 (0.45, 0.77)**
≥ 2	3.0 (1.6, 4.8)	**1.69 (1.30, 2.08)**	**1.14 (0.80, 1.48)**

[1]Modified Poisson and linear regression models were used.
[2]Models adjusted for baseline (at cohort enrollment) age, body mass index, smoking status, and health insurance status.
Abbreviations: Adverse pregnancy outcomes (APOs), small-for-gestational-age (SGA), large-for-gestational-age (LGA), appropriate-for-gestational-age (AGA), hypertensive disorder of pregnancy (HDP), gestational diabetes (GDM), and preterm birth (PTB), CVD (cardiovascular disease).
Bolded results were statistically significant finings (p<0.05).

345 Association of county-level WIC enrollment and adverse pregnancy outcomes in the U.S. from 2016-2019

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OBJECTIVE: Food and nutrition insecurity are associated with adverse pregnancy outcomes (APOs). We evaluated, at the county-level, whether changes in WIC enrollment were associated with the rate of APOs among nulliparous individuals eligible for WIC.

STUDY DESIGN: Using U.S. National Center for Health Statistics Natality data between 2016-2019, we conducted a longitudinal, county-level analysis. The exposure was the change in county-level WIC enrollment from 2016 to 2019 (increase [>0%] versus no change or decrease [≤0%]) among those eligible for WIC (i.e., U.S. resident and Medicaid insured). APOs were measured in 2019, and included maternal (CD, HDP, GDM, ICU admission, and transfusion) and infant (PTB < 34 weeks, NICU admission, SGA, and LGA) measures. Hierarchical logistic regression was used and adjusted for baseline county-level mean WIC enrollment and APOs in 2016 and individual-level covariates, including mean age at delivery, and proportion of the population that self-identified as non-Hispanic White, had competed college education, and enrolled in prenatal care in the first trimester.

RESULTS: Among 1,945,914 WIC-eligible nulliparous individuals from 3,120 U.S. counties, the county-level age-standardized rate of WIC enrollment decreased from 2016 (73.1%) to 2019 (66.1%) (average annual percent change, AAPC: -3.2%; 95% CI: -3.7, -2.9). WIC enrollment increased in 27.4% of counties. Compared with counties in which WIC enrollment decreased or did not change, counties in which WIC enrollment increased had lower rates of multiple maternal [GDM (aOR: 0.71; 95% CI: 0.57, 0.89), ICU admission (aOR: 0.47; 95% CI: 0.34, 0.65), transfusion (aOR: 0.68; 95% CI: 0.53, 0.88)], and infant [PTB (aOR 0.71; 0.56, 0.90); NICU admission (aOR: 0.77; 95% CI: 0.60, 0.97)] APOs.

CONCLUSION: As a greater proportion of eligible nulliparous individuals within a county enrolled in WIC, the likelihood of APOs decreased. In an era where WIC enrollment has decreased and food and nutrition insecurity has increased, efforts are needed to increase WIC enrollment among eligible individuals in pregnancy.

TABLE. Association between county-level change (increase versus no change or decrease) in WIC enrollment and adverse pregnancy outcomes[1]

	Unadjusted odd ratios OR (95% CI)[2]	Adjusted odds ratio AOR (95% CI)[3]
Maternal Outcomes		
Cesarean delivery	0.56 (0.37, 0.85)*	1.00 (0.68, 1.48)
HDP	0.59 (0.45, 0.76)*	0.83 (0.62, 1.12)
GDM	0.56 (0.48, 0.67)*	0.71 (0.57, 0.89)*
ICU admission	0.47 (0.35, 0.63)*	0.47 (0.34, 0.65)*
Transfusion rate in 2019	0.62 (0.50, 0.77)*	0.68 (0.53, 0.88)*
Infant Outcomes		
PTB <34 weeks	0.54 (0.44, 0.65)*	0.71 (0.56, 0.90)*
NICU admission	0.55 (0.45, 0.68)*	0.77 (0.60, 0.97)*
LGA	0.58 (0.46, 0.75)*	0.84 (0.63, 1.11)
SGA	0.62 (0.46, 0.83)*	0.98 (0.67, 1.42)

[1]Exposure measured change in WIC enrollment from 2016 to 2019. Outcomes ascertained in 2019.
[2]Hierarchical logistic regression was used, hierarchically clustered on U.S. state.
[3]Adjusted for county-level WIC enrollment and rate of adverse pregnancy outcomes in 2016, and individual-level covariates, including mean age at delivery, and proportion of the population that self-identified as non-Hispanic White, had competed college education, and enrolled in prenatal care in the first trimester.
*p<0.05.
Abbreviations: Hypertensive disorders of pregnancy (HDP), gestational diabetes (GDM), intensive care unit (ICU), preterm birth (PTB), neonatal intensive care unit (NICU), large-for-gestational-age (LGA), and small-for-gestational-age (SGA).

346 HDP and GDM and predicted risk of maternal cardiovascular disease 10-14 years after delivery

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OBJECTIVE: To determine whether hypertensive disorders of pregnancy (HDP) and gestational diabetes mellitus (GDM) are associated with a higher 10- and 30-year predicted risk of atherosclerotic cardiovascular disease (ASCVD), as quantified by the Framingham Risk Score 10-14 years after delivery.

STUDY DESIGN: A secondary analysis from the prospective Hyperglycemia and Adverse Pregnancy Outcome (HAPO) Follow-up Study. The exposure (expressed as a multiple dichotomous variable) was HDP alone, GDM alone, or both HDP and GDM, compared with none of these (reference). The primary outcomes were high predicted 10- and 30-year ASCVD risk (composite of fatal and non-fatal coronary heart disease and stroke). We used the Framingham Risk Score defined as ≥7.5% at 10 years and ≥20% at 30 years per current guidelines. Secondarily, we examined predicted ASCVD risk as a continuous measure. Modified Poisson and linear regression models adjusted for baseline covariates: field center, age, BMI, height, smoking and alcohol use, and parity, all measured at the OGTT during pregnancy.

RESULTS: Of 4,432 assessed individuals, the median age was 30.5 and the median BMI was 26.5 at baseline. A total of 8.2% (n=364) developed HDP alone, 11.2% (n=497) developed GDM alone, and 2.5% (N=112) developed both HDP and GDM. At 10-14 years after delivery (median 11.6), individuals with HDP alone (aRR: 1.02; 95% CI: 1.01-1.04) and GDM alone (aRR: 1.02; 95% CI: 1.01-1.04) were at higher predicted 10-year ASCVD risk compared with those with neither HDP nor GDM. Individuals with HDP alone (aRR: 1.01; 95% CI: 1.01-1.03), GDM alone (aRR:1.04; 95% CI: 1.02-1.06), and both HDP and GDM (95% CI: 1.06; 95% CI: 1.01-1.10) were at higher predicted risk of 30-year CVD compared with those with neither HDP nor GDM. These results were similar when modeling ASCVD risk as a continuous percentage (TABLE).

CONCLUSION: Pregnant individuals with HDP and GDM in the HAPO FUS cohort who were 10-14 years after delivery were more likely to be at high predicted risk of ASCVD.

TABLE. Association between HDP and GDM and 10- and 30-year predicted risk of ASCVD

	Frequency	Unadjusted analysis	Adjusted analysis
	% with outcome (row percentage)	Unadjusted risk ratio, RR (95% CI)	Adjusted risk ratio, aRR (95% CI)
10-year ASCVD risk ≥7.5% (binary)			
Neither GDM/HDP	1.1	Ref.	Ref.
HDP alone	3.0	1.02 (1.00, 1.04)	1.02 (1.00, 1.04)
GDM alone	4.6	1.04 (1.02, 1.05)	1.02 (1.01, 1.04)
Both HDM and GDM	5.4	1.04 (1.00, 1.08)	1.03 (0.99, 1.07)
30-year ASCVD risk ≥20% (binary)			
Neither GDM/HDP	1.0	Ref.	Ref.
HDP alone	2.5	1.02 (1.00, 1.03)	1.01 (1.00, 1.03)
GDM alone	6.2	1.05 (1.03, 1.07)	1.04 (1.02, 1.06)
Both HDM and GDM	8.0	1.07 (1.02, 1.12)	1.06 (1.01, 1.10)
	Mean (SD)	Unadjusted Percent Risk (95% CI)	Adjusted Percent Risk (95% CI)
10-year ASCVD risk by 1% increase (continuous)			
Neither GDM/HDP	2.1 (1.5)	Ref.	Ref.
HDP	2.7 (2.0)	0.61 (0.40, 0.83)	0.54 (0.36, 0.73)
GDM	3.0 (2.5)	0.98 (0.76, 1.20)	0.50 (0.33, 0.68)
Both HDM and GDM	3.6 (2.9)	1.56 (1.02, 2.10)	1.03 (0.57, 1.48)
30-year ASCVD risk by 1% increase (continuous)			
Neither GDM/HDP	7.2 (4.8)	Ref.	Ref.
HDP	9.4 (6.8)	2.29 (1.57, 3.01)	1.38 (0.81,1.90)
GDM	11.2 (9.3)	4.01 (3.18, 4.84)	1.92 (1.26, 2.57)
Both HDM and GDM	13.6 (9.8)	6.48 (4.71, 8.25)	3.35 (1.98, 4.73)

Poisson regression with robust error variance and linear regression were used. Missing imputation for covariates was performed.
Models adjusted for maternal variables at oral glucose tolerance test during pregnancy: study field center, age (continuous), BMI (continuous), height (continuous), smoking status (yes/no), alcohol use (yes/no), and parity (0, >1).
Final N=4,432 individuals without chronic hypertension in pregnancy.
Abbreviations: Hypertensive disorders of pregnancy (HDP), gestational diabetes mellitus (GDM), and atherosclerotic cardiovascular disease (ASCVD).

347 Hyperemesis gravidarum: investigating pregnancy outcomes by severity and time of diagnosis

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OBJECTIVE: With inconsistencies regarding the possible effect of hyperemesis gravidarum on the course of pregnancy, this research aimed to study the association between hyperemesis gravidarum and pregnancy outcomes, while addressing the trimester of diagnosis and severity of the disease.

STUDY DESIGN: A population-based retrospective cohort study was conducted, including all singleton deliveries of mothers from the largest health maintenance organization in the country, in a single tertiary hospital between the years 1991-2021. Incidence of adverse pregnancy outcomes was compared between pregnancies with and without hyperemesis gravidarum diagnosis, including preterm birth, low birth weight, cesarean delivery, and perinatal mortality. Severe cases were defined as hyperemesis gravidarum with metabolic disturbances. Multivariable Generalized Estimation Equation binary models were used to study the association between maternal hyperemesis gravidarum, trimester of diagnosis and severity, and the studied outcomes while adjusting for smoking, nulliparity, fertility treatments, ethnicity, gender, maternal age, and maternal recurrence in the cohort.

RESULTS: The study population included 232,476 pregnancies, of which 3227 (1.4%) were complicated with hyperemesis gravidarum. Women with hyperemesis gravidarum were more likely to deliver preterm (adjusted OR=1.30, 95%CI 1.14-1.47), a newborn with low birth weight (adj. OR=1.52, 95%CI 1.16-1.98, only if diagnosed in the second trimester), and to have a cesarean delivery (adj. OR=1.22, 95%CI 1.10-1.35). They were less likely to experience perinatal mortality (adj. OR=0.54, 95%CI 0.31-0.93, among mild cases only). A dose-response association was observed between preterm birth and hyperemesis gravidarum severity (Table).

CONCLUSION: Hyperemesis gravidarum is associated with an increased risk for preterm birth, low birth weight, and cesarean delivery, specifically among women diagnosed during the second trimester. However, it is associated with a lower risk for perinatal mortality.

Table. Adjusted* Odds ratios and 95%CI for the association between HG and pregnancy outcomes, by severity and by time of diagnosis

		Preterm birth		Low birthweight		Cesarean delivery		Mortality	
	Variables	Adj. OR (95% CI)	P -value	Adj. OR (95% CI)	P -value	Adj. OR (95% CI)	P -value	Adj. OR (95% CI)	P -value
All cases	No HG	1.00 (Reference)		1.00 (Reference)		1.00 (Reference)		1.00 (Reference)	
	HG	1.30; (1.14-1.47)	<0.001	1.09; (0.95-1.24)	0.184	1.22; (1.10-1.35)	<0.001	0.63; (0.38-1.04)	0.72
By severity	No HG	1.00 (Reference)		1.00 (Reference)		1.00 (Reference)		1.00 (Reference)	
	Mild HG	1.26; (1.11-1.44)	<0.001	1.07; (0.93-1.22)	0.317	1.23; (1.11-1.37)	<0.001	0.54; (0.31-0.93)	0.029
	Severe HG	2.04; (1.31-3.19)	0.02	1.51; (0.92-2.48)	0.101	0.93; (0.59-1.47)	0.768	2.45; (0.78-7.71)	0.125
By time of diagnosis	No HG	1.00 (Reference)		1.00 (Reference)		1.00 (Reference)		1.00 (Reference)	
	1st trimester	1.09 (0.90-1.31)	0.359	1.03 (0.85-1.24)	0.733	1.18 (1.02-1.36)	0.019	0.46 (0.20-1.02)	0.058
	2nd trimester	1.92 (1.50-2.46)	<0.001	1.52 (1.16-1.98)	0.002	1.46 (1.17-1.81)	0.001	1.59 (0.75-3.37)	0.291
	3rd trimester	1.32 (1.05-1.64)	0.014	0.95 (0.74-1.21)	0.697	1.15 (0.97-1.37)	0.106	0.38 (0.12-1.20)	0.102

HG: hyperemesis gravidarum.
* Adjusted to smoking, nulliparity, fertility treatments, ethnicity, gender and maternal age at delivery

348 Is insufficient prenatal protein consumption a risk for adverse pregnancy outcomes? A prospective multicenter study

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OBJECTIVE: During pregnancy, there is an increase in nutritional requirements, including the macronutrient Protein, to maintain maternal metabolism while supporting fetal growth and development. Studies in low and middle income countries have suggested that insufficient protein consumption is associated with low birthweight (LBW) and small for gestational age (SGA). The aim of the

current study was to study the association between insufficient protein consumption and adverse pregnancy outcomes in a high-income country.

STUDY DESIGN: A prospective multicenter cohort study was conducted, in which pregnant women completed a detailed food frequency questionnaire (FFQ) regarding their dietary habits during pregnancy. The adequacy of protein consumption was defined based on the international Recommended Dietary Allowance, which are 1.1 g of protein/kg/day among pregnant women. The following pregnancy outcomes were compared between women with sufficient and insufficient protein consumption (>1.1 or < 1.1 protein/kg/day): SGA, LBW, preterm deliveries (PTD), gestational diabetes mellitus, gestational hypertension and anemia. Multivariable logistic models were used to study the association between the study groups and each adverse pregnancy outcome, while adjusting for pre-pregnancy BMI and maternal age.

RESULTS: The study included 219 women who fully completed the FFQ, of which 29.7% (n=65) were with insufficient protein consumption. Insufficient protein consumption was not associated with socioeconomic status or age, however women with insufficient protein consumption were more likely to be overweight (BMI > 25). Insufficient protein consumption was not associated with the studied adverse pregnancy outcomes (Table), including PTD and LBW. The multivariable models have revealed similar results (adj.OR=2.18; 95%CI 0.69-6.84 and adj.OR=0.70; 95%CI 0.19-2.62, for PTD and LBW respectively).

CONCLUSION: Insufficient protein consumption in high income countries may not be associated with adverse pregnancy outcomes. However, further research is recommended regarding the protein quality rather than its quantity.

Table: Demographic and clinical characteristics and pregnancy outcomes by protein intake

	Insufficient Protein intake (n=65, 29.7%)	Sufficient Protein intake (n=154, 70.3%)	p-value
Demographic and clinical characteristics			
Age (mean+ SD)	32.5 ± 5	31.93 ± 4.7	0.430
Pre-Pregnancy BMI			
BMI ≤ 25	23 (37.1%)	109 (74.1%)	**<0.001**
BMI > 25	39 (62.9%)	38 (25.9%)	
Socioeconomic Status			
Below Average	24 (40.7%)	51 (36.2%)	0.548
Above Average	35 (59.3%)	90 (63.8%)	
Pregnancy outcomes			
Low Birthweight	3 (5%)	12 (7.9%)	0.459
Gestational Age Mean +SD	38.37 ± 3.5	38.59 ± 3	0.644
Preterm Delivery	6 (9.5%)	8 (5.3%)	0.255
Gestational Diabetes Mellitus	7 (10.9%)	19 (12.8%)	0.711
Anemia	16 (25.4%)	55 (35.7%)	0.141
Gestational hypertension	4 (6.5%)	8 (5.2%)	0.715
Small for gestational age (SGA)	0 (0%)	5 (3.2%)	0.142

349 Antenatal aspirin prescription following the United States preventive services task force's (USPSTF) 2021 practice update

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OBJECTIVE: To compare the odds of antenatal aspirin prescription between patients with moderate risk factors for preeclampsia and patients with high risk factors for preeclampsia, as defined by the USPSTF.

STUDY DESIGN: A retrospective cohort study of all pregnant patients with a documented prenatal care visit prior to 16 weeks' gestation and delivered in our health care system between 1/1/2021 – 12/31/2022. Patients' preeclampsia risk was stratified according to 2021 USPSTF guidance using data from the initial prenatal visit. The primary outcome was appropriate prescription of antenatal aspirin, defined as prescription by 16 weeks' gestation to any patient with 1 high risk factor or 2 or more moderate risk factors for preeclampsia, and assessed using chi-square tests. Odds of correct antenatal aspirin prescription were also compared between risk groups using log-binomial regression.

RESULTS: Of 1325 patients, 167 (12.6%) were found to have 1 or more high risk factor for preeclampsia and 316 (23.8%) were found to have 2 or more moderate risk factors for preeclampsia. Patients with just 1 high risk factor were significantly more likely to be prescribed antenatal aspirin than those with a combination of moderate risk factors (76.1% vs 38.9%, $p < 0.05$). The odds of correct antenatal aspirin prescription were over 5 times greater among patients with at least 1 high risk factor relative to those with multiple moderate risk factors (OR = 5.02, 95% CI 3.30 – 7.66). Adjusted for covariates of maternal age, parity, and blood pressure at the initial prenatal visit, the odds of antenatal aspirin prescription were unchanged between groups (aOR = 5.36, 95% CI 3.32 – 8.63).

CONCLUSION: Since publication of the USPSTF's 2021 practice update on aspirin use for preeclampsia prophylaxis, less than 50% of eligible patients in our health care system have been correctly prescribed this medication. This trend was more pronounced among patients considered moderate risk, highlighting an opportunity for healthcare provider education on the utility of aspirin in this population.

Baseline characteristics of the study population by risk			
	Number (%)[a]		
Variable	Moderate Risk Factors (n=316)	High Risk Factors (n=167)	P-Value
Maternal age, years, Median (IQR)	36 (32.5-38)	34 (31 – 36)	0.0001
Race or ethnic status			0.95
Caucasian	135 (42.7)	75 (44.9)	
Hispanic	56 (17.7)	30 (18.0)	
Black	25 (7.9)	10 (6.0)	
Asian	66 (20.9)	34 (20.4)	
Other, unknown	34 (10.8)	18 (10.8)	
BMI[b], Mean (SD)	30.1 (0.34)	30.2 (0.53)	0.07
Nulliparity	253 (80.1)	72 (43.1)	0.00
Multifetal gestation	0 (0.0)	20 (12.0)	0.00
IVF[c] **conception**	48 (14.9)	13 (7.8)	0.03
Obstetric co-morbidities			
Chronic hypertension	0 (0.0)	85 (50.9)	0.00
Pre-gestational diabetes	0 (0.0)	12 (7.2)	0.00
Pre-gestational renal disease	0 (0.0)	2 (1.2)	0.12
Autoimmune disease	0 (0.0)	14 (8.4)	0.00
Baseline BP[d], mm Hg, Median (IQR)			
Systolic BP	119.5 (112 – 127)	126 (117 – 138)	0.00
Diastolic BP	73 (68 – 80)	78 (70-84)	0.0001
Mode of delivery			0.25
Spontaneous vaginal	136 (43.0)	77 (46.1)	
Operative vaginal	38 (12.0)	12 (7.2)	
Cesarean	142 (44.9)	78 (46.7)	
Gestational age, weeks, Median (IQR)	39 (38-40)	38 (37-39)	0.00
Birthweight, grams	3324.1 (31.4)	3205.7 (46.1)	0.09

[a] Except where otherwise noted
[b] Body mass index
[c] In vitro fertilization
[d] Blood pressure

350 Maternal Covid19 infection is assoicated with failed newborn hearing screening tests and requires urgent attention

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OBJECTIVE: Prior studies of the effects of SARS-CoV-2 (COVID) infection on pregnancy have mixed results. Our objectives were to determine characteristics of pregnant women with and without COVID and maternal and neonatal outcomes

STUDY DESIGN: A prospective observational cohort study of pregnant women (age ≥18 years) between May 2020 and August 2021 was conducted in a single center. COVID infection was diagnosed by the detection of viral RNA on nasal pharyngeal swabs during gestation.

Demographics, gestational age, comorbidities, maternal and newborn outcomes were abstracted. The primary outcome was the rate of COVID infection in pregnancy during the first 18 months of the Pandemic. Secondary outcomes included cesarean delivery (CD), hospital admission, and preeclampsia; newborn outcomes included prematurity, NICU admission, and evidence of vertical transmission.Continuous variables were analyzed using t-tests and categorical variables were tested by Chi-square.

RESULTS: Among 916 participants, 114 (12.3%) were diagnosed with COVID infection (Table 1). Women who contracted COVID infection were more likely to be Hispanic (6.7% vs 40.1%, $p < 0.001$); have a BMI ≥ 35 (35.0% vs 22.9%, p=0.005); although the mean BMI was similar (35.1 ± 7.9 vs, 33.2 ± 6.9, p=0.06). There were no differences in comorbidities, pregnancy complications, CD, or preterm birth (PTB). Women with symptomatic COVID infection were more likely to be admitted to the ICU. No newborns had evidence of vertically acquired COVID. However, infants born to COVID infected women were more likely to fail their hearing screening exam (11.3% vs 2.5%, $p < 0.001$).

CONCLUSION: Perinatal infection with COVID infection did not increase CD, PTB, nor obstetrical complications. Symptomatic women had higher rates of ICU admissions. Newborn outcomes were generally good. However, the higher rates of failed newborn hearing tests following maternal COVID infection is concerning as the virus has been reported to cause adverse neurological sequalae in adults. This new finding requires confirmation and followup. If confirmed, early identification and treatment is critical.

Table 1: AzPIStACHO study participant (n=916) Characteristics and Outcomes stratified by SARS-CoV-2 status.

	Total (n=916)		Covid Pos (n=114)		Not Covid Pos (n=802)		p-value
Variables	Mean/n	SD/%	Mean/n	SD/%	Mean/n	SD/%	
Baseline Characteristics							
Age (years)	29.2	± 5.6	29.1	± 5.1	29.3	± 5.7	
Nulliparity	377	41.1%	42	36.8%	335	41.8%	0.32[a]
Race White	724	79.0%	99	86.8%	625	77.9%	0.01[a]
Hispanic Ethnicity	398	43.4%	76	66.7%	322	40.1%	<0.001[a]
Medicaid	383	41.8%	55	48.3%	328	40.9%	0.17[a]
Education							0.11[b]
College	429/848	50.6%	43/103	41.7%	386/754	51.8%	
Master's/Doctorate	142/848	16.7%	19/103	18.4%	123/754	16.5%	
Married/Domestic partner	555/846	65.4%	68/104	65.4%	487/742	65.6%	0.64[b]
Self-Reported planned pregnancy	357/821	43.5%	50/102	49.0%	307/719	42.7%	0.23[a]
Prenatal Care	887	96.8%	113	99.1%	774	96.5%	0.14[a]
Gestational age at recruitment (weeks)	31.4	± 9.1	29.9	± 9.5	31.6	± 9.1	0.06[c]
BMI	33.4	± 7.2	35.1	± 7.9	33.2	± 6.9	0.06[b]
Morbid Obesity (BMI>35)	224	24.5%	40	35.0%	184	22.9%	0.005[a]
Any preexisting medical condition	374	40.8%	50	43.9%	324	40.4%	0.48[a]
Diabetes	37	4.0%	5	4.4%	32	4.0%	0.84[a]
Type 1 or 2	10	1.1%	2	1.8%	8	1.0%	0.47[a]
Type 2	27	2.9%	3	2.6%	24	3.0%	0.83[a]
Chronic HTN	65	7.1%	8	7.0%	57	7.1%	0.97[a]
Complications during pregnancy							
Any complication	262	28.6%	27	23.7%	235	29.3%	0.21[a]
Hypertensive disorder of pregnancy	98	10.7%	13	11.4%	85	10.6%	0.79[a]
IUFD > 20 weeks	4	0.4%	1	0.9%	3	0.4%	0.45[a]
Miscarriage < 20 weeks	5	0.5%	1	0.9%	4	0.5%	0.27[a]
Antepartum ICU Admission	11	1.2%	7	6.1%	4	0.5%	<0.001[a]
Delivery Outcomes							
Cesarean delivery	312/868	35.9%	45/113	39.8%	267/755	35.4%	0.36[a]
Repeat Cesarean	111/868	12.8%	16/113	14.2%	95/755	12.6%	0.64[a]
Primary Cesarean	201/737	27.3%	29/94	30.9%	172/755	22.8%	0.08[a]
Newborn Outcomes							
	n = 895		n = 106		n = 789		
Gestational Age at Delivery (weeks)	38.2	± 2.3	38.5	± 1.5	38.2	± 2.4	0.43[b]
<37 weeks	136	15.2%	13	12.3%	123	15.6%	0.37[a]
<32 weeks	19	2.1%	1	0.9%	18	2.2%	0.37[a]
Birthweight (grams)	3116	± 611	3191	± 452	3106	± 629	0.09[c]
NICU admission	178	19.9%	19	17.9%	159	20.2%	0.59[a]
Hypoglycemia NICU	66	7.4%	6	5.7%	60	7.6%	0.10[a]
Hyperbilirubinemia requiring phototherapy	89	9.9%	3	2.8%	86	10.9%	0.009[a]
Pass hearing test	866	96.8%	97	91.5%	769	97.5%	0.001[a]
Fetal Anomalies	73	8.2%	6	5.7%	67	8.5%	0.32[a]
Readmission	47	5.3%	6	5.7%	41	5.2%	0.84[a]

a = Chi-square test; b = Wilcoxon 2 sample; c = 2-sample t-test

351 Is periodontitis such a big hit to pregnancy outcomes? a bench study in rat model

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OBJECTIVE: Periodontitis (PD) is plaque bacteria-induced chronic inflammation and contributes numerous systemic diseases. Previous epidemiological studies and meta-analysis also reported the association between PD and adverse pregnancy outcomes, however, few mechanistic studies have been conducted. Here we aimed to investigate the mechanistic actions of PD in pregnancy outcomes.

STUDY DESIGN: Forty female SD rats were randomly divided into Control or PD group, the rats in PD underwent four-week bilateral ligation of maxillary second molar. Fetal weight, litter size, placental weight, ultrasound blood flow signals were recorded. The offspring was also subjected to the Morris Water Maze test and placental tissues were performed with CD31and CK-7 staining.

RESULTS: Compared with Control, maternal blood pressure, fetal weight , litter size, and long-term learning and memory ability of offspring in PD group showed declining tendencies but didn't achieve any statistical significances. However, significant alterations in uteroplacental unit were observed: PD group exhibited increased placental weight, decreased CD31 and CK-7 intensity in mesometrial triangle of placenta, suggesting impaired trophoblast invasion and defective angiogenesis; ultrasound examination revealed steady blood flow signal in uterine artery but significantly increased systolic/diastolic velocity (S/D) values in umbilical artery and fetal middle cerebral artery in PD group, indicating compromised fetoplacental perfusion.

CONCLUSION: In current study, we didn't observe any PD-induced significantly detrimental effects on pregnancy outcomes. Nevertheless, our data showed that PD were associated with pathological features in placenta and defective perfusion in fetoplacental unit. The current study, while preliminary and limited, gives us a hint that PD may be a potential risk factor to good pregnancy outcomes.

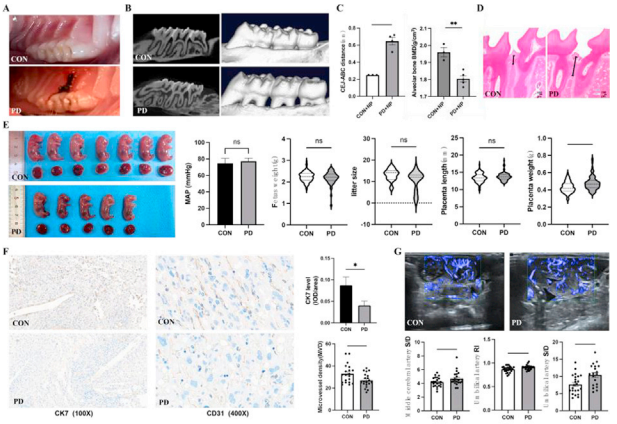

Figure1: A: Gingival manifestations in the CON and PD groups. (CON) Control group; (PD) Periodontitis group. B: The maxillary alveolar bone of CON and PD Nonpregnant rats were taken micro-computed tomography (micro-CT) scan. On the right panel, there is the 3D reconstruction of maxilla. C: Results are expressed as mean ± standard error of the distance of cementum-enamel junction to alveolar bone crest in mm and alveolar bone mineral density obtained by micro-CT. D: HE staining in maxilla of CON and PD Nonpregnant rats. E: Morphology and weight of the fetus and placenta in the two groups of rats and results of blood pressure in pregnant rats. F: Immunohistochemical staining of CK7 in the interstitial triangle of the uterus and CD31 in the placenta tissue of pregnant rats. G: The RI and S/D of fetal umbilical artery and S/D of fetal middle cerebral artery were measured by Aplio i900.

352 Remote blood pressure monitoring during pregnancy: Comparing patient engagement between connected and unconnected device users

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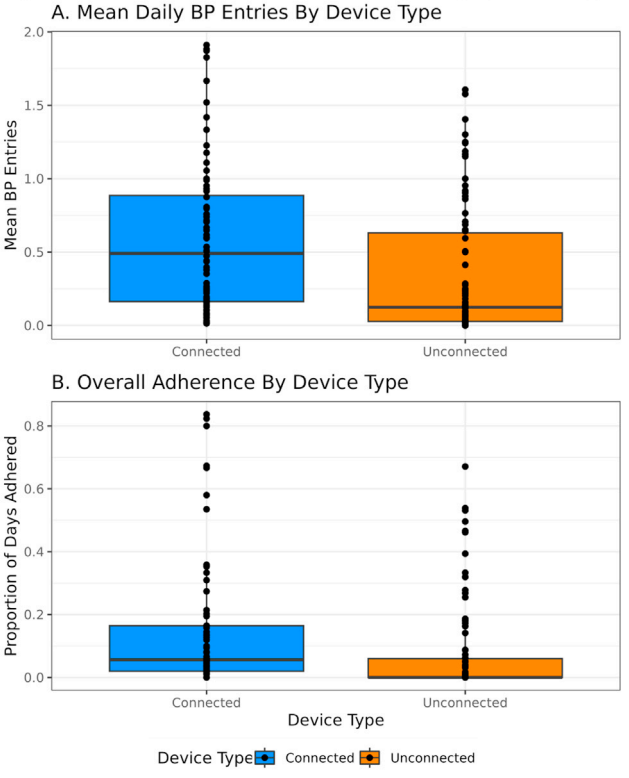
OBJECTIVE: Remote patient monitoring (RPM) for blood pressure (BP) is increasingly used for monitoring patients with hypertensive disorders of pregnancy (HDP). Connected RPM devices automatically sync values at the time of measurement, unlike unconnected devices, which require the patient to manually record values after measurement. It is unclear if connected devices have advantages over existing modalities. We sought to compare patient engagement with BP RPM between connected and unconnected devices.

STUDY DESIGN: In January 2023, Delfina Care, a comprehensive pregnancy care platform, was launched for pregnant patients at a community practice in Texas. Eligible patients were initially provided unconnected BP RPM devices, requiring patients to manually log BP measures in the Delfina Care patient application. In April 2023, connected BP devices were introduced, which automatically synchronized measures to the application. Data on the number of measures recorded and patient adherence (at least 2 BP measures/day for the duration of their pregnancy) were collected. Poisson and logistic regressions were fit to model the effect of device type on the number of BP measures and adherence, respectively. Both models controlled for relevant confounders (age, parity, weeks since enrollment, primary clinic and preferred language) and included a random effect for repeated measures from patients.

RESULTS: A total of 4,381 BP measures were recorded from 152 patients. Patients with connected devices had more mean entries/day (0.57 vs. 0.35) and higher adherence rates (15% vs. 8%) compared to those with unconnected devices (Figure 1). Adjusted analyses noted 2.28 (95% CI: 1.44-3.61) times more BP measure per day and 6.28 (95% CI: 2.62-15.05) higher odds of adherence among connected versus unconnected device users.

CONCLUSION: Patients with connected devices entered more BP measures per day and had higher adherence to the RPM protocol. These findings suggest that automated recording facilitates RPM of BP and ultimately has the potential to improve care among pregnant patients at high risk for HDP.

Figure 1: Remote Blood Pressure (BP) Monitoring by Device Type



Caption: The boxplot shows the median for each group as the black horizontal line and the interquartile range for each group as the upper and lower bound of the box.

353 Changing labor unit culture and cesarean delivery: a prospective study

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OBJECTIVE: To assess the association between maternity unit culture change and improvement in hospital nulliparous, term, singleton, vertex cesarean birth (NTSV CB) rates.

STUDY DESIGN: Clinicians at 69 Michigan birthing hospitals participating in the Obstetrics Initiative (OBI) funded by Blue Cross Blue Shield of Michigan were invited to complete the Labor Culture Survey (LCS) in 2020 and 2022 as a part of a statewide initiative to lower the NTSV CB rate.The LCS includes 28 Likert-style items covering 7 subscales measuring individual attitudes, beliefs and perceptions of unit norms. We examined the relationship between changing LCS scores and reduction of the NTSV CB rate. Excluding hospitals with a 2020 NTSV CB rate below the Healthy People 2030 (HP2030) goal (≤23.6%) we defined "successful" hospitals as those that either (a) achieved the HP2030 goal, or (b) reduced their NTSV CB rate by ≥5 percentage points by 2022. We compared differences in LCS scale means using Wilcoxon rank sum tests.

RESULTS: 57 hospitals participated in the LCS both years, 44 (77%) of which had an NTSV CB rate above the HP2030 goal in 2020. Of these, 8 met criteria for "successful" hospital designation. There were no significant baseline differences in LCS scores between groups. In 2022, successful hospitals had significantly lower fear of vaginal birth (Fear) and significantly higher estimation of unit microculture supportive of vaginal birth (Table 1). Fear decreased over time at successful hospitals (-0.07, 95% CI -0.16 to 0.02, p< .05) and increased at unsuccessful hospitals (0.04, 95% CI -0.01 to 0.09, p< .05).

CONCLUSION: Over the two year period, decreasing clinicians' fear of vaginal birth was most predictive of successfully improving NTSV CB rates. Clinicians' fear, as a barrier to change, may impact the success of initiatives to safely reduce NTSV CB rates and should be considered in hiring decisions, training activities, and peer-support processes.

2022 Labor Culture Survey subscale scores by Hospital Success in Reducing NTSV CB Rates

	Unsuccessful	Successful	
LCS Subscale	Mean (95% CI)	Mean (95% CI)	P-value
Best Practices	3.16 (3.11-3.21)	3.17 (3.01-3.34)	0.82
Fear	1.44 (1.40-1.49)	1.35 (1.28-1.42)	**0.04**
Unit Microculture	2.72 (2.67-2.78)	2.87 (2.70-3.04)	**0.02**
Physician Oversight	3.10 (3.05-3.15)	3.06 (2.93-3.20)	0.50
Maternal Agency	2.82 (2.75-2.88)	2.76 (2.57-2.94)	0.55
Cesarean Safety	1.86 (1.82-1.91)	1.93 (1.81-2.06)	0.46

354 Invasive testing for abnormal NIPT before and after the texas heartbeat act

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OBJECTIVE: Texas passed the "Texas Heartbeat Act", also known as Senate Bill 8, in 2021, which effectively banned abortions in the state of Texas after a fetal heartbeat is detected. This law was enacted on September 1st, 2021. Whether this law has impacted patient decision-making regarding invasive testing is unknown. We sought to determine the rate of uptake of invasive testing after an abnormal cell free DNA (cfDNA) before and after the enactment of the Texas Heartbeat Act on September 1st, 2021.

STUDY DESIGN: This was a retrospective cohort study of all genetic counseling visits for an abnormal cfDNA at our institution in Austin, Texas between 2019-2022. Information regarding demographics, abnormal cfDNA results, invasive testing, ultrasound anomalies, and pregnancy outcomes was collected. Chi square tests were used to compare groups before and after September 1st, 2021.

RESULTS: 146 patients had genetic counseling visits for an abnormal NIPT between 2019-2022, 81 were done prior to September 1, 2021, and 65 after. Patient demographics were similar between groups, including maternal age, abnormal cfDNA result, language and public or private insurance. The rate of invasive testing did not change after the Texas Heartbeat Act (44% before, 37% after, p value 0.21). The type of invasive testing and the rate of pregnancy terminations also did not change. When stratifying by insurance status (public versus private), the rate of invasive testing and pregnancy termination did not change after the law was passed.

CONCLUSION: Restrictive laws in Texas have not changed the likelihood of patients to undergo invasive testing in our population. The rate of terminations for abnormal pregnancies also has not changed, including for those using public insurance or who are uninsured.

Table 1: Demographics and Outcomes

	Pre- Sept 1, 2001 (n=81)	Post- Sept 1, 2001 (n=65)	p-value
Age at EDD (mean, range)	34 (29-39)	33 (26-37)	0.33
Abnormal cfDNA result			0.11
T21, T18, T13	29 (36%)	24 (37%)	
Abnormal sex chromosomes	26 (32%)	26 (40%)	
No call	16 (20%)	4 (6%)	
Other	10 (12%)	11 (17%)	
Language			0.58
English	55 (68%)	43 (67%)	
Spanish	25 (31%)	18 (28%)	
Insurance			0.48
Public	36 (49%)	26 (43%)	
Private	38 (51%)	35 (57%)	
Invasive testing pursued	36 (44%)	24 (37%)	0.21
Invasive test			0.24
CVS	7 (19.4%)	8 (33.3%)	
Amniocentesis	29 (80.6%)	16 (66.7%)	
GA of invasive testing (mean, range)	16 (15-20)	16 (14-17)	0.59
Pregnancy outcome			0.74
Liveborn	59 (73%)	46 (71%)	
SAB/IUFD	7 (9%)	7 (11%)	
Termination	7 (9%)	8 (12%)	

cfDNA = cell free DNA, CVS = chorionic villous sampling, GA = gestational age, IUFD = intrauterine fetal demise, SAB = spontaneous abortion, T13 = trisomy 13, T18 = trisomy 18, T21 = trisomy 21

355 Body composition vs. traditional weight and BMI for assessing hypertensive disorders of pregnancy (HDOP) risk

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OBJECTIVE: Clinical history (hx) and BMI are established risk factors for HDOP. We sought to evaluate if incorporation of body composition parameters improves HDOP prediction compared to traditional clinical hx and weight/BMI.

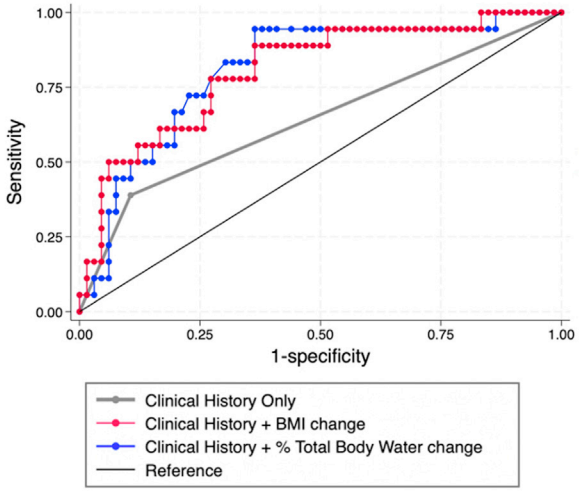
STUDY DESIGN: Primary analysis of a prospective cohort. Pregnant individuals at high risk for medically-indicated or spontaneous PTB were recruited from a MFM outpatient clinic, 2021-2023. Direct segmental multi-frequency bioelectrical impedance analysis technology measured each participant's body composition (% body fat, skeletal muscle mass, total body water, lean body mass) up to 4 times during pregnancy using the non-invasive InBody 270 scale-type device. Those with ≥ 2 InBody measurements were included in this analysis. The primary outcome was development of HDOP. Logistic regression models were constructed to select the top: (1) clinical hx (2) clinical hx + weight/BMI; (3) clinical hx + body composition parameters to predict HDOP. Area under the receiver operating

characteristics curves (AUC) were used to select the model that best predicted HDOP.

RESULTS: 88 study participants were included; 18 (20.5%) developed HDOP. The cohort was racially and ethnically diverse (38% Black, 9% Latinx); most (93%) were multiparous. First InBodys were at a median 18.2 (IQR 14.7-22.4) wks' and last Inbodys were at a median 29.1 (IQR 25.3, 32.7) wks.' The most predictive clinical factor for HDOP was hx of preeclampsia (AUC 0.64, 95% CI 0.52, 0.76). The most predictive weight/BMI factor was BMI change between the first & last InBody; adding this to hx of preeclampsia improved model prediction (AUC 0.809, 95% CI 0.694, 0.923) vs. clinical hx, p=0.009. The most predictive body comp factor was total body water change between the first & last InBody; adding this to hx of preeclampsia also improved model prediction (AUC 0.816, 95% CI 0.706, 0.926) vs. clinical hx, p=0.003, Figure. The BMI and total body water models similarly predicted HDOP (p=0.93).

CONCLUSION: Adding mid-pregnancy changes in BMI or total body water to clinical factors significantly improves prediction of HDOP beyond clinical factors.

Figure. Receiver operating characteristic (ROC) curves, comparing sensitivity vs. 1-specificity, for the prediction of hypertensive disorders of pregnancy.



***BMI change** = BMI as measured at last InBody during pregnancy minus BMI as measured at first InBody during pregnancy
***% Total Body Water change** = % Total Body Water as measured at last InBody during pregnancy minus % Total Body Water as measured at first InBody during pregnancy
- Median gestational age of first InBody = 18.2 (IQR 14.7, 22.4) weeks
- Median gestational age of last InBody = 29.1 (IQR 25.3, 32.7) weeks

356 Changes in maternal body composition parameters across gestation vary by prepregnancy BMI

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[1]Johns Hopkins, Durham, NC, [2]University of North Carolina, Chapel Hill, NC, [3]Washington University School of Medicine in St. Louis, Barnes Jewish Hospital, St. Louis, MO

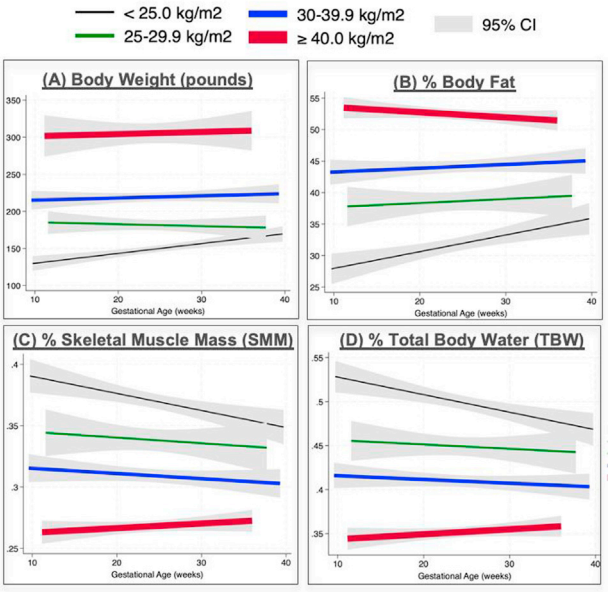
OBJECTIVE: Obesity and excessive gestational weight gain are established risk-factors for multiple adverse perinatal complications, but the pathophysiology underlying these risks is poorly understood. We sought to evaluate whether the pattern of weight gain and potential changes in body composition throughout pregnancy varies by pre-pregnancy BMI.

STUDY DESIGN: Primary analysis of a prospective cohort. Pregnant individuals at high risk for medically-indicated or spontaneous PTB were recruited from a single MFM outpatient clinic, 2021-2023. Direct segmental multi-frequency bioelectrical impedance analysis technology was used to measure each participant's body composition up to 4 times during pregnancy using the non-invasive InBody 270 scale-type device. Participants were grouped by pre-pregnancy BMI category (normal < 25, overweight 25-29.9, obese 30-39.9, morbidly obese ≥ 40 kg/m2) and body composition parameters were compared. Data were analyzed by fixed-effects linear regression accounting for varying numbers of observations per subject.

RESULTS: 284 InBody assessments were obtained from 153 subjects (24% normal weight, 22% overweight, 33% obese, and 21% morbidly obese). The population was racially (36% Black) and ethnically (20% Latinx) diverse. Initial InBody assessments occurred at a median 19.0 (IQR 15.4-24.7) weeks'; most (57%) were obtained between 14-28 weeks'. Body weight and composition varied significantly across gestation and by BMI category (Figure). Patients with normal BMIs had increased % fat as pregnancy progressed, but had reduced % skeletal muscle mass and % total body water (p< 0.001). In contrast, those with morbid obesity had increased % total body water and % skeletal mass, accompanied by reductions in % body fat as pregnancy progressed (p< 0.001).

CONCLUSION: Pregnancy is associated with distinct shifts in body composition that vary by pre-pregnancy BMI among individuals at high-risk for adverse pregnancy outcomes. An improved understanding of how pregnancy physiology differs by BMI may provide key insight into obesity-mediated disease associations and morbidities.

Figure. Body weight and body composition (fitted values) across gestation among patients at high risk for medically indicated and/or spontaneous PTB, as assessed by segmental multi-frequency bioelectrical impedance scale device (InBody 270), stratified by pre-pregnancy BMI.



357 Physical activity and pregnancy outcomes among the nuMoM2b cohort

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OBJECTIVE: To identify socioeconomic factors associated with self-reported physical activity during pregnancy and its impact on composite maternal and neonatal outcomes through a large prospective study

STUDY DESIGN: This is a secondary analysis of the Nulliparous Pregnancy Outcome Study: Monitoring Mothers-To-Be (nuMoM2b). All subjects participating in the nuMoM2b study were surveyed on whether they were physically active at three separate prenatal visits. Subjects were eligible for this analysis if they responded to this question at all three visits. Those that answered "Yes" at all visits were grouped in the "Consistent Activity" category while the remainder were grouped in the "Limited Activity" category. Delivery complications were grouped into composite maternal morbidity and composite neonatal morbidity outcomes. Statistical analysis included Chi-square, student t-tests, and multivariate logistic regression models.

RESULTS: From the 10,038 subjects enrolled in the NuMoM2b study, 9,057 (90.2%) were eligible for this analysis. Of these subjects, 4,734 (52.3%) were in the "Consistent" group while the remaining 4,323 (47.7%) were in the "Limited" group. Subjects in the "Limited" group were more likely to be from a non-white background (48.3% vs 28.8%, P< 0.0001), have government insurance (34.2% vs 17.1%, P< 0.0001), be below the poverty line (16.4% vs 9.0%, P< 0.0001), and have at most a high school level education (27.0% vs 11.2%, P< 0.0001). The "Consistent" group had a lower proportion of both composite maternal morbidity (44.3% vs 46.8%, P = 0.019) and composite neonatal morbidity (15.6% vs 17.5%, P = 0.011). In multivariate logistic modeling, consistent physical activity remained an independent predictor of composite maternal morbidity but not composite neonatal morbidity.

CONCLUSION: Subjects from socially or demographically disadvantaged groups are more likely to report limited physical activity in pregnancy. Consistent physical activity throughout pregnancy was associated with fewer adverse maternal outcomes but no difference in adverse neonatal outcomes.

Table 1 – Composite Maternal and Neonatal Morbidity Outcomes Compared Between and Predicted by Physical Activity Levels

	Physical activity throughout pregnancy		P-value
	Limited (n = 4323)	Consistent (n = 4734)	
Composite Maternal Morbidity Present	2023 (46.8)	2099 (44.3)	0.0190
Cesarean section	1211 (28.6)	1235 (26.7)	0.0447
Postpartum complications	232 (5.5)	232 (5.0)	0.3254
Readmission*	83 (2.0)	68 (1.5)	0.0749
Gestational diabetes	203 (4.7)	175 (3.7)	0.0176
Hypertensive disorders	1005 (23.2)	1044 (22.1)	0.1747
Adjusted Odds Ratio [95% CI]**	**1.0**	**0.88 [0.80-0.98]**	**0.0156**
Composite Neonatal Morbidity Present	758 (17.5)	736 (15.6)	0.0109
Delivery < 37 weeks	404 (9.5)	316 (6.8)	< 0.0001
NICU admission	25 (0.6)	23 (0.5)	0.5523
5-minute APGAR < 7	82 (2.0)	88 (1.9)	0.8858
Small for gestational age	141 (3.3)	155 (3.3)	0.9732
Large for gestational age	108 (2.5)	137 (2.9)	0.2463
Shoulder dystocia	81 (1.9)	84 (1.8)	0.7288
Neonatal death	11 (0.26)	8 (0.17)	0.3765
Adjusted Odds Ratio [95% CI]**	**1.0**	**0.97 [0.85-1.10]**	**0.6107**

*Readmission within 14 days of delivery
**CI – Confidence Interval; Adjusted for age, race, education level, income level, body mass index, tobacco use, alcohol use

358 Is severe maternal morbidity a risk factor for postpartum mental health hospitalization?

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OBJECTIVE: To examine rates of hospitalization with a mental health (MH) condition during the first year postpartum among patients with and without severe maternal morbidity (SMM) during delivery hospitalization.

STUDY DESIGN: Data are from the Maryland's State Inpatient Database and include patients with a delivery hospitalization during 2016-2019 (n=261,642). We compare rate of hospitalization with a MH diagnosis at 42 days and 42 days to 1 year postpartum by SMM status during the delivery hospitalization. We use multivariable logistic regression to examine hospitalization with a MH diagnosis (with and without substance use disorders) for patients by SMM status, adjusted for patient sociodemographic characteristics and presence of MH diagnosis during the delivery hospitalization. Analyses are also adjusted for clustering at the patient level for patients with multiple deliveries during the period of analysis. SMM and MH conditions are identified using ICD-10 diagnosis and procedure codes.

RESULTS: Overall, 7,206 patients (2.8%) experienced rehospitalization in the year following delivery. Among patients with rehospitalization, 25.5% (n=1,837) had a MH diagnosis. The rate of hospitalization with a MH diagnosis was 11.3 per 1,000 deliveries at 42 days postpartum and 23.2 at 42 days to 1 year postpartum for patients with SMM compared to 1.7 and 5.4 for patients without SMM during the delivery hospitalization. Patients with SMM had 3.7 times the odds (95% CI 2.8, 4.8) of hospitalization with a MH diagnosis during the first-year postpartum adjusting for age, race, median household income of zip code, primary insurance, urban

residence, and the presence of a MH diagnosis during the delivery hospitalization (Table 1).

CONCLUSION: Patients who experience SMM have a higher odds of hospitalization with a MH diagnosis in the postpartum period. Treatment and support resource listing should be made available to patients upon discharge after delivery, and evidence-based interventions to improve MH should prioritize women with SMM.

	Rehospitalization with MH (Non-SUD + SUD) diagnosis				Rehospitalization with MH (Non-SUD) diagnosis				Rehospitalization with MH (SUD only) diagnosis			
	Unadjusted		Adjusted		Unadjusted		Adjusted		Unadjusted		Adjusted	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Delivery with SMM (no SMM=ref)	4.82	3.74, 6.21	3.67	2.81, 4.78	5.52	4.21, 7.25	4.09	3.08, 5.43	3.94	2.68, 5.78	2.82	1.91, 4.17
Age (years)												
<25		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.
25-29	0.67	0.59, 0.75	0.76	0.67, 0.86	0.62	0.54, 0.71	0.71	0.61, 0.82	0.83	0.7, 0.99	0.97	0.82, 1.15
30-34	0.51	0.45, 0.57	0.75	0.65, 0.85	0.48	0.42, 0.56	0.68	0.59, 0.8	0.52	0.44, 0.63	0.89	0.73, 1.08
35-39	0.49	0.42, 0.57	0.79	0.67, 0.92	0.49	0.41, 0.58	0.73	0.61, 0.87	0.47	0.37, 0.59	0.93	0.73, 1.18
40+	0.43	0.32, 0.58	0.73	0.54, 0.98	0.39	0.27, 0.54	0.60	0.42, 0.85	0.42	0.27, 0.64	0.93	0.6, 1.45
Race & Ethnicity												
NH White		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.
NH Black	1.15	1.04, 1.26	0.98	0.88, 1.1	1.24	1.11, 1.39	1.12	0.98, 1.27	1.06	0.92, 1.22	0.85	0.73, 0.99
Hispanic	0.37	0.31, 0.45	0.41	0.33, 0.51	0.43	0.35, 0.54	0.50	0.4, 0.64	0.20	0.14, 0.28	0.24	0.17, 0.35
None of the above	0.43	0.35, 0.53	0.64	0.51, 0.79	0.53	0.42, 0.66	0.80	0.63, 1.01	0.28	0.2, 0.39	0.47	0.33, 0.68
Median household income (1)												
1st quartile (lowest)		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.
2nd quartile	0.58	0.52, 0.65	0.89	0.79, 1.00	0.61	0.54, 0.7	0.91	0.79, 1.04	0.48	0.41, 0.57	0.83	0.7, 0.99
3rd quartile	0.45	0.39, 0.51	0.81	0.7, 0.93	0.46	0.39, 0.53	0.78	0.67, 0.92	0.38	0.32, 0.45	0.85	0.7, 1.03
4th quartile (highest)	0.39	0.34, 0.45	0.81	0.69, 0.96	0.42	0.35, 0.49	0.80	0.66, 0.96	0.25	0.2, 0.32	0.72	0.56, 0.94
Primary insurance												
Private		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.
Medicaid/Medicare	3.41	3.07, 3.79	2.47	2.17, 2.81	2.82	2.51, 3.17	2.08	1.8, 2.4	7.15	5.94, 8.61	4.34	3.47, 5.43
Self-pay/none	1.63	1.25, 2.11	1.59	1.21, 2.08	1.57	1.18, 2.11	1.56	1.16, 2.1	2.16	1.4, 3.33	1.98	1.28, 3.07
Urban residence	0.84	0.64, 1.1	1.09	0.82, 1.45	0.97	0.69, 1.37	1.17	0.84, 1.65	0.68	0.47, 0.97	1.03	0.71, 1.49
Comorbidities noted during delivery hospitalization												
MH condition	7.10	6.46, 7.79	4.55	4.07, 5.09	8.78	7.89, 9.76	6.61	5.85, 7.48	6.15	5.37, 7.04	2.69	2.3, 3.14
SUD	7.75	7.02, 8.56	3.01	2.67, 3.4	5.25	4.64, 5.93	1.92	1.67, 2.21	18.20	15.96, 20.75	6.70	5.67, 7.92

Table 1. Odds of rehospitalization with a mental health diagnosis by severe maternal morbidity status. HCUP, Maryland Inpatient Database, 2016-2019. N= 261,642 deliveries. Adjusted models includes all variables in the table. Standard errors adjusted for individual-level clustering. Unadjusted models show the odds of SMM for each characteristics.
Note: MH, mental health; SUD, substance use disorder; (1) Household income is median for zip code.

359 Hemoglobinopathy screening in the era of expanded carrier screening: is hemoglobin electrophoresis necessary?

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OBJECTIVE: ACOG recommendations for hemoglobinopathy screening involve complete blood count with MCV, with hemoglobin electrophoresis recommended for high-risk populations. Expanded carrier screening (ECS) involves testing for mutations associated with hemoglobinopathy. Our objective was to compare detection rates of hemoglobinopathy carriers through the use of electrophoresis versus expanded carrier screening (ECS).

STUDY DESIGN: This is a retrospective cohort study. Participants include patients who underwent concomitant hemoglobin electrophoresis and ECS during their initial prenatal care visit in 2022. In our multiethnic population, electrophoresis is routine. Demographics, electrophoresis, ECS results and MCV were recorded, with microcytosis defined as MCV< 80fL. Those with a known clinical diagnosis of a hemoglobinopathy were excluded. Fisher's exact test was used for statistical comparison.

RESULTS: 506 patients were included. Table 1 describes the sensitivity of screening based on testing strategy. There were 129 hemoglobinopathy carriers (25.5%), including 33 with beta-chain abnormalities, 86 alpha-thalassemia carriers, and 10 who were carriers for both. ECS identified all 129 carriers, while electrophoresis detected abnormal globin chains in 43 carriers (33.5%). Electrophoresis also identified 6 patients with globin chain variants of no clinical significance. Of 96 alpha-thalassemia carriers detected by ECS, 87 were "silent carriers" (aa/a-), and 9 had deletion of two coding genes. Microcytosis was present in all 9 patients with the two-gene deletion. While microcytosis was more common in "silent carriers" (23.0% vs 6.6%; p< .001), most "silent carriers" were normocytic.

CONCLUSION: There was no incremental benefit to hemoglobin electrophoresis in those undergoing ECS. In addition, ECS detects silent alpha thalassemia carriers, most of whom are normocytic. While we did not identify a clinical benefit in identifying "silent carriers", in those at highest risk of severe forms of alpha-thalassemia (including Hemoglobin H disease) ECS is superior to conventional screening with electrophoresis and MCV.

Table 1. Sensitivity of Hemoglobinopathy screening with Hemoglobin Electrophoresis/MCV vs DNA Carrier Screening

	Hemoglobin Electrophoresis	Hemoglobin Electrophoresis + MCV	DNA Carrier Screening
Hemoglobin S	22/22	22/22	22/22
Hemoglobin C	14/14	14/14	14/14
Hemoglobin E	4/4	4/4	4/4
Beta-Thalassemia	3/3	3/3	3/3
Alpha-Thalassemia Carrier (a-/a-)	0/9	9/9	9/9
Alpha-Thalassemia Silent Carrier (aa/a-)	0/87	20/87	87/87

360 A novel method for placental evaluation: Isolation of intact circulating trophoblast cells from maternal circulation

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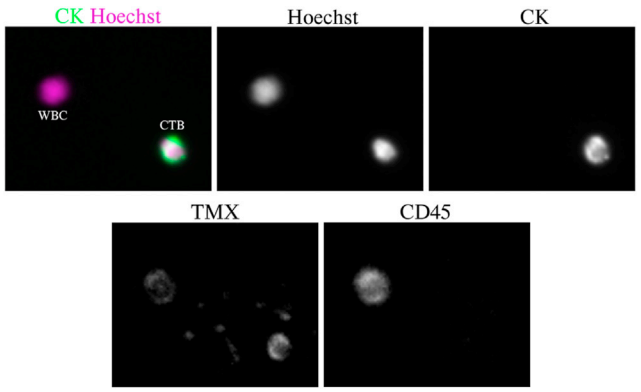
OBJECTIVE: We are developing a program to test the hypothesis that gene expression profiles of placental cells in maternal circulation can be used as a biomarker to predict risk of stillbirth and other adverse pregnancy outcomes. As a foundational step in this effort, we developed a method to isolate individual, intact circulating trophoblasts (CTB) from maternal circulation.

STUDY DESIGN: After informed consent, buffy coats were isolated from third trimester pregnancy blood samples using the AccuCyte® sample preparation system. Following immunomagnetic bead enrichment, cells were spread to slides. A 4-parameter manual immunofluorescence (IF) assay was developed with the following markers: Hoechst (nucleus), pan-cytokeratin (CK, trophoblast marker), TMX (supportive trophoblast marker) and CD45 (exclusion marker). Slides were stained and then imaged on the CyteFinder® imaging system. CTBs were defined as nucleated, CK positive, TMX agnostic, and CD45 negative cells. CTBs were then isolated using the CytePicker® Retrieval Module.

RESULTS: The method was developed using the JEG-3 cell line in spike-in experiments. We then evaluated clinical samples from uncomplicated pregnancies (N=3 to date). CTBs were identified in all clinical samples and successfully retrieved from slides. A representative image of a CTB is shown (Figure 1).

CONCLUSION: Identification and isolation of intact CTB from maternal circulation was demonstrated reproducibly from third trimester samples. This methodology is a critical component of our efforts to evaluate CTB gene expression to identify risk of stillbirth and other adverse pregnancy outcomes.



361 Receipt and access to perinatal behavioral health care - experiences of birthing individuals

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OBJECTIVE: Perinatal mental healthcare is critical to ensuring mental wellness and healthy outcomes for birthing individuals and their babies. We conducted a qualitative study to understand how birthing individuals experienced perinatal mental healthcare in the Military Health System (MHS).

STUDY DESIGN: This was an IRB-approved protocol which included Tricare beneficiaries who gave birth within the past five years and were recruited for semi-structured qualitative interviews from Feb 2023 to May 2023. Purposive and snowball sampling was utilized to ensure diverse participation. Interviews were recorded and transcribed with deductive coding, and themes identified until saturation was reached.

RESULTS: A total of 34 individuals completed interviews, with ten main themes identified, these included the importance of support from their obstetric provider and colleagues, the importance of mental health check-ins during pregnancy, challenges accessing care, feelings of dismissiveness regarding mental health needs, inadequate assessment of symptoms, and curtailing of symptoms and situational stress, lack of care postpartum, waiting extended periods for postpartum visits, concealing symptoms to avoid documentation in chart, and support from doulas and support groups postpartum. A common theme included the need to improve screening, "I had to be proactive about it. I don't think we have adequate screening for, at least for postpartum anxiety."

CONCLUSION: The results of our qualitative study indicate variation in mental health care experiences in the perinatal period. While some individuals had prompt and supportive care, others experienced delays and dismissals by their providers. This provides an opportunity to improve perinatal behavioral healthcare in the MHS.

362 Identifying hemolytic disease of the fetus and newborn (HDFN) in a large integrated healthcare system

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OBJECTIVE: HDFN is a blood disorder caused by maternal-fetal red cell antigen incompatibility. This study aims to identify HDFN cases using electronic health records (EHR) of pregnant patients.

STUDY DESIGN: A retrospective cohort study was performed among pregnant patients receiving obstetrical care at Kaiser Permanente Southern California (01/01/2008–06/30/2022). Using structured (e.g., diagnostic/procedural codes and laboratory results) and unstructured (clinical notes analyzed via Natural Language Processing) data abstracted from EHRs, we extracted HDFN-specific "indicators" (including antibody test, antibody titer, HDFN diagnosis, blood transfusion/intravenous immunoglobulin treatment [IVIG], and jaundice/phototherapy) to identify potential HDFN patients. Chart reviews and adjudication by a clinical investigator were performed on select combinations of indicators for case ascertainment. HDFN due to ABO isoimmunization was excluded. The HDFN frequency and proportion of each combination were calculated.

RESULTS: Among 572,328 pregnancies, indicators for maternal positive antibody test (2.72%), maternal abnormal titer (0.08%), maternal/infant HDFN diagnosis (0.45%), maternal/infant transfusion/IVIG treatment (0.64%), and infant jaundice/phototherapy (35.40%) were extracted. Pregnancies with 8 different indicator combinations (out of 24 total combinations) plus 91 pregnancies from other combinations were chart reviewed. 105 (30.97%) HDFN pregnancies were confirmed (Table). A majority of HDFN pregnancies (n=87) had at least the following indicators: maternal positive antibody test, maternal abnormal titer, and maternal/infant HDFN diagnosis. Those with all 5 indicators had a confirmed HDFN rate of 89%.

CONCLUSION: We successfully identified HDFN patients using a combination of medical indicators extracted from structured and unstructured data that may be used in future pharmacoepidemiologic studies. Traditional indicators (positive antibody test results, high titers, and clinical codes) alone did not identify HDFN pregnancies, highlighting an unmet need for improved practices in HDFN coding.

Table: Accuracy of ascertaining HDFN cases

Indicators*	Total Pregnancies	Total Confirmed HDFN Pregnancies	HDFN Rate (%)
A, B, C, D, E	54	48	88.89
A, B, C, D	5	3	60.00
A, B, C, E	78	36	46.15
A, B, D, E	16	7	43.75
A, C, D, E	26	9	34.62
A, B, D	14	2	14.29
A, B, C	46	0	0.00
A, C, D	9	0	0.00
All other combinations**	91	0	0.00
Overall	339	105	30.97

HDFN: Hemolytic Disease of the Fetus and Newborn (ABO Isoimmunization was excluded)
*A: maternal positive antibody test; B: maternal abnormal titer; C: maternal/infant HDFN diagnosis; D: maternal/infant transfusion/IVIG treatment; E: infant jaundice/phototherapy
**Random sample of chart reviews was selected

363 Characteristics of cesarean deliveries among women with and without COVID-19 infection

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OBJECTIVE: Pregnant women infected with the COVID-19 virus have higher risk of developing severe outcomes of the disease compared to nonpregnant women. Furthermore, pregnant women with COVID-19 infection may also be at an increased susceptibility for adverse obstetrical outcomes. Limited data exists regarding how the virus specifically affects the characteristics of cesarean deliveries (CD) among infected women. Therefore, our study aimed to examine the correlation between COVID-19 infection and CD characteristics in a cohort of women who underwent cesarean section.

STUDY DESIGN: We conducted a population-based retrospective cohort study at a tertiary medical center, including all women with singleton pregnancies who underwent cesarean section delivery (CD) between 2020 and 2022. Exclusion criteria consisted of incomplete medical records, multiple gestations, and fetal malformations. The study group included women diagnosed with COVID-19 infection during their hospitalization, while the comparison group comprised women without COVID-19 infection. We examined the differences in CD characteristics between both groups using a multivariable logistic regression analysis to adjust for potential confounders, including emergent CD, parity, ethnicity and gestational age at delivery.

RESULTS: The study population consisted of a total of 4398 women who underwent cesarean delivery and met the inclusion criteria. Among them, 98 women were infected with COVID-19. COVID-19 infection was significant associated with an increased risk of emergent surgery (Table 1, 75.5% vs. 55.1%; p< 0.001). Furthermore , COVID-19 was associated with a prolonged duration of anesthesia and higher proportion of regional anesthesia. Using a multivariable logistic regression analysis, after adjusting for parity, ethnicity and gestational age at delivery, the association between COVID -19 infection and an elevated risk of emergent CD remained significant (adjusted OR 2.45, 95% CI 1.50-3.99; p< 0.001).

CONCLUSION: Among women who underwent cesarean section, COVID-19 infection was found to be predictive of an increased risk of emergent surgery.

Table 1: Cesarean delivery characteristics of women with and without COVID-19 diagnosis

Characteristics	Women with COVID-19 diagnosis n=98 (%)	Women without COVID-19 diagnosis n=4,300 (%)	P
Emergent surgery n (%)	74 (75.5)	2,382 (56.1)	<0.001
Surgery duration min (mean±SD)	36.6±19.4	36.5±16.6	0.953
Anesthesia duration in minutes (mean±SD)	86.1±70.2	53.4±19.6	<0.001
Type of Anesthesia			
Regional alone n (%)	73 (74.5)	2,788 (64.9)	0.049
General alone n (%)	24 (24.5)	1,243 (28.9)	0.338
Regional & General n (%)	1 (1.0)	255 (5.9)	0.040
CD main indication			
NRFHR n (%)	29 (29.6)	747 (17.4)	0.002
Previous single CD n (%)	4 (4.1)	583 (13.6)	0.006
Previous multiple CDs n (%)	18 (18.4)	1,005 (23.4)	0.246
Failed induction n (%)	1 (1.0)	64 (1.5)	1.000
NPL 1 n (%)	3 (3.1)	158 (3.7)	1.000
NPL2 n (%)	6 (6.1)	300 (7.0)	0.742
Breech presentation n (%)	7 (7.1)	464 (10.8)	0.248
Other non-vertex presentation n (%)	2 (2.0)	138 (3.2)	0.515
Cord prolapse n (%)	1 (1.0)	68 (1.6)	1.000
Placenta previa n (%)	4 (4.1)	76 (1.8)	0.102
Suspected macrosomia n (%)	1 (1.0)	172 (4.0)	0.185
Severe PET n (%)	1 (1.0)	47 (1.1)	1.000
Suspected placental abruption n (%)	2 (2.0)	35 (0.8)	0.199

P P-value, SD standard deviation, OR odds ratio, SD standard deviation, CD cesarean delivery. NRFHR non reassuring fetal heart rate, NPL non progressive labor, PET preeclamptic toxemia

364 Aspartate aminotransferase to platelet ratio: predictor of early preterm delivery in women with preeclampsia toxemia

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OBJECTIVE: Preeclampsia toxemia (PET) is one of the leading causes of maternal morbidity and mortality worldwide. Inflammatory processes have been suggested as underlying mechanisms that eventually lead to ischemia and vasoconstriction in the affected end organs. Aspartate aminotransferase-to-platelet ratio index (APRI) can be easily calculated from routine blood tests, and is associated with early inflammatory processes. However, the association between APRI, PET and its complications is not well studied. Therefore, our study aims to explore the correlation between the APRI parameter and the risk of early preterm delivery (< 34 weeks of gestation) in women with PET.

STUDY DESIGN: We conducted a population-based cohort study at a tertiary medical center, including all women with singleton gestations who delivered between 2020 and 2022 and were diagnosed with PET. The exclusion criteria included women with an incomplete medical record, multiple gestations, and fetal malformations. The median APRI index of the cohort served as the cut-off point to compare the risk of preterm delivery between the low APRI index group and the high APRI index group. A multivariable logistic regression analysis was used to adjust for confounders, including parity and maternal age

RESULTS: The study population included 513 women with PET who met the inclusion criteria. The median APRI index value of the cohort served as the cutoff point, with 255 women having an APRI index < 0.26 and 258 with an APRI index ≥0.26. A higher APRI index was significantly associated with an increased risk of early preterm delivery (Table 1, 15.1% vs. 9.0%; p= 0.040). Using a multivariable logistic regression analysis, after adjusting for maternal age and parity, the association between early preterm delivery and an APRI index of ≥0.26 remained significant (adjusted OR 1.89, 95% CI 1.09-3.29; p=0.024, Table 2).

CONCLUSION: An APRI index ≥ 0.26 is independently associated with early preterm delivery before 34 weeks of gestation among women with PET.

Baseline, Obstetrical characteristics and perinatal outcomes of women with PET, with APRI below the median versus APRI above the median

Characteristics	PET with APRI<0.26 n= 255	PET WITH APRI=>0.26 n=258	P-Value
Maternal age (years± SD)	29.73+-7.04	28.7+-6.52	0.086
Ethnicity			
Jewish n (%)	73 (28.6%)	85 (32.9%)	0.29
Bedouin Arab n (%)	182 (71.4%)	173 (67.1%)	
Nulliparity n (%)	92 (36.1%)	127 (49.2%)	0.003
Pre-gestational diabetes n (%)	12 (4.7%)	9 (3.5%)	0.51
Gestational diabetes n (%)	23 (9%)	21 (8.1%)	0.75
Chronic HTN n (%)	11 (4.3%)	6 (2.3%)	0.22
Previous cesarean section n (%)	64 (25.1%)	44 (17.1%)	0.03
Mode of delivery			
Vaginal delivery n (%)	153 (60%)	148 (57.4%)	0.59
Cesarean delivery n (%)	102 (40%)	110 (42.6%)	
Epidural anesthesia n (%)	117 (45.9%)	100 (42.6%)	0.47
Induction of labor n (%)	92 (36.1%)	102 (39.5%)	0.46
Polyhydramnios n (%)	2 (0.8%)	1 (0.4%)	0.62
Oligohydramnios n (%)	11 (4.3%)	9 (3.5%)	0.65
Placental abruption n (%)	4 (1.6%)	9 (3.5%)	0.26
Preterm delivery 34-36.6 weeks n (%)	45 (17.6%)	49 (19%)	0.73
Preterm delivery before 34 weeks n (%)	23 (9%)	39 (15.1%)	0.04

SD standard deviation, PET Preeclampsia Toxemia, HTN Hypertension

365 Antepartum multidisciplinary approach improves postpartum pain scores in patients with opioid use disorder

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OBJECTIVE: Pregnancies affected by maternal opioid use disorder (MOUD) face difficulties with postpartum pain control and Neonatal Opioid Withdrawal Syndrome (NOWS). This study aims to determine if prenatal anesthesia consultation for MOUD patients affects maternal and fetal outcomes.

STUDY DESIGN: This is a retrospective cohort study of pregnant patients diagnosed with MOUD who received prenatal care and delivered at an academic institution between January 2017 and July 2023. Subjects were divided into those who received prenatal anesthesia consultation and those who did not. Severe pain on a numerical rating scale was defined as score $\geq$7. Statistical analysis was performed using Mann-Whitney U test with statistical significance defined as $p < 0.05$.

RESULTS: The cohort included 324 women with MOUD. Of these, 15.7% (N=51) received anesthesia consultation and 84.3% (N=273) did not. When comparing pain scores in the first 24 hours postpartum, patients with prenatal anesthesia consultation had statistically significant lower rates of severe pain compared to those who did not (26% vs. 45.3%, p=0.01). Neonatal outcomes were assessed; though NOWS diagnoses were not associated with prenatal anesthesia consultation, NICU admissions were significantly fewer for patients who had anesthesia referral (p=0.01). Factors found to have significant association with prenatal anesthesia consultation were care with an obstetric provider with training in maternal opioid care ($p < 0.01$) and a higher number of prenatal care visits (10.3 vs. 8.9, p=0.02).

CONCLUSION: MOUD patients who received anesthesia consultation in pregnancy reported lower postpartum pain scores than those without consultation. Our data supports multidisciplinary care including prenatal anesthesia consultation for MOUD patients.

Table 1. Associated Maternal Demographics and Obstetric Outcomes Associated with Prenatal Anesthesia Consultation for MOUD

	Anesthesia Consultation		p-value
	Yes	No	
Maternal Characteristics			
OUD-experienced provider	45 (88.2%)	151 (55.5%)	**<0.01**
1st trimester prenatal care	35 (70%)	145 (59.9%)	0.18
Number of PNC visits	10.3 (±2.9)	8.9 (±3.9)	**0.02**
Government Assisted Insurance	46 (90.2%)	225 (84.6%)	0.30
Hepatitis C	14 (27.5%)	61 (22.3%)	0.43
Drug use during pregnancy	11 (21.6%)	84 (30.9%)	0.18
MOUD Type - Buprenorphine - Buprenorphine/naloxone - Methadone	 26 (51.0%) 12 (23.5%) 13 (25.5%)	 152 (56.1%) 42 (15.5%) 77 (28.4%)	0.37
Caucasian	46 (90.2%)	246 (90.1%)	0.98
BMI (kg/m²)	27.1 (±6.0)	27.9 (±6.1)	0.39
AMA (≥35 yrs)	19 (37.3%)	72 (26.6%)	0.12
Obstetric and Neonatal Outcomes			
Cesarean delivery	22 (44%)	122 (45.2%)	0.88
Preterm birth	6 (12%)	43 (15.8%)	0.49
Postpartum PCEA use	18 (36%)	65 (24.2%)	0.08
Postpartum Hospital Opioid Use	17 (34%)	79 (28.9%)	0.47
Severe pain (7-10) PPD#0	13 (26%)	121 (45.3%)	**0.01**
Discharge Opioid Rx	10 (20%)	37 (13.6%)	0.24
Postpartum relapse	1 (2.2%)	11 (4.7%)	0.43
Neonatal Opioid Withdrawal Syndrome (NOWS)	9 (18.4%)	54 (20.1%)	0.78
NOWS requiring morphine	12 (23.5%)	83 (30.2%)	0.32
NICU admission	22 (44.9%)	179 (66.1%)	**0.01**
Breastfeeding at discharge	18 (51.4%)	90 (44.1%)	0.42

Data presented as N (%) or mean ±SD

366 Investigating the impact maternity care access and social vulnerability on short-interval birth in Tennessee

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OBJECTIVE: Maternity Care Access (MCA) and levels of community vulnerability can impact contraception access and health outcomes for pregnant-capable individuals. The relationship between maternity care access based on county of residence and short-interval birth (SIB) rates across Tennessee was analyzed.

STUDY DESIGN: Tennessee birth certificate data for 2015-2021 from the Tennessee Department of Health was obtained. Maternal county of residence was coded using the March of Dimes 2018 definitions of MCA (full-access, moderate-access, low-access, or maternity desert) and CDC/ATSDR 2020 social vulnerability index (SVI). Birth intervals of 6-23 months were coded as short-interval birth (SIB). Births were excluded if they were nulliparous or had missing birth interval information. Analysis was completed in SPSS 29.0 and Pearson chi-square tests, Kruskal-Wallis tests, and binary logistic were conducted.

RESULTS: Overall, 319,600 births were included in analysis. SIB was highest in maternity care deserts (24.5%; $p < .001$). There was a statistically significant difference in SVI between MCA levels ($p < 0.001$). Logistic regression was used to analyze the relationship between SIB and SVI. SIB was significantly higher among reported household incomes < $25,000 (27.6%; $p < .001$) and those with a high school diploma or GED (26.8%; $p < .001$). SVI was higher among groups experiencing SIB 2015-2020 ($p < .001$) and remained statistically significant after controlling for age, education, race/

ethnicity, and household income (AOR:1.048; 95%;CI:1.010-1.087, p< .001).

CONCLUSION: Measures of high vulnerability and low healthcare access are associated with higher rates of SIB. County-level data may not be the best indication of health access and outcomes in Tennessee as it is likely patient-level factors vary widely within counties. Future work should investigate MCA and community vulnerability on rates of prenatal contraceptive counseling and obtaining desired contraception.

Table 1. Logistic regression model of the association between SIB (birth interval 6-23 months) and Social Vulnerability Index (SVI)

	Total (N)	No SIB	SIB	Unadjusted Odds (95% CI)	Adjusted Odds (95% CI)
SVI	.54+/-.30	.54+/-.31	.55+/-.31	1.20[a] (1.16-1.23)	1.05[a] (1.01-1.09)
Age	27.88 +/-5.73	29.91+/-5.19	27.23+/-5.29	.90[a] (.90-.91)	.90[a] (.89-.90)
Education					
< High School	48,801 (14.7%)	34,530 (14.2%)	12,271 (16.4%)	(ref)	(ref)
High School or GED	92,351 (29.1%)	57,574 (27.8%)	24,777 (33.1%)	1.032[a] (1.01-1.06)	.86[a] (.83-.89)
Some College	98,534 (31.0%)	77,383 (31.9%)	21,151 (28.2%)	.77[a] (.75-.79)	.82[a] (.79-.85)
Bachelor's	51,737 (16.3%)	40,750 (16.8%)	10,987 (14.7%)	.72[a] (.74-.78)	1.19[a] (1.13-1.24)
Graduate Degree or Higher	28,396 (8.9%)	22,634 (9.3%)	5,762 (7.7%)	.72[a] (.69-.74)	1.29[a] (1.22-1.37)
Household Income					
<$25,000	88,195 (40.8%)	63,875 (38.5%)	24,320 (48.1%)	(ref)	(ref)
$25,000-$49,999	50,852 (23.5%)	39,550 (23.9%)	11,302 (22.4%)	.75[a] (.73-.77)	.84[a] (.82-.87)
$50.000-$99,999	48,937 (22.6%)	39,534 (23.8%)	9,403 (18.6%)	.63[a] (.61-.64)	.80[a] (.77-.83)
>$100,000	28,391 (13.1%)	22,865 (13.8%)	5,526 (10.9%)	.64 (.61-.66)	.96 (.92-1.00)
Race					
White	214,057 (67.4%)	163,825 (67.5%)	50,205 (67.1%)	(ref)	(ref)
Black	64,923 (20.5%)	47,608 (19.6%)	17,315 (23.1%)	1.19[a] (1.16-1.21)	1.04[a] (1.01-1.07)
American Indian/Alaskan Native	568 (0.2%)	418 (0.2%)	150 (0.2%)	1.17 (.97-1.41)	1.02 (.80-1.31)
Asian	6,385 (2.0%)	5,320 (2.2%)	1,065 (1.4%)	.65[a] (.61-.70)	.79[a] (.73-.86)
Native Hawaiian/Pacific Islander	430 (0.1%)	326 (0.1%)	104 (0.1%)	1.04 (.84-1.30)	1.17 (.87-1.58)
Other	25,617 (8.1%)	21,229 (8.7%)	4,388 (5.9%)	.68[a] (.65-.70)	.74[a] (.69-.80)
More than one race	5,484 (1.7%)	3,904 (1.6%)	1,580 (2.1%)	1.32[a] (1.25-1.40)	1.16[a] (1.08-1.25)
Ethnicity					
Not Hispanic	282,380 (88.7%)	213,965 (87.9%)	68,415 (91.2%)	(ref)	(ref)
Hispanic	36,092 (11.3%)	29,461 (12.1%)	6,631 (8.8%)	.70[a] (.8-.72)	.86[a] (.81-.91)

[a] significant at p<.05

367 Intrauterine transfusion before and after 34 weeks: procedure-related complications and gestational age at delivery

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OBJECTIVE: Maternal red blood cell alloimmunization may be treated with serial intrauterine transfusions (IUT). Few studies are available regarding the safety profile of IUT performed after 34 gestational weeks as a strategy to postpone delivery until term. In patients undergoing their final IUT before and after 34 weeks, the following were assessed: (1) the frequency and type of procedure-related (PR) complications; (2) gestational age (GA) at delivery.

STUDY DESIGN: This was a retrospective study of pregnancies complicated by alloimmunization with suspected fetal anemia treated with IUT at a single center. PR-complications were defined as any of the following within 48 hours of IUT: 1) rupture of membranes or preterm delivery, 2) intrauterine infection, 3) fetal death, 4) fetal compromise resulting in emergency cesarean, or 5) neonatal death. The secondary outcome was GA at delivery. Study outcomes were compared between patients with final IUT before and after 34 gestational weeks.

RESULTS: In total, 94 pregnancies with 237 IUT met inclusion criteria. Among the 94 pregnancies, 59 (62.8%) had their last IUT before and 35 (37.2%) had their last IUT after 34 gestational weeks. Maternal age, parity, GA at first IUT, and the presence of hydrops were similar between the groups. Patients with the last IUT after 34 weeks underwent more IUT per pregnancy (mean 3.2 versus 2.1, $p < 0.01$). There were 3 PR-complications identified (1.3% of procedures and 3.2% of pregnancies); 2 were in the group with their last IUT after completing 34 weeks. There was no difference in PR-complications when comparing pregnancies with their last IUT before and after 34 weeks ($p = 0.28$). Pregnancies with the last IUT after 34 weeks delivered at a later GA (mean 37.1 versus 36.0 weeks, $p < 0.01$).

CONCLUSION: IUT PR-complications were rare. IUT beyond 34 gestational weeks did not appear to pose additional risk to the pregnancy and may mitigate the risk of premature delivery. Future studies are needed to validate these findings and examine cost effectiveness and patient tolerability of additional IUT.

368 Utility of extended cervical length surveillance among asymptomatic patients with prior spontaneous preterm birth

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OBJECTIVE: Controversy exists regarding the benefit of extended cervical length (CL) surveillance with transvaginal ultrasound (TVUS) beyond 23 6/7 weeks among asymptomatic patients with prior spontaneous preterm birth (sPTB).

STUDY DESIGN: This retrospective cohort study evaluated extended surveillance (ES) in asymptomatic patients with prior sPTB. Patients were included if CL surveillance began prior to 23 6/7 weeks and ≥ 2 TVUS CL measurements were performed. Patients with previable

birth, multiple gestations, or major fetal anomalies were excluded. Two groups were identified: routine surveillance (RS) to 23 6/7 weeks, and ES to 32 6/7 weeks. Demographic data and pregnancy outcomes were recorded. The primary outcome was sPTB before 34 0/7 weeks. Chi squared and T-test were used for statistical analysis. A P value < 0.05 was significant.

RESULTS: Between 2017 and 2023, 8653 TVUS CLs were performed, and 333 patients met inclusion criteria. Maternal characteristics were similar. By 23w6d, 273 patients (81.9 %) had a normal CL (nCL), and 60 patients (18.0 %) had a short CL (sCL) < 25 mm. In the nCL group, 93 continued ES and 5 (5.4 %) were then diagnosed with sCL (Figure 1). There is no difference in incidence of sPTB or neonatal outcomes. The sensitivity of ES for sPTB < 34 0/7 weeks is 66%, and the positive predictive value is 40%. The number needed to detect one sCL after 23 6/7 weeks is 19 patients, and 50 patients to detect one sPTB < 34 0/7 weeks. The median time from diagnosis of sCL to delivery is 67 (interquartile range 63 - 100) days. The ES group had significantly more triage visits (mean 1.67 vs 2.11, $p = 0.02$).

CONCLUSION: While ES in asymptomatic patients with prior sPTB may effectively identify patients who will deliver before 34 0/7 weeks gestation, there is no currently accepted intervention to prevent sPTB. Because ES does not predict birth within 7 days of diagnosis, a sCL past 23 6/7 weeks should not direct medication administration for neonatal benefit. If an effective strategy is identified for his population, then surveillance past 23w6d gestation may be a reasonable policy.

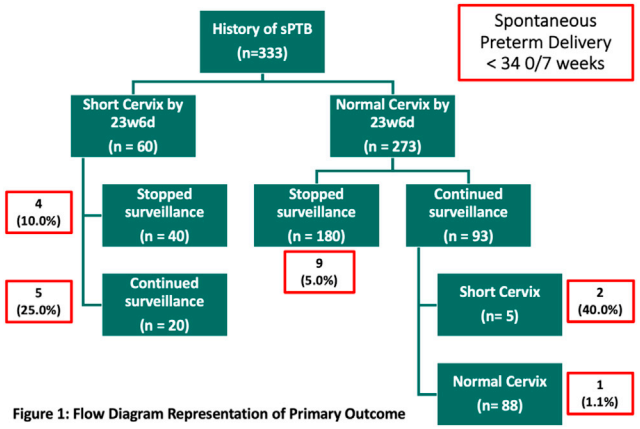

Figure 1: Flow Diagram Representation of Primary Outcome

369 A customized model versus ultrasound for predicting neonatal birthweight

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OBJECTIVE: Adequate estimation of fetal weight (EFW) in utero is essential to a healthy pregnancy. Ultrasound-based formulas for EFW have a random error exceeding 15% in five percent of fetuses. As a result of this inaccuracy, under and over-intervention can occur. Herein, we propose a personalized AI model that leverages a linear mixed model to forecast neonatal birthweight.

STUDY DESIGN: Our 2005-2021 dataset included information on births $\geq$ 36 weeks of gestation to mothers with at least one consecutive birth. We excluded cases with anomalies or birthweights below 1,000 g, consecutive birthweights delta $\geq$ 20%, and variables with $\geq$ 30% missing values. The model incorporated key maternal-neonatal demographic and clinical fixed/random variables for each birth order (2 to $>$ 5) to capture individual variability, followed by a train-test split in a 63:37 ratio. The model was then compared to the standard ultrasound EFW performance using the Mean Absolute Error (MAE).

RESULTS: The dataset included 11,453 mothers, accounting for 28,629 births. The key variables used in the model were ethnic and religious background, maternal age, parity, birthweights of previous deliveries, mode of conception, comorbidities, tobacco use, uterine anomalies, gestational age at delivery, and gender. Figure 1a describes the distribution of mothers according to their parity. Figure 1b gives the EFW of the testing model vs. ultrasound. Considering all birthweight ranges, the MAE of our model was comparable to ultrasound performance (232.29 g vs. 234.02 g, p=0.279). In a sub-analysis, the MAE across our model's 3000-4000 g weight range, which represented $>$ 75% of the testing cohort, was significantly lower than the ultrasound performance (209.29 vs. 228.86, p$<$ 0.001). At the extremes of these birthweights, ultrasound performed better than our model.

CONCLUSION: The suggested model's accuracy surpasses the sonographic EFW within specific weight groups, but both methods present comparable predictive abilities when considering the total dataset. Currently, we validate our findings prospectively.

1a. distribution of mothers according to their parity

Parity	2	3	4	5+
Frequencies	6,835 (60%)	3,735 (32%)	726 (6%)	157 (2%)

1b. Model vs. US estimation of fetal weights.

Weight (g)	Sample size	US EFW	Model Estimation	P-value
		MAE	MAE	
< 2500	136	214.4	256.51	**0.003**
2500-3000	1,459	214.06	251.53	**<0.001**
3000-4000	6,346	228.86	209.29	**<0.001**
4000-4500	475	354.86	450.38	**<0.001**
> 4500	28	487.46	624.14	**0.01**
Total	8,444	234.02	232.29	0.279

MAE, mean absolute error; US, ultrasound; EFW, estimated fetal weight.
P < 0.05 was considered significant.

Abstracts 370-643

370 Endometriosis complicated pregnancy: site-specific evaluation of characteristics and maternal morbidity

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OBJECTIVE: To examine pregnancy characteristics and maternal morbidity at delivery among pregnant patients with a diagnosis of endometriosis.

STUDY DESIGN: This cross-section study queried the National Inpatient Sample, examining 17,796,365 deliveries from 2016-2020. Exclusion criteria included adenomyosis and uterine myoma. Endometriosis location was grouped as adnexa, pelvic peritoneum, and other. The outcome measures were clinical and pregnancy characteristics and CDC-defined severe maternal morbidity and postpartum hemorrhage, assessed with multivariable model.

RESULTS: Endometriosis was diagnosed in one in 1,012 patients (n=17,590), with 24.1% in the adnexa, 7.0% in the pelvic peritoneum, 5.5% in other locations, and 1.5% in multi-anatomical locations. In multivariable analysis, the prevalence of pregnancy complicated by endometriosis increased during the study period in both the adnexa and the pelvic peritoneum. The risk of placenta previa was increased in all endometriosis groups, especially in patients with pelvic peritoneal endometriosis (aOR 5.12, 95%CI 3.97-6.61). The risks of placenta accreta spectrum were increased with odds exceeding two-fold for locations other than adnexa and pelvic peritoneum (aOR 3.50, 95%CI 2.10-5.02) and multi-anatomical location endometriosis (aOR 2.87, 95%CI 1.10-7.50). All endometriosis-locations had increased risk for cesarean delivery, with multi-location endometriosis having the highest increase (aOR 42.62, 95% CI 24.91-72.92), followed by adnexal endometriosis (aOR 17.48, 95%CI 15.86-19.27). All endometriosis groups were associated with an increased risk of severe maternal morbidity at delivery, with pelvic peritoneal endometriosis having the highest risk (aOR 2.23, 95%CI 1.74-2.84), followed by adnexal endometriosis (aOR 1.97, 95%CI 1.72-2.25). The risk of postpartum hemorrhage was increased in multi-anatomical location endometriosis (aOR 1.97, 95%CI 1.26-3.09) and adnexal endometriosis (aOR 1.89, 95%CI 1.68-2.13).

CONCLUSION: Pregnancy complicated by endometriosis is associated with high-risk pregnancy characteristics and adverse delivery outcomes.

371 Association between preterm birth and adverse childhood experiences in a diverse population

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OBJECTIVE: To determine whether a relationship exists between adverse childhood experiences, maternal race, earlier gestational age at delivery and maternal cortisol and choline levels among a diverse population.

STUDY DESIGN: This a prospective, observational cohort study of pregnant women enrolled before 16 weeks gestation. Demographics, including race and previous pregnancy outcomes were obtained. The Adverse Childhood Experiences (ACE) scale was used to quantify lifetime stressors. Hair cortisol concentration (HCC) and plasma choline levels were obtained from participants at 16 weeks gestation. Continuous and categorical statistical analyses were used.

RESULTS: Of 151 participants enrolled, 23 identified as Black and 128 as White. Black women had higher ACE scores compared with white women (3.59 ± 2.12 vs 2.31 ± 2.39, $p = 0.034$, $b = 0.457$). Gestational age at birth was earlier for Black infants than White infants (266.4 ± 21.1 days v s 274.0 ± 16.7 days, $p = 0.043$). In White women, ACE score ≥ 5 and plasma choline concentrations below the mean were associated with earlier gestational age at birth. ACE and maternal HCC were correlated for all women ($p = 0.048$, $b = 0.216$) although depression/anxiety, obesity, and Black race did not independently affect HCC. Maternal plasma choline concentration was lower for Black women compared with White women ($p = 0.008$) and HCC was negatively associated with plasma choline concentration ($p = 0.016$, $b = -0.571$) in Black, but not White participants ($p = 0.050$, $b = -0.416$).

CONCLUSION: Higher ACE scores were correlated with higher HCC and lower serum choline concentration for both Black and White women. These factors were also associated with earlier gestational age at birth. Black women reported higher ACE scores than White women and have a known higher risk of preterm birth. Addressing childhood trauma and stress, and supplementing pregnancies with choline, may contribute to a reduction in known racial disparities in preterm birth.

372 Comparison of ultrasound and magnetic resonance imaging in predicting congenital diaphragmatic hernia (CDH) outcomes

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OBJECTIVE: Optimal imaging for CDH includes observed to expected lung-to-head ratio (O/E LHR) by ultrasound (US), and percent predicted lung volume (PPLV) by magnetic resonance imaging (MRI), but data for sensitivity of one modality over the other is lacking. Our primary objective was to determine whether MRI or US derived prognostic factors are best at predicting need for extracorporeal membrane oxygenation (ECMO) at early and late gestational age. Secondary outcomes included survival to discharge, length of neonatal intensive care unit stay (NLOS), ventilator days (VD), and inhaled nitric oxide duration (iNOD).

STUDY DESIGN: This retrospective study included CDH affected fetuses managed at a single fetal care center from 2013-2022 who had 2 sets of fetal MRI and US performed between 21w0d-27w6d and 32w0d-37w6d. Prenatal, and neonatal data were obtained from the electronic medical record. Those with right sided CDH, other major anomalies, < 34 weeks gestational age at birth, multiple gestations, and genetic syndromes were excluded. The relationship between prenatal prognostic factors and neonatal outcomes was described using spearman and pearson correlations with p value of < 0.05 taken as significant. We compared the sensitivity of MRI and US derived measures using univariate logistic regression.

RESULTS: Of 141 fetuses, 52 met inclusion criteria. 48 neonates survived to discharge (92%) and 20 required ECMO (38%). Lower PPLV and O/E LHR values were significantly correlated with need for ECMO, increased NLOS, longer VD, and longer iNOD at both time points (p values < 0.05). There were no significant differences at both time points in the AUCROC for PPLV vs O/E LHR for ECMO, predicting survival, increased NLOS, and increased VD (p values >0.05).

CONCLUSION: MRI PPLV and US O/E LHR derived prognostic factors are clinically useful in predicting CDH severity. We found no advantage of one modality over the other, even when compared at two different time points in predicting need for ECMO and other neonatal outcomes.

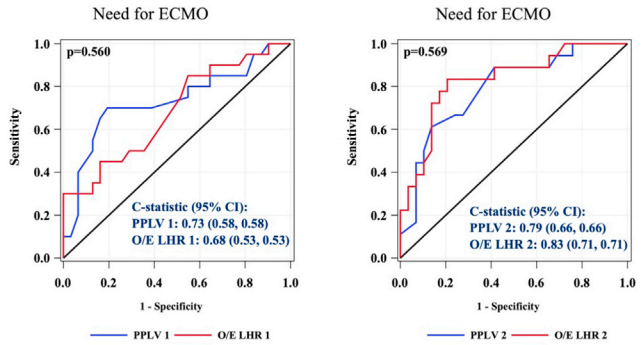

Fig 1. Comparison of MRI derived PPLV vs US derived O/E LHR at predicting the primary outcome. 1A. Second trimester imaging 1B. Third trimester imaging

373 Evaluating the Effects of the OCT on Neonatal and Maternal Outcomes in Newborns with FGR

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OBJECTIVE: To assess the efficacy of the Oxytocin Challenge Test (OCT) prior to delivery in fetuses diagnosed with Fetal Growth Restriction (FGR) and to investigate its influence on delivery outcomes. Additionally, a comparison group of Small for Gestational Age (SGA) fetuses was included for analysis.

STUDY DESIGN: A retrospective cohort study included live singleton deliveries between January 2019 and December 2020. FGR and SGA were determined based on birthweight falling below the 3rd and 10th percentile, respectively. The cohort was stratified into three distinct groups: 1) FGR with negative OCT; 2) FGR without OCT; and 3) SGA fetuses. Primary outcome measures included the rate of emergency cesarean delivery, while secondary outcomes comprised adverse neonatal outcomes, including at least one of the following: 5-minute Apgar scores below 7, umbilical cord blood pH below 7.1, neonatal ICU admission, neonatal admission lasting longer than 4 days, neonates needing intubation, or being diagnosed with intraventricular hemorrhage.

RESULTS: A total of 1451 electronic records were included in this analysis. The FGR with OCT group comprised 42 newborns, the FGR without OCT group consisted of 277 newborns, and the SGA group included 1132 newborns. Among the 33 newborns in the FGR group with negative OCT results, 15.2% (5/33) required emergency cesarean delivery, compared to 15.5% (43/277) in the FGR group without OCT (p = .956), and more than 10.9% (109/1132) in the SGA group (p = .012). The occurrence of neonatal composite adverse outcomes was comparable between the FGR-negative group with OCT (21.2%) and the FGR group without OCT (25.6%) (p = .305), while exceeding the occurrence of adverse neonatal outcomes in the SGA group, which was 8% (p < .001).

CONCLUSION: Administration of the Oxytocin Challenge Test prior to delivery in fetuses diagnosed with Fetal Growth Restriction does not reduce adverse maternal or neonatal outcomes.

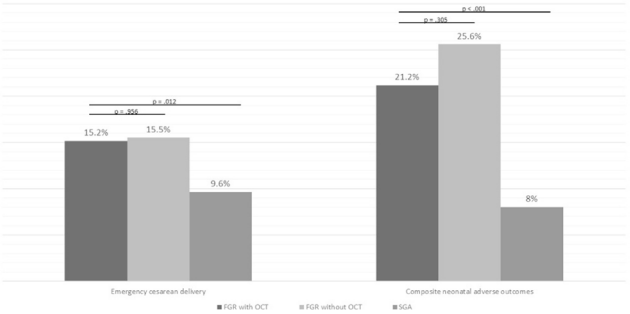

Figure 1: Comparison of Emergency Cesarean Deliveries among FGR with Negative OCT, FGR without OCT, and SGA Groups
Abbreviations: FGR – Fetal Growth Restriction; OCT – Oxytocin Challenge Test; SGA – Small for Gestational Age.

374 Elevated Middle-Cerebral-Artery Peak-Systolic-Velocity (MCA-PSV) in non-anemic fetuses: Providing a better understanding of enigmatic MCA-PSV Dopplers

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OBJECTIVE: An elevated middle cerebral artery peak systolic velocity (MCA-PSV) is a well-accepted tool for the diagnosis of fetal anemia with a progressive rise in MCA-PSV as anemia worsens . A value greater than 1.5 Multiple of Median (MoM) has a sensitivity of 100% and a false positive rate of 12% for the diagnosis of moderate to severe fetal anemia. High values of MCA-PSV may be due fetal behavioral state, fetal growth restriction, maternal diabetes, or other rare causes.

Our aim was to investigate the incidence, causes and outcome in fetuses with elevated MCA-PSV >1.5 MoM despite normal or near normal Hgb on fetal blood sampling (FBS).

STUDY DESIGN: An observational retrospective cohort study of all fetuses who underwent FBS due to MCA PSV >1.5 MoM at a tertiary fetal medicine center between 2007 and 2021. Fetuses were included if they had a no or mild anemia defined as Hgb deviation of less than 20 gr/L from a gestational age (GA) adjusted mean. Indications for Doppler assessment, causes of abnormal MCA PSV and neonatal outcomes were collected.

RESULTS: Overall, 383 fetuses had an MCA PSV >1.5 MoM and underwent subsequent FBS. Twenty-three (n=23, 6%) fetuses met inclusion criteria, and had normal Hgb or mild anemia at FBS. The reasons for Doppler assessment included abnormal fetal surveillance or genetic anomalies (n=11), maternal isoimmunization (n=5), suspected antepartum hemorrhage (n=4) and non-indicated Doppler assessment (n=3). A cause for elevated MCA PSV other than moderate to severe anemia was eventually elucidated in 12 of the 23 cases (52.2%). Favorable perinatal outcomes were observed only in truly unexplained cases with no additional anomalies (n=11, 47.8%).
CONCLUSION: Elevated MCA PSV >1.5 MoM appear in 6% of pregnancies despite normal/near normal Hgb. Pregnancies with alternative causes for this false positive measurement are at risk for poor neonatal outcomes.

375 Elevated middle cerebral artery peak systolic velocity (MCA PSV) in fetuses with unexplained anemia

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OBJECTIVE: Middle cerebral artery peak systolic velocity (MCA-PSV) Doppler measurement is a highly sensitive tool for identifying moderate to severe fetal anemia. While various factors like isoimmunization, infections, genetic conditions and less commonly, twin-twin transfusion syndrome and twin-anemia polycythemia sequence can cause fetal anemia, sometimes the cause remains unidentified before birth.

Our study aimed to determine the incidence of unexplained prenatal fetal anemia and to assess the related perinatal outcomes.
STUDY DESIGN: An observational retrospective cohort study of all fetuses who underwent Fetal Blood Sampling due to MCA PSV >1.5 MoM at a tertiary fetal medicine center between 2007 and 2021. Fetuses were included if they had a moderate or severe anemia defined as hemoglobin (Hgb) deviation of more than 20 gr/L above gestational age-adjusted mean with negative anemia workup (Parvovirus serologies, indirect coombs, maternal Hgb electrophoresis, parental molecular testing for alpha thalassemia and Kleihauer Betke test). Data collected encompassed indications for Doppler assessment, prenatal and postnatal data, neonatal outcomes, autopsy findings, placental pathology and genetic testing.
RESULTS: Overall, 383 fetuses had an MCA PSV >1.5 MoM and underwent subsequent FBS. Twelve fetuses (3.1%) had moderate to severe anemia of unknown perinatal etiology. The indications for Doppler assessment were a sonographic anomaly in all fetuses (8 with non-immune hydrops or polyhydramnios and 4 with other major structural anomalies, not typically associated with anemia). Postnatal investigations revealed rare anemia-causing factors in four cases, such as fetal Gaucher's disease, Pyruvate Kinase deficiency, KAT6A gene pathogenic variants, and Trisomy 21 with bone marrow failure. The survival was poor with 6 (50%) cases of perinatal death divided into two intrauterine death and four neonatal deaths.
CONCLUSION: Unexplained anemia in pregnancies accounts for 3.1% of cases, potentially leading to adverse neonatal outcomes. Therefore, vigilant monitoring and close surveillance are advised for such pregnancies.

376 Efficiency and Equity of Genetic Counseling Referrals: A Needs Assessment of Providers

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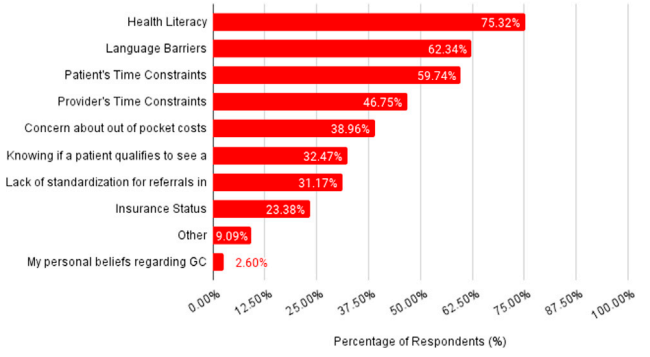
OBJECTIVE: Little is known about prenatal providers' comfort and competency in counseling about genetic risks without the assistance of genetic counselors (GCs). A recent study estimates 30% of patients with indications for GC referrals are missed by their primary provider. This survey aimed to assess prenatal provider needs related to genetic counseling with a focus on referral patterns, comfort in counseling, and barriers to care.
STUDY DESIGN: We conducted an anonymous, cross-sectional survey in Qualtrics to assess clinicians' self-reported confidence in knowledge of indications for GC referrals, designated by the American College of Medical Genetics and Genomics (ACMG). The survey was reviewed by three GC experts to provide content validity and distributed electronically to physicians, midwives, advanced practice providers in our institution from Ob/Gyn, family medicine, fertility and maternal-fetal medicine. Descriptive statistics were performed.
RESULTS: The survey response rate was 44.7% (77/170). 67.5% of respondents report that the majority of their patients utilize government insurance plans. Assessing confidence, 83% percent of participants reported they could appropriately identify patients that qualify for GC. 68.8% of respondents stated they always screen family history for birth defects and congenital cardiac defects. The majority of providers did not screen for family history of audiovisual deficits (68.4%) or consanguinity (71.2%), despite ACMG recommendations. Only one third (31.2%) agreed that they were equipped to elicit family history in patients with limited health literacy or language barriers. Respondents identified multiple barriers to counseling (Figure 1). Providers were supportive of a proposed, standardized care tool to assist in the collection of family history, to improve clinic efficiency and to identify which patients may benefit from referral.
CONCLUSION: Our results demonstrate discrepancies between providers' confidence level and recognition of indications for GC. This emphasizes the need for standardized tools, designed to improve access and minimize inequities in referrals.

Figure 1. Provider Perceived Patient Barriers to Genetic Counseling counseling (select all).



377 Examining the role of angiogenic imbalance via elevated sFlt-1/PLGF in the development of hypertension

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OBJECTIVE: The PRAECIS study demonstrated maternal serum soluble fms-like tyrosine kinase 1 to placental growth factor (sFlt-1/PlGF) ratio provides stratification of risk of developing severe

preeclampsia (PE) and other research has established a relationship between PE and risk of later life hypertension (HTN). We sought to determine if an elevated sFlt-1/PlGF ratio in the second trimester would be associated with an increased risk of either stage 1 or stage 2 HTN later in life.

STUDY DESIGN: Blood pressure (BP) measurements greater than 2 months postpartum (PP), medications, and diagnoses were abstracted on N=1,165 singleton pregnancies that were part of a prospective birth cohort study which enrolled patients from 2006-2008. Stage 2 and Stage 1 HTN were defined using the American College of Cardiology/America Heart Association (ACC/AHA) 2017 classification criteria with at least 2 elevated BP measurements, physician diagnoses, or usage of anti-hypertensive medication. sFlt-1/PlGF ratios were collected at a median of 24.6 weeks gestation. Adjusted Cox proportional hazard models were used to estimate hazard ratios (HR) and 95%CI for the time to diagnosis for Stage 2 and Stage 1 HTN within 15 years PP in association with quartiles of sFlt/PlGF in those with either PE or gestational HTN. Potential confounders in adjusted models were identified using a directed acyclic graph.

RESULTS: Of the N=890 women with complete information, N=260 (29.2%) were diagnosed with Stage 1 and N=169 (19.0%) were diagnosed with Stage 2 HTN within 15 years of delivering. There were N=275 (23.6%) participants that were either missing electronic medical record follow up or sFlt-1/PLGF concentrations. In adjusted Cox proportional hazard models we observed no significant association between the hazard of developing either Stage 2 or Stage 1 HTN and increasing concentrations of the sFlt/PlGF ratio (Table 1).

CONCLUSION: Mechanisms other than angiogenic imbalance during pregnancy may explain the association with HDP and the heightened risk of later life HTN.

TABLE 1. Risk of hypertension within 15 years after delivery in association with quartiles of sFlt/PlGF at ~24 weeks gestation

	Unadjusted HR (95%CI)	Adjusted HR[a] (95%CI)
Stage 2 chronic hypertension		
sFlt/PlGF Quartile 1	Ref	
sFlt /PlGF Quartile 2	0.79 (0.51, 1.22)	0.77 (0.49, 1.22)
sFlt /PlGF Quartile 3	1.20 (0.79, 1.84)	1.19 (0.77, 1.83)
sFlt /PlGF Quartile 4	0.85 (0.54, 1.34)	0.79 (0.49, 1.27)
Stage 1 chronic hypertension		
sFlt /PlGF Quartile 1	Ref	
sFlt /PlGF Quartile 2	0.89 (0.63, 1.24)	0.81 (0.58, 1.14)
sFlt /PlGF Quartile 3	1.03 (0.74, 1.45)	0.96 (0.69, 1.35)
sFlt /PlGF Quartile 4	0.78 (0.55, 1.09)	0.75 (0.53, 1.05)

[a] Adjusted for maternal age at delivery, pre-pregnancy BMI, race, smoking, renal disease, and diabetes. sFlt-1=soluble fms-like tyrosine kinase; PlGF= placental growth factor.

378 Development of hypertension within 15 years postpartum by phenotype of preeclampsia

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OBJECTIVE: Despite the known association between hypertensive diseases of pregnancy (HDP) and later life hypertension (HTN),less is known about how this risk is modified among those with a history of differing phenotypes of preeclampsia (PE), early onset PE diagnosed prior to 34 weeks gestational age (GA) and late-onset PE diagnosed after 34 weeks GA.

STUDY DESIGN: Postpartum blood pressure (BP) measurements greater than 2 months after delivery, medications, and diagnoses were abstracted on N=1,165 singleton pregnancies that were part of a prospective birth cohort study at a single institution from 2006-2008. Stage 2 and Stage 1 HTN were defined using the American College of Cardiology (ACC)/American Heart Association (AHA) 2017 classification criteria with at least 2 BP measurements, physician diagnoses, or usage of anti-hypertensive medication. Adjusted Cox proportional hazard models were used to estimate hazard ratios (HR) and 95%CI for the time to diagnosis for Stage1 and Stage 2 HTN within 15 years postpartum, in association with a diagnosis of PE or gestational hypertension (gHTN). Potential confounders in adjusted models were identified. Subsequent pregnancy BPs and subjects with chronic HTN were excluded.

RESULTS: Of the N=1,011 participants, N=311 (30.8%) were diagnosed with Stage 1 and N=205 (20.3%) with Stage 2 HTN within 15 years of delivering. During these pregnancies N=86 (8.5%) and N=53 (5.2%) were diagnosed with PE and gHTN, respectively. There were N=154 (13.2%) participants that were missing electronic medical record follow up. In adjusted Cox proportional hazard models, participants who had PE or gHTN had a 1.76 (95%CI: 1.16, 2.68) and 3.53 (95%CI: 2.12, 5.87) times higher hazard of developing Stage 2 HTN within 15 years post delivery (Table 1). This risk was diminished for developing Stage 1 HTN. When stratifying the hazard of developing Stage 2 HTN by phenotype of PE , late onset PE was significantly associated with an increasing hazard while there was no association with early onset PE.

CONCLUSION: The risk of later life HTN differentiates based on PE phenotype as well as HTN classification.

TABLE 1. Risk of hypertension within 15 years after delivery for participants who had hypertensive disease of pregnancy

	Unadjusted HR (95%CI)	Adjusted HR[a] (95%CI)
Stage 2 chronic hypertension		
All PE	2.36 (1.61, 3.45)	1.76 (1.16, 2.68)
Early onset PE	0.96 (0.39, 2.33)	0.69 (0.28, 1.73)
Late onset PE	2.85 (1.89, 4.30)	2.03 (1.30, 3.19)
gHTN	4.03 (2.45, 6.63)	3.53 (2.12, 5.87)
Stage 1 chronic hypertension		
All PE	0.80 (0.47, 1.34)	0.72 (0.43, 1.22)
Early onset PE	0.26 (0.06, 1.03)	0.22 (0.06, 0.90)
Late onset PE	1.12 (0.64, 1.95)	1.02 (0.59, 1.79)
gHTN	1.95 (1.22, 3.11)	1.99 (1.24, 3.18)

[a] Adjusted for maternal age at delivery, pre-pregnancy BMI, race, smoking, renal disease, and diabetes. PE=preeclampsia, gHTN= gestational hypertension.

379 Differences in Cardiovascular Disease Symptoms per Trimester Among Risk Screen Positive Pregnant Patients

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OBJECTIVE: Cardiovascular disease (CVD) continues to be a leading cause of maternal morbidity and mortality in the United States. The optimal time for CVD risk screening during pregnancy remains

uncertain due to symptom and vital sign variability at different gestational ages. This study sought to investigate the symptomatology of CVD in pregnant women who screened positive for CVD risk, with a focus on whether symptom presentation varied across trimesters. Furthermore, we explored the timing of screening on the likelihood of identifying true positive CVD cases.

STUDY DESIGN: This prospective cohort study included obstetrical patients who screened positive for CVD risk over a year starting June 15, 2022, at an inner-city academic medical center. Universal CVD risk screening was performed during prenatal and postpartum visits using the California Maternal Quality Care Collaborative toolkit. All positive cases underwent ECHO, EKG, and cardio-obstetric team assessment.

RESULTS: Significant differences were observed in the presentation of CVD symptoms among the study cohorts. Shortness of breath was more prevalent in the 2nd trimester, while hypertension was more common in the 1st trimester and postpartum period. Interestingly, no significant differences were found in the number of true positive cases identified across the trimesters.

CONCLUSION: Our findings highlight the potential influence of pregnancy progression on the manifestation of CVD symptoms, suggesting that the timing of screening could potentially impact disease detection. However, the consistent number of true positive cases identified across all trimesters supports the argument that screening should be conducted regardless of gestational age. This finding underscores the importance of universal screening throughout pregnancy and postpartum. Additionally, the significant increase in hypertension during the 1st trimester among this perinatal cohort of CVD risk positive patients suggests that underlying pre-existing conditions contribute to CVD, necessitating early management and treatment.

	Total		1st Tri		2nd Tri		3rd Tri		Postpartum		p-value
	N	%	N	%	N	%	N	%	N	%	
SOB											**0.021**
Positive	77	58.8%	9	40.9%	33	70.2%	35	59.3%	0	0.0%	
Negative	54	41.2%	13	59.1%	14	29.8%	24	40.7%	3	100%	
Rapid HR											0.227
Positive	59	45.0%	11	50.0%	18	38.3%	30	50.8%	0	0.0%	
Negative	72	55.0%	11	50.0%	29	61.7%	29	49.2%	3	100%	
Palpitations											0.752
Positive	71	54.2%	13	59.1%	27	57.4%	30	100%	1	33.3%	
Negative	60	45.8%	9	40.9%	20	42.6%	29	49.2%	2	66.7%	
HR >110											0.413
Positive	32	25.0%	5	23.8%	9	19.6%	18	31.0%	0	0.0%	
Negative	96	75.0%	16	76.2%	37	80.4%	40	69.0%	3	100%	
BP 140/90											**0.026**
Positive	20	15.6%	5	23.8%	8	17.4%	5	8.6%	2	66.7%	
Negative	108	84.4%	16	76.2%	38	82.6%	53	91.4%	1	33.3%	
CVD Identified											0.570
Yes	45	34.6%	6	27.3%	17	37.0%	20	33.9%	2	66.7%	
No	85	65.4%	16	72.7%	29	63.0%	39	66.1%	1	33.3%	

*P-value from Chi-Square test for association

380 Cost-effectiveness of a reverse screening algorithm for syphilis in pregnancy

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OBJECTIVE: Syphilis rates in the U.S. continue to rise from historic lows in 2000. In pregnancy, it is crucial to screen and diagnose infection to prevent vertical transmission. Traditionally, screening is done with a non-treponemal test such as the rapid plasma reagin (RPR) followed by confirmatory testing using a treponemal immunoassay. The greater sensitivity of the immunoassays compared to non-treponemal tests has led to the emergence of a reverse screening algorithm (immunoassay followed by RPR), however they have lower specificity. Nationally, there is heterogeneity in the algorithm used. In this study, we evaluated the cost-effectiveness of syphilis screening in pregnancy using a traditional versus reverse screening algorithm.

STUDY DESIGN: We constructed a decision-analytic model to compare outcomes between traditional and reverse screening. Our theoretical cohort included 3,408,000 individuals, the estimated annual live births among individuals without history of prior syphilis infection. Outcomes were stillbirth, preterm birth, infant death, congenital syphilis, undiagnosed syphilis cases, costs, and quality adjusted life years (QALYs). We used a willingness-to-pay for the incremental cost-effectiveness ratio of $100,000/QALY. Model inputs were derived from the literature and assessed with sensitivity analyses.

RESULTS: In our cohort, the reverse screening approach was associated with 368 fewer cases of undiagnosed maternal syphilis infections, 50 fewer stillbirths, 17 fewer preterm births, 59 fewer infant deaths, and 67 fewer cases of congenital syphilis. Despite higher costs, reverse screening was cost-effective with an ICER of $8,328/QALY. In univariate sensitivity analysis, reverse screening was cost-saving when the immunoassay cost was below $5.48.

CONCLUSION: In our study, the reverse screening approach was a cost-effective strategy to improve diagnosis of syphilis in pregnancy and reduce adverse outcomes associated with vertical transfer. Adopting reverse screening protocols for pregnant individuals could be advantageous for health systems.

Table 1. Outcomes in a theoretical cohort of 3,408,000 pregnant individuals without a history of prior syphilis infection.

	Reverse screening algorithm	Traditional screening algorithm	Difference (Reverse - Traditional)
Stillbirth	18,983	19,033	-50
Preterm birth	296,957	296,974	-17
Infant death	2,903	2,962	-59
Congenital syphilis	266	333	-67
Undiagnosed syphilis	62	430	-368
Cost (USD)	$25,221,924,047.00	$25,200,022,425.00	$21,901,622.00
Effectiveness (QALYs)	193,215,642	193,213,013	2,630
Incremental Cost Effectiveness Ratio (ICER)	$8,328.00 / QALY		

381 Comprehensive Detailed Anatomic Ultrasound: Allotted Time of 30- vs 45-Minutes

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OBJECTIVE: The purpose was to ascertain how often Registered Diagnostic Medical Sonographers (RDMS) complete a comprehensive detailed anatomy ultrasound (Current Procedural Terminology [CPT] code 76811) when allotted 30 vs 45 minutes to perform it.

STUDY DESIGN: We conducted a retrospective cohort study within our MFM Ultrasound Clinics. Cohorts were singletons who had a CPT 76811 performed by a RDMS at 18-24 weeks. We excluded

pregnancies with major congenital anomalies and multiples. The CPT 76811 ultrasound study was considered to be complete when all items suggested by the AIUM Detailed Second Trimester OB Checklist were visualized. Based on a baseline rate of 45% of comprehensive detailed anatomy ultrasounds that were completed in our clinics in 30 minutes, to detect a relative increase of 30% (45% to 58%; alpha error=5%; 80% power), 430 women (215 in each group) were required to demonstrate a clinically significant improvement in our primary outcome. Thus, the two cohort groups were: 215 consecutive CPT 76811 performed in July 2022, when RDMS were allocated 30 minutes, and 215 consecutive CPT 76811 performed in January 2023, when RDMS were given 45 minutes.

RESULTS: Of the 215 anatomy ultrasounds performed in each group, 117 (54%) were completed when RDMS were allocated 30 minutes compared to 173 (80%) when they were given 45 minutes ($p < 0.001$). Additionally, the number of times the patient had to return to complete the anatomy ultrasound was significantly more when RDMS were given 30 minutes compared to when they were allocated 45 minutes (p=0.005). There was no statistical difference in maternal age, race, BMI, number of prior cesarean delivery, or co-morbidities between the two groups. There was a difference in gestational age and nulliparity between the two groups. (Table 1).

CONCLUSION: RDMS were significantly more likely to complete a comprehensive detailed anatomy ultrasound using the AIUM checklist when allocated 45 minutes vs 30 minutes to perform it. Our findings provide guidance to clinicians and their practices in terms of logistics in schedule planning, billing, and allotment of resources.

Table 1. Baseline and Ultrasound Characteristics

	Anatomy Ultrasounds Performed in 30 minutes (N=215)	Anatomy Ultrasounds Performed in 45 minutes (N=215)	P Value
Maternal Age (years)			0.8287
<20	6 (2.9)	6 (2.9)	
20-34	170 (79)	165 (76.7)	
≥35	39 (18.1)	44 (20.4)	
Race/Ethnicity			0.8591
Black	41 (19.1)	39 (18.1)	
White	69 (32.1)	64 (29.8)	
Hispanic	85 (39.5)	85 (39.5)	
Other	16 (7.4)	21 (9.8)	
Unknown	4(1.9)	6 (2.8)	
Nulliparity	132 (61.3)	90 (41.9)	**<0.001**
Gestational age at performance of detailed ultrasound (weeks)	20.6 ± 1.49	21.0 ± 1.58	**0.013**
BMI			0.127
BMI <30kg/m²	103 (47.9)	120 (55.8)	
BMI ≥ 30-39 kg/m²	79 (36.7)	74 (34.4)	
BMI ≥ 40 kg/m²	33 (15.3)	21 (9.8)	
Comorbidities			0.2479
Chronic Hypertension	11 (5.1)	16 (7.4)	
Pregestational/Gestational Diabetes	11 (5.1)	20 (9.3)	
Prior Cesarean Delivery	40 (18.6)	39 (18.1)	
Completed anatomy scans	117 (54.4)	173 (80.5)	**<0.001**
Number of times patient had to return to complete anatomy ultrasound			**0.005**
0	151 (70.2)	184 (85.6)	
1	50 (23.2)	26 (12.1)	
≥2	14 (6.5)	5 (2.3)	

Data are presented as mean ± standard deviation or n (%)

BMI, body mass index (kg/m²);

Values that are statistically significant are bolded

382 Effect of Single vs. Double Blind Peer Review: Interrupted Time Series Analysis

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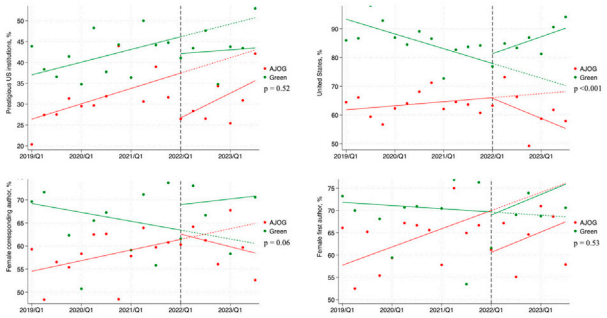
OBJECTIVE: To evaluate the impact of peer-review type (single-blind vs double-blind) on the institutional, country of origin, and female author representation in two major OBGYN journals.

STUDY DESIGN: This was a bibliometric analysis of comparing publication in Obstetrics & Gynecology (Green Journal) which implemented double-blind peer review in July 2021with the American Journal of Obstetrics and Gynecology (AJOG) which did not change from single-blind peer review. In double-blind peer review, information on authors such as name and institution was blinded. However, the country was not blinded. We retrieved all articles published from 2019 to 2023. Our primary outcome was the proportion of published articles from US institutions' in the top 50 funded OBGYN departments based on the NIH RePORTER database each year (2018-2022). Our secondary outcomes were the country of origin, female first, and last authors. The sex of the authors was determined by a Google-based webtool. Considering the review to publication period would be 3 to 4 months, we assumed that Green Journal publications in 2022 and 2023 (post-intervention) would have had double-blind peer reviews. We conducted a multiple group interrupted time series analysis using ordinary least squares regression, with AJOG being the referent journal.

RESULTS: During the analysis period, 450 of 1273 (35.4%) in AJOG and 298 of 950 (31.4%) in the Green Journal were published in the post-intervention period. Compared with AJOG, the Green Journal proportion of publications by top US research institutions, female corresponding author, and female first author did not significantly change after the intervention (p=0.52, 0.06, and 0.53 respectively), but the proportion of articles from the United States increased significantly after the intervention ($P < 0.001$).

CONCLUSION: Double-blinded review did not impact the characteristics that were blinded but did decrease the proportion of published manuscript originating outside the US. Green Journal should consider blinding the country.

Figure 1. Percentages of outcomes per quarter



383 Candidacy for Regional Anesthesia Stratified by Anticoagulation Type

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OBJECTIVE: In women on anticoagulation in pregnancy, low molecular weight heparin (LMWH) is often preferred due to lower dosing frequency when compared to unfractionated heparin (UFH).

However, its longer half-life can theoretically increase risk of hemorrhage and inability to receive regional anesthesia. For these reasons, guidelines suggest transition from LMWH to UFH at 36 weeks' gestation. However, many patients will have a scheduled delivery or present with enough time to receive regional anesthesia. The objective of this study is to describe rates of receipt of regional anesthesia by type of anticoagulation at time of delivery.

STUDY DESIGN: This was a retrospective cohort study of all patients on anticoagulation in pregnancy delivering at a single institution between 2013-2023. Women were categorized by anticoagulation type (UFH or LMWH). The primary outcome was receipt or non-receipt of regional anesthesia. Secondary outcomes included rates of postpartum hemorrhage (PPH) and transfusion. Univariate analysis was performed using the chi-square and Wilcoxon rank sum test where appropriate.

RESULTS: 346 patients were included in the analysis with 238 (68.8%) on UFH and 108 (31.2%) on LMWH at time of delivery. There were baseline differences between groups including higher rates of Black race (55.6% vs 41.1%; p=.022) and therapeutic dosing (32.4% vs 14.7%; p< .001) among patients taking LMWH. There were no differences in rates of regional anesthesia (84.3% vs 89.1%; p=.208). There were increased rates of non-candidacy for regional anesthesia (5.6% vs 1.3%; p=.020) in the LMWH group. However, when restricting to deliveries > 36 weeks, there was no difference seen between groups (p=.417; Table 1). There were no differences in rates of PPH (p=.581) and transfusion due to blood loss (p=.097)

CONCLUSION: There was no difference in rate of receipt of regional anesthesia, but non-candidacy was higher among patients taking LMWH versus UFH at delivery. However, this finding was not significant when restricting to those delivering after 36 weeks.

Table 1 – Study outcomes

	Heparin (n=238)	Enoxaparin (n=108)	p-value
Admission to delivery, hours	8.28 (0.0-17.8)	8.38 (0.0-19.2)	.886
Delivery <24 hours	136 (60.2)	64 (60.4)	.972
Delivery <12 hours	85 (37.6)	36 (34.0)	.520
Admission to anesthesia, hours	10.5 (4.2-35.2)	12.0 (5.6-32.5)	.699
Type anesthesia			.159
None	18 (7.8)	7 (6.5)	
Regional	206 (86.6)	87 (80.6)	
Regional to general	6 (2.5)	4 (3.7)	
General	6 (2.5)	9 (8.3)	
PCA	2 (0.8)	1 (0.9)	
Not candidate for regional anesthesia	3 (1.3)	6 (5.6)	.020
Not candidate for regional anesthesia > 36 weeks	2 (0.8)	2 (1.9)	.417
Postpartum hemorrhage	40 (17.3)	21 (19.8)	.581
Transfusion	8 (3.4)	8 (7.4)	.097

384 Digital Intervention and Hybrid Care Improves Adherence to Gestational Diabetes Surveillance - Prospective Pilot Study

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OBJECTIVE: Assessing adherence to glycemic control surveillance among women with gestational diabetes (GDM) using a digital intervention.

STUDY DESIGN: We assessed the adherence to the use of a digital intervention as part of a four-week prospective clinical study investigating hybrid remote and in-clinic visits for 19 women with GDM starting at 32-34 weeks of gestation. Virtual visits consisted of comprehensive maternal care as well as remote fetal monitoring and ultrasound assessment of amniotic fluid deepest vertical pocket. A digital intervention was used to enhance the engagement of patients with daily documentation of glucose levels (Datos Ltd. platform), from study recruitment date until birth. Our primary metric for adherence was the percent of fasting glucose measurements documented. In addition, obstetric and neonatal outcomes of the study participants were compared with a control group of 452 GDM patients followed in the same MFM clinic during the preceding year.

RESULTS: Adherence to recording fasting glucose values was 92.23% during the four-week hybrid in-clinic and remote care study and declined to 61.81% following the study period until birth (P=0.001). None of the participants required induction of labor due to glycemic imbalance. In addition, we compared the clinical outcomes of the study participants with the above-mentioned control group. In the study group there were 0/19 (0%) cases of macrosomia, high-grade perineal tears, shoulder dystocia, neonatal hypoglycemia, or respiratory distress syndrome. In comparison, in the control group, there were 47 cases of hypoglycemia and 18 cases of macrosomia. Overall, a total of 65/452 in the control group experienced complications (14.2%; P=0.059).

CONCLUSION: Digital Intervention improves adherence to glucose levels documentation. Engagement is highest when paired with hybrid care consisting of alternating in-clinic and remote visits. Additional larger studies are required to assess the potential contribution of this intervention to reduce GDM related complications.

Table 1. Adherence to Glucose Levels Documentation.

	Fasting Glucose Documentation			All-day Glucose Documentation		
	Study period	End of study to delivery	*P*	Study period	End of study to delivery	*P*
A1GDM (9)	88.21	66.04	0.050	74.99	59.41	0.028
A2GDM (10)**	95.84	58.00	0.018	84.62	44.38	0.005
Total Average	92.23	61.81	0.001	80.06	51.50	<0.001

Data presented as percentage.

A1/A2GDM: Gestational Diabetes type A1/A2

385 Does fetoscopic laser ablation (FLA) improve perinatal outcomes in Types II and III Vasa Previa?

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OBJECTIVE: The standard management of vasa previa (VP) includes inpatient admission at 28-32 weeks gestation, followed by cesarean delivery at 34-37 weeks gestation. The objective of our study was to

compare maternal and neonatal outcomes in patients with Type II and Type III VP undergoing fetoscopic laser ablation (FLA) with those receiving standard of care.

STUDY DESIGN: This was a retrospective study of all antenatally diagnosed cases of VP identified by ultrasound between September 2016 and July 2023 at a single quaternary referral center. Data pertaining to maternal and neonatal characteristics were extracted from ultrasound antenatal scans and maternal and neonatal hospitalization records. Type I VP data were also collected, and descriptive statistics are presented. Comparative analysis was performed between standard care and FLA groups with VP type II/III, with p-value < 0.05 considered significant. Survival was analyzed via Cox Regression model.

RESULTS: A total of 144 pregnancies were identified as suspected VP upon initial ultrasound. Subsequent ultrasound confirmed 89 (61.8%) of these diagnoses of VP. There were 52 (58%) Type I, 29 (33%) Type II, and 8 (9%) Type III VP. Among patients with Type II/III VP, 11/37(30%) underwent FLA. Overall, there were no differences in baseline demographics between groups. The differences between standard and laser therapy in patients with VP type II/III are described in Table 1. Preterm premature rupture of membranes (PPROM) was significantly higher in the FLA group. However, vaginal delivery was also significantly higher in the FLA group (1/3rd of cases), and FLA patients' maternal antenatal hospital stay was 11 days shorter. Risk of earlier delivery was 44% lower in FLA than standard care (HR 0.56), prolonging pregnancies by 9 days. However, these differences were not statistically significant (p=0.06).

CONCLUSION: FLA for VP types II and III reduces maternal hospital stay and makes vaginal delivery possible. Other neonatal benefits need further study in larger prospective studies.

Table 1. Comparison of maternal and neonatal by vasa previa type and direct comparison of standard of care to laser ablation in Type II and III vasa previa.

	Vasa Previa Type I (n=52)	Vasa PreviaType II/III		
		Standard Care (n=26)	Fetoscopic Laser (n=11)	p-value
PPROM	1	**0 (0%)**	**6 (54%)**	**0.001**
Vaginal delivery	0 (0%)	0 (0%)	**4 (36.4%)**	**0.005**
Maternal antenatal LOS	13.9 ± 10.3	**15.7 ± 11.5**	**4.64 ± 9.2**	**<0.01**
GA at delivery	33.9 ± 1.97	33.9 ± 1.98	35.2 ± 1.68	0.06
Birthweight (g)	2204 ± 491	2276 ± 491	2560 ± 497	0.1
Neonatal blood transfusion	4 (7.7%)	5 (19.2%)	0 (0%)	0.3
NICU LOS (days) Neonatal transfusion	14.2 ± 14.4	21 ± 27	12 ±15	0.3

PPROM, preterm premature rupture of membranes; LOS, length of stay; GA, gestational age; NICU, neonatal intensive care unit.

386 Breastfeeding rates among Black participants in a remote hypertension monitoring/community-based doula partnership study

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OBJECTIVE: Black patients both nationwide and within our state are known to have higher rates of hypertensive disorder of pregnancy (HDP) and worse pregnancy outcomes compared to White patients. Breastfeeding has been shown to decrease long-term cardiovascular risks in patients with preeclampsia; however, pre-study and pre-COVID local data suggests lower rates of breastfeeding initiation and exclusivity at hospital discharge among the Black patients compared to White (81 vs 93%) and (70 vs 88%). The objective of this project was to adapt our preexisting remote monitoring based postpartum hypertension program to include community-based doula support with lactation counseling to increase breastfeeding rates in a Black urban community in Wisconsin.

STUDY DESIGN: This was a prospective feasibility study at a single academic center from 1/2021-12/2022. Postpartum patients were eligible if they had a diagnosis of HDP, self-identified as Black and were enrolled in remote blood pressure monitoring. Community doulas were paired with patients to offer postpartum care, lactation, social and mental support for 6 weeks postpartum.

RESULTS: Forty-nine self-identified Black postpartum patients with a HDP were enrolled. Unexpectedly, this study was conducted during the COVID epidemic and at time of discharge, 80% of patients were breastfeeding in some capacity with only 39% exclusively breastfeeding. At the conclusion of the 6 week postpartum intervention, exclusive breastfeeding rates increased to 63%, with 79% of patients continuing to breastfeed at some level. Everyone who initiated breastfeeding was still breastfeeding at 6-weeks postpartum. Furthermore, no patients were utilizing donor milk at discharge, but two patients were transitioned to donor milk from formula during the 6 week postpartum period.

CONCLUSION: These data suggest that community doula support can not only support breastfeeding efforts established in the hospital, but actually increase exclusive breastfeeding rates after hospital discharge among a patient population with historically low rates of breastfeeding.

Table 1. Breastfeeding rates at discharge and 6 weeks postpartum

Feeding method	Discharge, n (%)	6 weeks postpartum, n (%)
Breastfeeding	20 (39)	32 (63)
Breast and formula feeding	21 (41)	8 (16)
Formula feeding	7 (14)	7 (13)
Unknown	3 (6)	3 (6)
Donor milk	0 (0)	2 (4)

387 Duration of Third Stage of Labor and Maternal Hemorrhagic Adverse Outcomes

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OBJECTIVE: ACOG Practice Bulletin on postpartum hemorrhage (#183) notes, that the third stage of labor (TSL) is associated with morbidity, although this threshold is not well established. Our objective was to identify the association between the duration of the TSL and composite maternal hemorrhagic adverse outcomes (CMHAO).

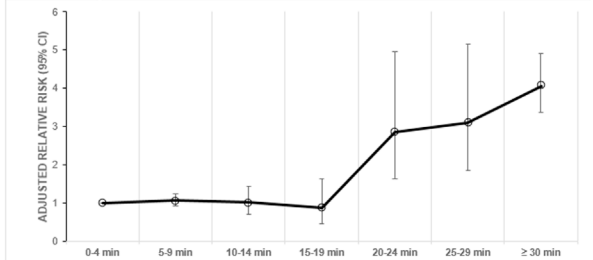
STUDY DESIGN: A retrospective cohort study of all singleton vaginal deliveries (VD) between March 2020 and Feb 2022 at a single Level IV center. Individuals with an unrecorded length of the TSL were excluded. We divided the cohort into 5-minute intervals after delivery of the newborn. Each 5-minute interval group was compared to all cases with a shorter TSL. Using Poisson regression, we evaluated whether TSL was associated with CMHAO, which consisted of blood loss $\geq$ 1000 mL, use of uterotonics, mechanical tamponade, surgical techniques for atony, transfusion, venous

thromboembolism, intensive care unit admission, hysterectomy, or death. We did a sensitivity analysis of TSL among term (≥ 37 wks) and preterm VD.

RESULTS: Of the 4,599 consecutive VD in the study period 4,513 (98%) met inclusion criteria, and of those, 777 (17%) had CMHAO. After 20 min, each addition of 5 min to TSL was associated with a significant increase in the CMHAO rate. Compared to TSL < 20 min, individuals with an interval of 20-24 min had higher rates of CMHAO (aRR 2.85, 95% CI 1.64-4.94). Likewise, CMHAO differed significantly when comparing 24-29 min and < 24, and ≥ vs. < 30 min (Fig). A sensitivity analysis of term VD noted a similar pattern: compared to less than 20 minutes, the 20-24 min interval was associated with a higher rate of CMHAO (aRR 2.63, 95% CI 1.31-5.30), as were the longer intervals. Due to infrequent outcomes, we were unable to perform a separate sensitivity analysis for preterm births.

CONCLUSION: Among singleton vaginal deliveries, third stage duration of ≥ 20 min, compared to < 20 min, was associated with significantly higher likelihood of hemorrhagic adverse outcomes. If confirmed in other population, guidelines on the duration of third stage of labor and associated morbidity may need revision.

Figure 1 – Third stage duration in 5-minute intervals and composite maternal hemorrhagic outcome.



	0-4 min	5-9 min	10-14 min	15-19 min	20-24 min	25-29 min	≥ 30 min
CMHAO [a]	15.9 (469/2,944)	17.3 (218/1,260)	16.5 (27/164)	14.3 (8/56)	50.0 (7/14)	50.0 (7/14)	68.9 (42/61)
Unadjusted RR (95% CI) [b]	--	1.09 (0.94-1.26)	1.01 (0.71-1.43)	0.87 (0.46-1.67)	**3.06 (1.81-5.19)**	**3.04 (1.80-5.16)**	**4.16 (3.47-4.99)**
Adjusted RR (95% CI) [c]	--	1.06 (0.92-1.23)	1.01 (0.71-1.43)	0.86 (0.45-1.62)	**2.85 (1.64-4.94)**	**3.09 (1.86-5.13)**	**4.06 (3.36-4.89)**

Data presented as % (n/N)

[a] CMHAO, composite maternal hemorrhagic adverse outcomes (which consisted of any of the following: blood loss ≥ 1000 mL, use of uterotonics (excluding prophylactic oxytocin), mechanical tamponade, surgical techniques for atony, transfusion, venous thromboembolism, intensive care unit admission, hysterectomy, or death; RR, relative risk; CI, confidence interval

[b] Each interval group was compared to all cases with a shorter third stage duration than that group (e.g. 20-24 min interval was compared to 0-19 min)

[c] Adjusted for maternal age ≥ 35 years, parity, induction of labor, and prolonged oxytocin use during labor (> 18 hours)

Bolded if significantly different

388 Eye towards Artificial Intelligence: Retinal Vascular Tortuosity vs. Vasoconstriction to Differentiate Preeclamptic and Normotensive Subjects

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OBJECTIVE: Previous publications have suggested a decrease in retinal vascular caliber in preeclampsia (PE) compared with controls. We sought to determine the better measure (retinal vessel caliber or tortuosity) to differentiate between severe PE (sPE) and normotensive controls in the immediate post partum period (≤72 hours).

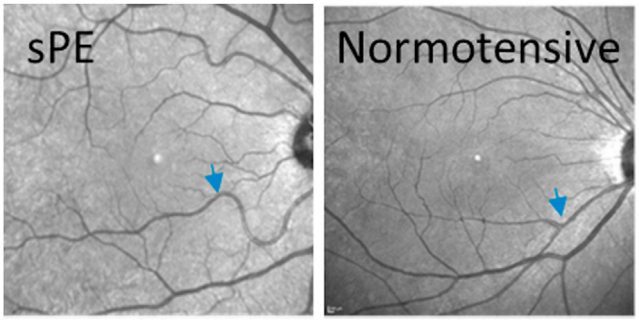
STUDY DESIGN: This cross-sectional study assessed 1) retinal vessel caliber and 2) retinal vascular tortuosity, in the artery and vein, in the superior and inferior temporal vascular arcades respectively. Controls were matched to cases by age, parity and race/ethnicity.

All measurements were made masked to diagnosis, using infrared (IR) images, on the Spectralis camera (Heidelberg Engineering, Germany). Vessel caliber (μm) was measured with the caliper function. Assessments of tortuosity were made using a standardized grading scale that spans from 1 (normal curvature) to 5 (most tortuosity) and were made by a retina specialist (HRC).

RESULTS: Mean (standard deviation) of gestational age at the time of delivery was 33 (4) weeks in 31 sPE cases and 38 (2) weeks in 35 controls. Retinal arteries measured 96.9 (13.8)μm in PE and 98.9 (14.3)μm in controls (P=0.42). Retinal veins measured 123.7 (16.8) μm in PE and 126.0 (16.1)μm in controls (P=0.62). Artery-to-vein (A:V) ratios did not differ between PE and controls.

The median (range) tortuosity level in the*infero-temporal*retinal artery was 2 (1-3.5) among sPE cases compared to 1 (1-4) in controls (P=0.04). None of the other vessels differed between cases and controls.

CONCLUSION: There was no difference in retinal vessel caliber, or A:V ratios, between subjects with sPE and normotensive controls in the immediate post-partum period. Patients with sPE had more tortuous*infero-temporal retinal arteries*than normotensive patients (Figure). This may reflect the effect of PE in arteries, compounded by gravitational changes, although the lack of effect in the*supero-temporal artery*may suggest a small sample size. Thissupportsthe use of retinal vascular tortuosity as a potential imaging marker of PE.



389 Congenital uterine anomalies and placenta accreta spectrum

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OBJECTIVE: Case reports and small studies suggests that congenital uterine anomalies (CUA) are associated with an increased risk of placenta accreta spectrum (PAS). We aimed to evaluate the association between PAS and CUA in a large, population-based study.

STUDY DESIGN: We performed a retrospective cohort study using the U.S National Inpatient Sample from 2017-2020. ICD-10 codes of delivery admissions greater than 20 weeks' gestation were used to determine patient exposures and outcomes. A logistic regression model was constructed to adjust for potentially confounding variables including history of a caesarean delivery, age, and placenta previa. A sensitivity analysis was performed including only patients with a code for PAS who also underwent hysterectomy. Data were weighted according to NIS reported sampling weights

RESULTS: The study cohort included 14,165,045 (2,833,010 unweighted) individuals. Congenital uterine anomalies were present in 60,335 (0.43%) individuals. PAS was more frequent in patients with CUAs compared to those without (0.42% vs 0.12%) with an odds ratio of 3.43 (95% confidence interval 2.60-4.54; p< 0.001). When controlling for age, prior caesarean, and placenta previa, the odds of having PAS is higher in those with a CUA (aOR 2.50; 95% CI 1.86-3.37; p< 0.001). In the sensitivity analysis including only individuals with PAS who underwent a hysterectomy, CUAs continued to be associated with PAS (aOR 2.11; 95% CI 1.33-3.34; p=0.001).

CONCLUSION: In this large population-based cohort, congenital uterine anomalies were associated with an increased risk of placenta accreta spectrum. Placental implantation is a complex process, which may be modified by CUAs.

Table 1:

	Congenital Uterine Anomaly	
	Yes n=60,334 (unweighted n= 12,067)	No n=14,104,709 (unweighted n=2,820,943)
Age	29.48 (29.37 – 29.60)	29.03 (28.98 – 29.07)
Gestational age at delivery	37.2 wks	38.3 wks
Race		
White	38,959 (64.6%)	7,110,311 (50.4%)
Black	3420 (5.7%)	2,053,475 (14.6%)
Hispanic	9725 (16.1%)	2,857,984 (20.3%)
Asian	3234 (5.3%)	846,414 (6.0%)
Native American	355 (0.6%)	99,799 (0.7%)
Other	2405 (4.0%)	623,434 (4.4%)
Placenta Accreta Spectrum	255 (0.4%)	17,414 (0.1%)
Prior C/S	20,429 (33.9%)	2,507,624 (17.8%)
Placenta previa	425 (0.7%)	58,664 (0.4%)
Outcomes	**OR**	**95% CI**
Unadjusted regression model	3.43	2.59-4.54
Adjusted regression model (age, prior caesarean, previa)	2.50	1.85-3.36

Data are presented as weighted n (%) or mean (S.E.) as appropriate.
*Race/ethnicity reported here to demonstrate the demographic representation of the cohort.

390 Does pregnancy impact bladder function in people with spinal cord injury?

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OBJECTIVE: This study aims to assess if people who had a pregnancy over 20 weeks'gestation after spinal cord injury (SCI) have worse bladder function than those with SCI who have never been pregnant using a validated survey.

STUDY DESIGN: An international online survey containing the Neurogenic Bladder Symptom Score (NBSS), (a validated bladder survey) and detailed demographic and pregnancy information was distributed. Participants were at least 18 years old and assigned female at birth. Those who had only ever had a pregnancy >20 weeks following SCI were compared to those who had never had a pregnancy >20 weeks. Mean and standard deviations (SD) were used to describe overall and bladder component scores; multivariate analyses assessed differences in NBSS between groups, controlling for relevant confounders including SCI level and severity, mobility device, bladder management methods, BMI, and age.

RESULTS: The recruitment rate was 85.4% (1056/1237) and the completion rate was 73.8% (780/1056). 288 people had never had a pregnancy >20 weeks, and 152 had only ever had a pregnancy >20 weeks after SCI. There was no difference in overall NBSS score between the groups (p=0.82), which held in multivariate analysis (p=0.69). When assessing specific components of the score, a significant difference between groups in storage and voiding was observed (P=0.003), however this is unlikely a clinicaldifference (non-pregnancy score 7.32 SD 4.45 vs pregnancy 8.27 SD 4.34).

CONCLUSION: This multivariate analysis demonstrates that people with SCI who had pregnancies have similar bladder function as those with SCI who have not had a pregnancy while considering clinically important confounders. The most important aspect of quality of life during SCI recovery is bladder function, and therefore it needs to be considered when contemplating pregnancy. This study describes key clinical information that will assist in evidence-based, preconception counselling for people with SCI and the physicians who care for them.

391 Correlation between social determinants of health and early initiation of breastfeeding after cesarean birth

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OBJECTIVE: While it is a goal to aid in early breastfeeding (BF) of postpartum persons, no study has investigated if there are racial, ethnic, or other disparities in achieving this after cesarean delivery. Our objective was to identify demographic and clinical characteristics associated with BF initiation in the first hour of life as recommended by the World Health Organization. We hypothesized that those who are non-White, Hispanic, and with public insurance would be less likely to initiate early BF.

STUDY DESIGN: In this secondary analysis of participants in a randomized trial of tranexamic acid during cesarean delivery, patients who breastfed were included.Those who experienced maternal or neonatal death prior to 24 hours after birth, delivery < 34 weeks, or had a multifetal gestation were excluded. Demographic and obstetric factors were analyzed in relation to BF initiation within the first hour. Adjusted ORs (95% CIs) were calculated using characteristics that may be associated with BF.

RESULTS: A total of 10,993 participants were enrolled in the study of whom 5,514 (50.2%) breastfed and had data regarding timing of BF initiation. Of these, 889 (16.1%) initiated BF in the first hour. Patients with private insurance (aOR 1.57, 95% CI 1.30-1.91) were more likely to achieve this outcome whereas Hispanic patients were less likely (aOR 0.74, 95% CI 0.60-0.92). There were no significant differences with regard to race or obesity. Those undergoing scheduled cesarean (versus unscheduled) were more likely to initiate BF within the first hour (aOR 1.53, 95% CI 1.28-1.83) and those who delivered prematurely were less likely to do so (aOR 0.45, 95% CI 0.31-0.64).

CONCLUSION: Public insurance and Hispanic ethnicity, which have both been associated with adverse health outcomes, were associated with delayed BF initiation. Initiation of BF is a modifiable outcome with appropriate operating room staff training. Inequities with breastfeeding in the first hour of life demonstrate the need for further evaluation and action to mitigate these disparities.

Table 1: Clinical and demographic characteristics associated with breastfeeding initiation within the first hour among patients who initiated breastfeeding after cesarean (n=5,514)

	Adjusted OR[1] (95% CI)
Black (vs. White)	0.92 (0.73, 1.16)
Hispanic (vs. non-Hispanic)	**0.74 (0.60, 0.92)**
Private insurance (vs. not private)	**1.57 (1.30, 1.91)**
Body mass index	
Overweight (vs. normal)	1.13 (0.79, 1.62)
Obese (vs. normal)	0.89 (0.63, 1.27)
Scheduled (vs. unscheduled cesarean)	**1.53 (1.28, 1.82)**
Gestational age <37 weeks (vs. ≥37 weeks)	**0.45 (0.31, 0.64)**

OR, odds ratio; CI, confidence interval

1. Multivariable models were adjusted for maternal age, body mass index, race, ethnicity, nulliparous status, marital status, use of private insurance, tobacco use during pregnancy, scheduled vs. unscheduled cesarean status, hypertensive disorders of pregnancy, diabetes, gestational age at delivery, anesthesia, TXA administration, and delivery during the SARS-Cov-2 pandemic.

392 Association of Diet Quality with Third Trimester Anemia

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OBJECTIVE: Anemia in pregnancy is a significant contributor to maternal morbidity including risk for cesarean delivery and need for transfusion. The relationship between antepartum diet and anemia is not yet well established. A more thorough understanding of this relationship represents a potentially modifiable risk factor for adverse outcomes.

STUDY DESIGN: This was a secondary analysis of a previously collected dataset from the nuMoms2B study that included 9,289 low risk primiparous patients from September 2010 through June 2014. The American Healthy Eating Index (AHEI-2010) was completed by participants in the first trimester to assess quality of diet in the 3 months prior to conception. AHEI scores were categorized by quartile, with the lowest quartile representing the lowest quality diet. Sociodemographic information was compared by quartile using chi square test and ANOVA for categorical and continuous variables, respectively. Antenatal anemia was defined as a third trimester hemoglobin of less than 11 g/dL measured after 24 weeks. Logistic regression was used to assess the association between AHEI-2010 quartile and anemia, adjusted for confounders.

RESULTS: A total of 6,071 patients were included in our analysis. Patients with the lowest AHEI-2010 scores (22.6 − 46) differed in demographic characteristics including a lower education level (39%), higher likelihood to identify as Black race (22.3%), and higher BMI. Adjusting for confounders, only those in the lowest AHEI2010 quartile had a significant independent association with the presence of third trimester anemia (aOR 1.40 95% CI 1.09 to 1.78, p = 0.007).

CONCLUSION: Pregnant patients with the lowest pre-conception diet quality are more likely to have anemia in the third trimester. Screening for diet quality preconception or earlier in pregnancy may represent an important way of identifying patients at risk of third trimester anemia, and allow for early intervention.

Association of Diet Quality with Third Trimester Anemia

Table. Association of Diet Quality with Third Trimester Anemia

Diet Quality by AHEI-2010	Unadjusted OR (95% CI)	P value	Adjusted OR (95% CI)*	P value
Fourth Quartile	1 (Reference)	N/A		
Third Quartile	1.01 (0.85 – 1.21)	0.13	0.94 (0.76- 1.16)	0.55
Second Quartile	**1.45 (1.22 - 1.72)**	**< 0.005**	1.04 (0.84- 1.30)	0.71
First Quartile	**1.89 (1.60 – 2.24)**	**< 0.005**	**1.40 (1.09- 1.78)**	**0.007**

*Adjusted for education, chronic hypertension, public insurance, race, age, marital status, seizure history, smoking status, percentage of federal poverty level***, BMI, bleeding disorders, asthma

**Third trimester anemia defined as hemoglobin < 11 g/dL after 24 weeks

***Percentage of federal poverty level (FPL) defined as <200% FPL

393 Cervical dilation after cervical ripening balloon as a predictor of cesarean delivery during induction

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OBJECTIVE: Understanding predictors of cesarean delivery (CD) during induction of labor (IOL) is important to reduce CD rates and morbidity. We aimed to understand predictors of CD among patients who had an IOL with cervical ripening balloon.

STUDY DESIGN: Retrospective cohort study of 500 patients who had an IOL with cervical ripening. Labor events were extracted from the medical record and all cervical exams after balloon removal were recorded. STATA was used for statistical analysis with t-test for continuous variables and chi-square analysis and logistic regression for categorical variables, a p-value of < 0.05 was used to indicate statistical significance.

RESULTS: Of the 500 patients with a cervical balloon, 353 had a dual agent (89% Pitocin, 11% misoprostol). The overall risk of CD was 27%. Those who had a CD were more likely to be nulliparous with a higher BMI than those who did not have a CD (Table). The average cervical dilation of first exam was significantly different between groups with a mean of 3.5 cm vs 4.2 cm for those who did and did not have a CD, respectively ($P< 0.01$). Dual agent ripening vs cervical balloon alone was not significantly associated with CD. In a logistic regression model adjusting for age, race, BMI, and birthweight, a first cervical exam $<$ or $=$ 3 cm after removal of balloon was a significant predictor of CD with an adjusted OR of 1.77 (95% CI 1.15-2.70) A first exam $<$ or $=$ 3cm after balloon removal was also a predictor of CD prior to active labor (6cm) with an adjusted OR of 2.52 (95%CI 1.44-4.41). Cervical dilation at first, second and third exam after balloon removal were also independent predictors of CD in adjusted logistic regression models.

CONCLUSION: For those undergoing induction of labor, those with a cervical dilation of $<$ or $=$ 3cm after cervical ripening balloon have a higher risk of cesarean delivery (aOR 1.77) and specifically a higher risk of CD for a failed induction (aOR 2.52). Cervical exam after balloon ripening could potentially be used as an intrapartum risk stratification tool for cesarean delivery risk.

	No Cesarean N=365	Cesarean N=135	P- value
Age in years, mean (SD)	32.38 (4.8)	33.1 (4.6)	0.12
Gestational age in weeks, mean (SD)	39.1 (6.8)	39.2 (8.7)	0.3
Race, N (%)			
White	236 (65%)	81 (60%)	0.23
Black	43 (12%)	22 (16%)	
Asian	26 (7%)	9 (7%)	
Hispanic	52 (14%)	16 (12%)	
Other	8 (2%)	7 (5%)	
Parity N (%)			
Nulliparous	221 (61%)	107 (79%)	<.01
Multiparous	144 (39%)	28 (21%)	
BMI in kg/m2, mean (SD)	26.8 (6.1)	28.8 (7.7)	<0.01
Birthweight in grams, mean (SD)	3218.7 (482.9)	3295.7 (569.8)	0.13
Dual agent ripening, N (%)	255 (70%)	98 (73%)	0.55
Cervical dilation at first exam after balloon removal in cm, mean (SD)	4.2 (1.7)	3.5 (1.2)	<0.01
Cervical dilation at 2nd exam after balloon removal in cm, mean (SD)	5.9 (2.4)	4.5 (1.4)	<0.01
Cervical dilation at 3rd exam after balloon removal in cm, mean (SD)	7.4 (2.4)	5.4 (1.7)	<0.01
Cervical dilation at 4th exam after balloon removal in cm, mean (SD)	8.5 (1.9)	6.1 (1.9)	<0.01
Cervical dilation at 5th exam after balloon removal in cm, mean (SD)	9.5 (0.9)	6.9 (2.2)	<0.01
Time on pitocin to fully dilated in hours, mean (SD)	14.9 (8.6)	24.1 (7.6)	<0.01
NICU admission or evaluation	111 (30%)	66 (49%)	<0.01

394 Azithromycin Dose and PPROM Treatment (ADAPT): a randomized controlled Phase I trial

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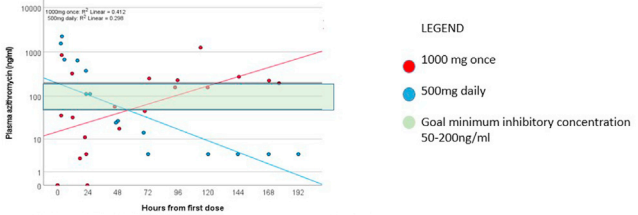
OBJECTIVE: Azithromycin clears from plasma quickly and concentrates in local tissue which is why daily dosing is not always needed. However, 1g one time dose of azithromycin may not maintain local (amniotic fluid) drug concentrations above minimum inhibitory concentrations (MIC50) for common genitourinary pathogens (50-200ng/ml). We aim to compare the pharmacokinetics of one time vs daily dosing of azithromycin in the setting of preterm prelabor rupture of membranes (PPROM).

STUDY DESIGN: This is a trial of singletons with PPROM randomized to 1gram oral azithromycin once or 500mg oral azithromycin daily x7 days. Primary outcome was amniotic fluid azithromycin concentrations over 8 days. Secondary outcomes included plasma azithromycin trough concentrations. Plasma was collected 1-4hrs, 12-24hrs after first dose, and then every 24hrs through 8 days. Amniotic fluid was collected throughout the day noninvasively with Always Flex-foam pads. We aimed to enroll 20 participants to achieve N=5 still pregnant through 8 days in each group. Continuous variables compared with Mann Whitney U test and relationship between azithromycin concentration and time assessed with linear regression.

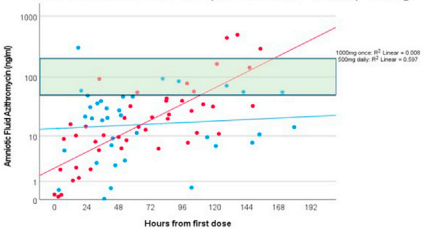
RESULTS: The study was halted after N=6 enrolled due to lagging enrollment, with 3 in each group. Mean gestational age of enrollment was 27.1 +/- 1.7wks in the 1g group and 31.0 +/- 1.4 in the 500mg daily group. One participant in each group had latency to delivery >7days. Mean amniotic fluid azithromycin concentration >96 hours from first dose was lower in the 1g once vs 500mg daily groups (25 +/-27 vs 131+/-163 ng/ml, MD -104 (-200 to -9, p=0.03). Plasma azithromycin concentration decreased over time in one time dosing (p=0.03) but not daily dosing (p=0.39) (Figure A). In contrast, amniotic fluid concentration remained relatively stable in the 1g group (p=0.71), but increased in the 500mg daily group (p< 0.001) (Figure B).

CONCLUSION: 500mg daily dosing of azithromycin maintains higher amniotic fluid concentrations, and more consistently greater than common MICs, over eight days compared to 1g once in the setting of PPROM.

A. Maternal plasma azithromycin with once vs daily dosing



B. Amniotic fluid azithromycin with once vs daily dosing



395 Factors Associated with Achieving Smoking Cessation for Pregnant Individuals with Substance Use Disorder

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OBJECTIVE: Maternal tobacco use, especially when comorbid with substance use disorder (SUD), leads to multiple adverse neonatal outcomes. Therefore, giving women the best chance for smoking cessation is important. This study evaluates interventions associated with a decrease in smoking among women with SUD receiving perinatal care within a multidisciplinary treatment program.

STUDY DESIGN: This was a longitudinal cohort study of obstetric patients with SUD enrolled in a multispecialty treatment program from 2015 to 2023. Patients were divided into two groups based on self-reported number of cigarettes smoked. Patients ≥ 36 weeks who still smoked >50% of the number of cigarettes reported at enrollment were compared to those who decreased tobacco intake by at

least 50% or quit entirely. Fisher's exact and two-sample t-tests were used for analysis.

RESULTS: Of 194 patients reviewed at 36 weeks, 137 patients reported still smoking > 50% of their tobacco use at program enrollment and 57 achieved > 50% decrease in use or quit entirely. Age, parity, race, BMI, and history of overdose did not differ significantly between groups. Nicotine replacement therapy (NRT) was used by 6.5% of patients persisting in their tobacco use compared to 10.4% of patients who decreased tobacco amount ($p = 0.52$). There was no significant difference between groups regarding participation in a group education session on tobacco cessation, adjunct anxiolytic use, or antidepressant therapy. Fetal growth restriction was diagnosed in 13.1% of patients that continued to smoke compared to 5.3% ($p = 0.13$) of patients in the cessation group.

CONCLUSION: No variables investigated differed significantly between patients who were able to decrease or completely stop smoking during pregnancy, albeit a limited sample size. Patients who successfully cut down or achieved cessation were more likely to have used nicotine replacement therapy. Surprisingly, participation in group education focused on smoking cessation did not differ.

Table 1. Combined maternal and neonatal outcomes

	Currently smoking (n = 137)	Partial / Complete Cessation (n = 57)	P-Value
MATERNAL OUTCOMES			
Participated in smoking cessation counseling	45 (32.8%)	20 (35.1%)	0.87
MAT			1
Buprenorphine	112 (81.8%)	47 (82.5%)	
Methadone	2 (1.5%)	0	
No MAT	23 (16.8%)	10 (17.5%)	
Nicotine replacement therapy			
Any NRT	7 (6.5%)	5 (10.4%)	0.5
Patch	6 (85.7%)	5 (100%)	1
Gum	2 (28.6%)	1 (20%)	1
Lozenge	0	2 (40%)	0.15
Inhaler	0	0	-
Chantix	0	0	-
Wellbutrin	0	0	-
Other	1 (14.3%)	0	1
Mood disorder medication at 36wks			
Anxiolytic	13 (11.9%)	5 (10.9%)	1
Anti-depressant	13 (11.9%)	8 (17.4%)	0.44
NEONATAL OUTCOMES			
Gestational age at delivery	39.0 (38.0 to 39.6)	39.1 (37.7 to 39.3)	0.26
Mode of delivery			
Vaginal	88 (64.2%)	37 (64.9%)	0.84
Primary Cesarean	16 (11.7%)	5 (8.8%)	
Repeat Cesarean	33 (24.1%)	15 (26.3%)	
3rd or 4th degree perineal laceration	0	0	-
Pre-eclampsia / eclampsia / HELLP	5 (2.6%)	2 (3.5%)	1
FGR diagnosed antepartum	18 (13.1%)	3 (5.3%)	0.13

396 Efforts to reduce NTSV cesareans by achieving ACOG/SMFM recommendations in a statewide quality improvement initiative

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OBJECTIVE: The Promoting Vaginal Birth (PVB) quality improvement (QI) initiative aims to reduce nulliparous, singleton, term and vertex (NSTV) cesarean section deliveries (C/S) and increase the percent of C/S meeting ACOG/SMFM OB care consensus recommendations for C/S indication. We aim to identify progress towards meeting initiative goals from baseline (Oct-Dec 2019) to 27-months into initiative Q1 (Jan-Mar) 2023.

STUDY DESIGN: ILPQC facilitated collaborative learning, rapid-response data and QI support for hospitals. Hospitals reported a random sample of 20 NTSV C/S per month and monthly progress on implementation of systems changes. McNemar's Test was used to evaluate progress on systems changes, proportion of deliveries that met ACOG/SMFM recommendations and % of hospitals achieving initiative goal of ≤23.6% NTSV C/S between baseline and Q1 2023. A Chi-Square Test was used to evaluate change in statewide NTSV C/S rate between baseline and Q1 2023 and change in disparities between NTSV C/S rate between white and Black patients.

RESULTS: 69 participating hospitals were included in the analysis. Hospitals improved between baseline and Q1 2023 on implementation of all systems changes ($p < .0001$) and meeting ACOG/SMFM recommendations overall from 50.1% to 65.3% ($p < .0001$) and for all C/S indications (Table 1). In Q1 2023, 47.8% of hospitals were at NTSV C/S rate goal of ≤23.6%. The statewide overall NTSV C/S rate was 25.1% at baseline and reduced to 23.4% by Q1 2023 ($p=.0118$). At baseline, the rate of NTSV C/S was higher in Black patients than white (30.5% vs. 26.3%, $p=0.02$) but by Q1 2023, the rate was similar between groups (24.3% vs. 23.1%. $p=0.37$).

CONCLUSION: Decreasing the rate of non-indicated NTSV C/S can improve maternal outcomes. Our results indicate that a statewide PVB QI initiative is associated with equitable implementation of systems changes, meeting ACOG/SMFM recommendations, an overall reduction in NTSV C/S births and reduction in the disparities gap 27 months into the initiative. Ongoing work will focus on safe reduction of NTSV C/S rates to goal for all Illinois hospitals.

Table 1. Change in percent of patients meeting ACOG/SMFM recommendations for C/S indications (N=3,840 baseline and 3,113 Q1 (Jan-Mar) 2023 patients included from 69 hospitals)

ACOG/SMFM recommendations	Baseline (2019) N (%)	Q1 (Jan-Mar) 2023 N (%)	p-value
Overall (Failed induction, arrest disorders 1st and 2nd stage)	474 (50.1)	512 (65.3)	<.0001
Failed induction	94 (33.0)	105 (48.8)	0.0003
Arrest disorder 1st stage	271 (74.9)	243 (81.5)	0.0396
Arrest disorder 2nd stage	109 (36.5)	164 (60.5)	<.0001

397 Effectiveness of a cervical pessary to prolong pregnancy after an episode of preterm labor

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OBJECTIVE: Randomized controlled trials (RCTs) on using a cervical pessary after an episode of preterm labor (PTL) show contradictive results. This study aims to perform an Individual Participant Data Meta-Analysis (IPD-MA) to assess the effectiveness of a cervical pessary to prolong pregnancy after an episode of PTL.

STUDY DESIGN: For this IPD-MA, RCTs were included that randomized pregnant women with a singleton pregnancy between 24-34 weeks with an ceased episode of PTL between cervical pessary or control (no intervention). This IPD-MA followed the PRISMA-IPD guidelines. Co-primary outcomes were: interval between randomization and delivery, delivery < 7 days and a composite of neonatal outcomes (mortality and severe morbidity). Secondary outcomes were maternal and neonatal outcomes according to the core outcomes set for preterm birth(PTB) studies. For all outcomes, a one-step meta-analysis approach was employed.

RESULTS: Five RCTs were eligible for inclusion of which three were included(n=273 pessary group, n=268 control group). Two trials were excluded since no data was provided. Mean prolongation of pregnancy was 59.3±27.7 days for pessary compared to 54.9±27.1 days for controls with a mean difference of 4.5 days (95% CI -0.08 - 9.0; P-value 0.054). Cervical pessary did not reduce risk of delivery < 7 days (RR 0.87; 95% CI 0.40 - 1.9; P-value 0.31). Moreover, there was no reduction in composite neonatal outcome (7.7% versus 8.2%, RR 0.95; 95% CI 0.53 - 1.7). Readmissions for PTL were lower in the pessary group (45 vs. 77, RR 0.50; 95% CI 0.32-0.77). No differences were found for other secondary maternal or perinatal outcomes (Table 1).

CONCLUSION: In women who went through an episode of PTL, we found no statistical significant beneficial effect for pessary placement in terms of delivery < 7 days, prolongation of pregnancy, PTB, or neonatal outcomes between both groups. Pessary reduced the probability of readmissions for PTL.

Table 1: primary and secondary outcomes

Variable	Pessary N= 273	Expectant management N=268	Risk ratio or Mean difference (95% CI)	P-value
Primary outcome				
Delivery <7 days after randomization No Yes	**N=273** 262 (96.0) 11(4.0)	**N=268** 256(95.5) 12(4.5)	0.87 (0.40-1.91)	0.31
Interval between randomization and delivery (days)	**N=273** 59.3 ± 27.7	**N=268** 54.9 ± 27.1	4.5 (-0.08 – 9.0)	0.054
Composite of neonatal outcome*	**N=273** 21 (7.7)	**N=268** 22 (8.2)	0.95 (0.53-1.67)	0.85
Secondary outcomes				
Any PTB <37 weeks	***N=273*** 72 (26.4)	***N=268*** 76 (28.4)	0.98 (0.75-1.28)	0.89
Spontaneous PTB <37 weeks#	***N=240*** 53 (22.1)	***N=238*** 65 (27.3)	0.85 (0.62-1.16)	0.30
Any PTB <34 weeks	***N=273*** 43(15.8)	***N=268*** 40(14.9)	1.07 (0.72-1.58)	0.75
Spontaneous PTB <34 weeks#	***N=241*** 33 (13.7)	***N=239*** 32 (13.4)	1.03 (0.66-1.62)	0.88
Gestational age at delivery (weeks)	***N=273*** 37.0 ± 3.4	***N=268*** 36.8±3.4	0.26(-0.30-0.83)+	0.36
Number of readmissions for an episode of PTL - No readmission - One or more	***N=241*** 196 (81.3) 45 (18.7)	***N=234*** 157 (67.1) 77 (32.9)	0.66(0.50-0.785)	0.001

PTB: preterm Birth, PTL; preterm labor
* Including Neonatal sepsis, Necrotizing enterocolitis, Respiratory distress syndrome, stillbirth, Perinatal death
# Data available of two included RCTs
+ Mean difference

398 Does Timing of Diagnosis of Hypertensive Disorders of Pregnancy Impact perinatal Outcomes?

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OBJECTIVE: Hypertensive disorders of pregnancy (HDP) can be diagnosed prior to labor starting, during the labor course or postpartum (pp). We sought to evaluate whether the timing of when HDP is diagnosed impacts pp blood pressure (BP) outcomes.

STUDY DESIGN: This was a secondary analysis of a randomized trial evaluating the efficacy of furosemide on BP outcomes. 384 patients with HDP (including gestational hypertension and preeclampsia with/without severe features) were enrolled at an urban tertiary care hospital between June 2018 to October 2019 with BPs followed for 10 days pp through a text-messaging program. Timing of HDP diagnosis was dichotomized based on distribution of outcomes: Time 1: diagnosed prior to labor or during latent labor; Time 2: diagnosed in active labor or pp. Primary outcome was time to resolution of hypertension (number of days to BP < 140/90 x 2). Secondary outcomes included persistent hypertension 7 days pp and need for antihypertensives pp. Multivariable logistic and Cox regression models were used to estimate associations between timing of HDP and outcomes.

RESULTS: Of 384 subjects, 338 (88%) were diagnosed with HDP at Time 1 and 46 (12%) at Time 2. Compared to those in Time 1, those diagnosed in Time 2 were less likely to have severe preeclampsia (11% vs. 35% p=0.001), were later in gestation (39 vs. 38 wks, p=0.004) and more likely to have a vaginal delivery (98% vs. 73%, p< 0.001), Table. Patients diagnosed at Time 2 had significantly shorter/faster median time to pp BP resolution even after controlling for severity of HDP, mode of delivery and furosemide use (5.5 vs. 6 days, aHR 1.17, 95% CI [1.07 − 1.28]). There was no difference in rate of persistent pp hypertension or need for antihypertensives, Table.

CONCLUSION: Timing of diagnosis of HDP impacts pp BP resolution. Patients diagnosed with HDP in active labor or postpartum experience a faster time to BP resolution. Our results may have implications for postpartum blood pressure monitoring. Further research targeting the pathways driving these findings should therefore be explored.

Table. Characteristics of Study participants by timing of HDP diagnosis.

Characteristics	Antepartum/Latent Intrapartum Time 1 (n=338)	Active Intrapartum/Postpartum Time 2 (n= 46)	*P* value
Maternal age, yrs, median (IQR)	27 (23 – 32)	27 (22 – 31)	0.790
Race			0.275
Black	251 (74)	38 (83)	
Other	87 (26)	8 (18)	
Insurance			0.300
Private	102 (31)	10 (22)	
Medicaid	232 (69)	36 (78)	
Nulliparous	176 (52)	18 (39)	0.117
Smoking	31 (32)	5 (56)	0.268
Highest level of PIH diagnosis			**0.001**
Gestational HTN	220 (65)	41 (89)	
Severe Preeclampsia	118 (35)	5 (11)	
Worsening hypertension	45 (13)	2 (4)	0.095
Gestational diabetes	22 (7)	0 (0)	0.091
BMI at delivery, kg/m^2, median (IQR)	35 (30 – 43)	33 (31 – 41)	0.310
GA at delivery, wk; median (IQR)	38 (37 – 40)	39 (38 – 40)	**0.004**
Methods of Delivery			**< 0.001**
Vaginal (Spontaneous or Operative)	246 (73)	45 (98)	
Cesarean delivery	92 (27)	1 (2)	
Creatine at enrollment, mg/dL, median (IQR)	0.58 (0.52 – 0.68)	0.62 (0.48 – 0.72)	0.518
Furosemide given after study period	21 (6)	0 (0)	0.092
Study Arm			0.432
Placebo	166 (49)	26 (57)	
Furosemide	172 (51)	20 (43)	
Outcome	**N (%)**	**N (%)**	**aOR**
Persistent hypertension at 7 days postpartum	43 (13)	2 (4)	0.41 (0.86 – 1.69)[a]
Overall need for antihypertensive medication	119 (35)	6 (13)	0.61 (0.22 – 1.71)[b]

aOR, adjusted odds ratio; BMI, body mass index; CI, confidence interval; GA, gestational age; HDP, hypertensive disorder of pregnancy, IQR, interquartile range; PIH, pregnancy induced hypertension. Data were presented as frequency (percentages) and median (IQR).
[a] Model adjusted for severity of HDP, mode of delivery and furosemide use. [b] Model adjusted for severity of HDP, gestational age at delivery and furosemide use.

399 Development of a risk scoring system for prediction of blood transfusion during admission for delivery

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OBJECTIVE: The most widely used tool for prediction of blood transfusion during admission for delivery is informed by expert

opinion rather than data. We aimed to develop and internally validate a practical and data-driven risk scoring system to predict blood transfusion during delivery admission in a contemporary U.S. cohort.

STUDY DESIGN: This was a secondary analysis of a multicenter cohort of patients delivering on randomly selected days at 17 U.S. hospitals (2019-20). Patients with placenta accreta spectrum were excluded (given known high risk for transfusion). The primary outcome was any blood transfusion during delivery admission. Candidate risk factors for transfusion were selected based on relevant literature. A multivariable logistic regression model was developed and internally validated using stratified k-fold (k=5) cross validation with stepwise backward elimination using significance level of 0.05. Each risk factor included in the final model was assigned a point value by dividing the log of the odds ratio by the log of the odds ratio of the factor with the lowest value. The summed points for an individual generate a numeric risk score predictive of transfusion. Performance of the risk score to predict transfusion was assessed using the area under the receiver operating curve (AUC).

RESULTS: Of 21,780 included individuals, 2.5% (N=545) received a blood transfusion. Factors associated with the highest risk for transfusion in the adjusted model included thrombocytopenia and placental abruption or significant antepartum bleeding (Table). Risk score outputs among patients in the cohort ranged from 0 to 18 (maximum possible 26) with a corresponding predicted risk for transfusion from 1.0% to 87.8%. The AUC for prediction of transfusion in the validation sub-sample was 0.81. Using the full cohort, the AUC was 0.76 (95% CI 0.74-0.78).

CONCLUSION: We developed a clinically applicable numeric risk score to predict blood transfusion during delivery admission. Future work should externally validate this risk scoring system.

Table. Adjusted odds ratio, risk difference per 1000 and derived risk score for factors associated with transfusion during delivery admission

Risk Factor Description	aOR (95% CI)	Adjusted risk difference per 1000 (95% CI)*	Score†
Thrombocytopenia (platelets <100,000/μL)	6.0 (4.1 – 8.9)	152 (97 – 207)	5
Abruption or significant antepartum bleeding	4.0 (2.9 – 5.4)	56 (34 – 78)	4
Unscheduled cesarean	3.1 (2.4 – 3.9)	44 (30 – 59)	3
Multifetal gestation	2.9 (2.0 – 4.3)	45 (17 – 73)	3
Preeclampsia with severe features or HELLP‡	2.8 (2.1 – 3.6)	39 (26 – 53)	3
Assisted reproductive technology	2.4 (1.7 – 3.4)	27 (10 – 44)	2
Chorioamnionitis‖	2.2 (1.6 – 3.0)	24 (11 – 37)	2
Prior cesarean delivery or uterine surgery¶	1.8 (1.4 – 2.3)	13 (6 – 21)	2
Prolonged labor (>24 hours)	1.6 (1.3 – 2.0)	9 (3 – 15)	1
Anemia**	1.4 (1.2 – 1.8)	5 (1 – 10)	1

Adjusted odds ratio (aOR); confidence interval (CI); Hemolysis, elevated liver enzymes, low platelet count (HELLP)
*The adjusted risk difference is the attributable risk for transfusion resulting from exposure to the specified risk factor in a theoretic population of 1000.
†The risk score is calculated by dividing the log of the odds ratio for the risk factor by the log of the odds ratio of the factor with the lowest value in the model. For example, the risk score for multifetal gestation is calculated by dividing the log of the odds ratio for multifetal gestation (2.9) by the log of the odds ratio of the factor with the lowest value (anemia: 1.4) to produce a risk score of 3.
‡Preeclampsia with severe features and HELLP as defined by ACOG
‖Chorioamnionitis defined clinically with a body temperature ≥37.8°C and no other known infection
¶Includes any prior uterine surgery (e.g., myomectomy)
**Anemia defined by treatment (i.e., iron supplementation)

400 Association of Trimester-Specific Smoking Cessation and Risk of Stillbirth

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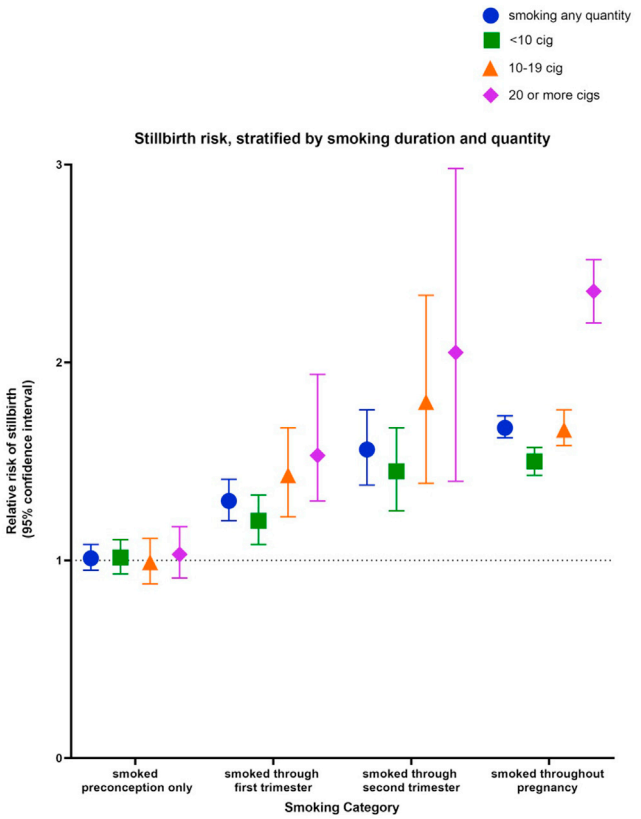
OBJECTIVE: Tobacco use in pregnancy is associated with stillbirth and other adverse pregnancy outcomes. This study aims to quantify the relative influence of smoking cessation at various timepoints in pregnancy on stillbirth risk.

STUDY DESIGN: Population-based retrospective cohort study of all US live births and stillbirths using vital statistics birth records, 2014-2019. Outcomes of women who reported smoking only in the 3 months prior to conception, through first trimester then quit, through second trimester then quit, and smoked throughout pregnancy were compared to a referent group of nonsmokers. Generalized linear modeling estimated the relative risk of smoking duration during pregnancy on stillbirth risk and was also stratified by categories of number of cigarettes smoked per day. Outcomes were limited to births at 32-42 weeks.

RESULTS: Of 23,500,558 births, 10.0% smoked either preconception only or anytime during the pregnancy. The overall stillbirth rate during the study period was 0.26%, 0.20% in non-smokers, and 0.29% in smokers. Stillbirth rate was 0.20% among preconception only smokers, 0.26% and 0.31% when smoking cessation occurred after the first or second trimester, respectively, and the highest among those who smoked throughout pregnancy 0.34%, $p < 0.0001$. Smoking limited to preconception only had no significant association with stillbirth, however stillbirth risk demonstrated a sequential increase with longer durations of smoking during pregnancy, with highest risk among those who smoked throughout pregnancy. Stillbirth risk was also higher among those who smoked higher number of cigarettes per day (figure).

CONCLUSION: Smoking during pregnancy is associated with increased risk of stillbirth, with sequential increased risk with longer durations of smoking during pregnancy and smoking a higher number of cigarettes per day. These data demonstrate that quitting earlier in pregnancy is optimal, and for those who do not quit, smoking fewer number of cigarettes per day may help to minimize the risk of stillbirth.



401 Digital exams in patients with PPROM: Outcomes based on number of exams

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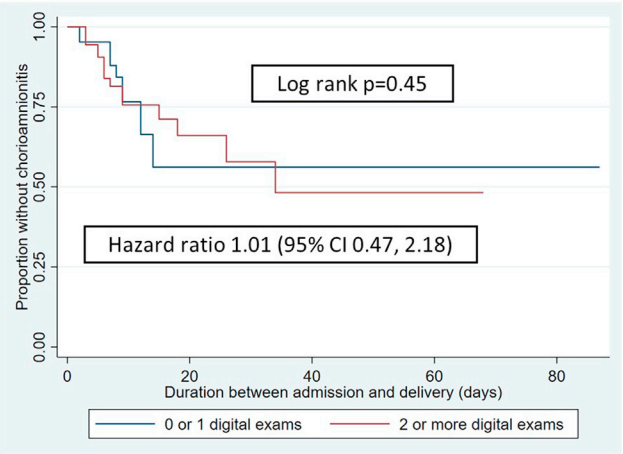
OBJECTIVE: ACOG recommends minimizing digital exams in patients with preterm prelabor rupture of membranes (PPROM). However, many patients with PPROM ultimately receive digital exams when speculum exams are limiting or not feasible. We examined the association between number of digital exams and outcomes in patients with PPROM in a modern population.

STUDY DESIGN: This was a retrospective cohort study of patients with PPROM at a single center between January 2019 and March 2021. Inclusion criteria were singleton gestations between 24w0d and 33w6d gestation with confirmed rupture of membranes who delivered > 24 hours after PPROM diagnosis. The primary outcome was chorioamnionitis. Secondary outcomes were composite maternal and neonatal infectious morbidity. These outcomes were compared between patients who had ≤1 and >1 digital exams prior to the diagnosis of labor or start of induction. A Cox proportional hazards regression model was performed to account for latency (duration between admission and delivery).

RESULTS: 125 patients with PPROM were included in this analysis. The median number of digital exams performed were 2 (interquartile range 1, 3). Patient with >1 digital exams were more likely to go into spontaneous labor (24% vs. 51%, p=0.003). However, there was no significant difference in pregnancy latency between patients with ≤1 and >1 digital exams (9 vs. 6 days, p=0.19). There was no difference in the rate of chorioamnionitis between patients with ≤1 and >1 digital exams (23.9% vs. 20.3%, hazard ratio (HR) 1.01, 95% confidence interval (CI) 0.47, 2.18). Composite maternal infectious morbidity (30.4% vs 24.1%, HR 0.92, 95% CI 0.46, 1.85) and neonatal infectious morbidity (2.2% vs 3.8%, HR 2.01, 95% CI 0.21, 19.59) were similar between groups.

CONCLUSION: Although >1 digital exam was associated with an increase in spontaneous labor, this is likely confounded by indication (symptomatic patients are more likely to get digital exams than speculum exams). Importantly, there is no association between number of digital exams and latency or infectious morbidity in patients with PPROM.

Figure 1: Kaplan-Meier survival estimates for chorioamnionitis based on number of digital exams



402 Chorion-Derived Extracellular Vesicles Cargo Transporter protein BCRP: Paracrine drug transportation at the feto-maternal interface

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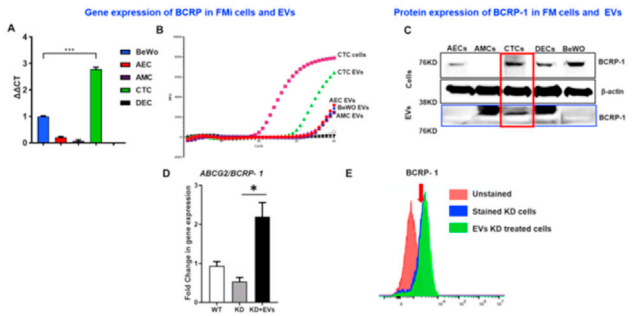
OBJECTIVE: The transport of drugs across the placenta during pregnancy impacts maternal well-being and fetal development. Transporter proteins like Breast Cancer Resistance Protein-1 (BCRP-1) participate in drug efflux mechanisms and influence the pharmacokinetics of diverse substances. BCRP-1 can be propagated in extracellular vesicles (EVs) to transition BCRP-1 lacking cells to perform drug transport functions. This study explored the paracrine signaling abilities of chorion trophoblast cell (CTC)-derived EVs in restoring BCRP-1 expression loss.

STUDY DESIGN: BCRP-1 gene (qRT-PCR) and protein (western blot) expressions were determined in fetal membrane cells (amnion, chorion) and decidua. EVs from CTCs were isolated and the presence of BCRP-1 was confirmed in EVs (western blot). We employed the CRISPR/Cas9 approach to achieve BCRP-1 knockdown in maternal decidual cells. These cells were subsequently exposed to CTC-derived EVs containing BCRP-1, and the restoration of BCRP-1 expression was assessed by PCR and surface expression by flow cytometry.

RESULTS: Gene expression levels of ABCG2/BCRP-1 were significantly higher in CTCs compared to BeWo cells (+ve control)) (Fig 1A, ***p< 0.001). EVs derived from CTCs had higher BCRP-1gene (Fig 1B) compared to AEC and DEC. BCRP-1 protein in EVs was similar to those derived from amnion and decidual cells (Fig 1C). Upon treatment with chorion-derived EVs, maternal decidual cells with BCRP-1 knockdown displayed effective restoration of BCRP-1 protein, as demonstrated by gene levels (Fig 1D) and surface protein expression levels (Fig 1E).

CONCLUSION: This study provides pioneering evidence that the delivery of BCRP-1 through EVs can trigger drug efflux activity in cells via paracrine signaling. The modulation of BCRP-1 by EVs underscores the intricate interplay between EVs and placental drug transport mechanisms, offering valuable insights into their potential involvement in modulating drug responses during pregnancy.

Figure 1. Expression and functional paracrine signaling of BCRP-1 in chorion-derived extracellular vesicles



403 Associations between diabetic keto acidosis and adverse neonatal outcomes in those with pre-gestational diabetes

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OBJECTIVE: Type 1 diabetes (T1D) and type 2 diabetes (T2D) have been associated with increased neonatal morbidity in pregnancy. Specifically, diabetic ketoacidosis (DKA) during pregnancy can cause significant adverse perinatal outcomes, however, the impact of a DKA diagnosis in pregnancy on neonatal outcomes unknown.

STUDY DESIGN: This is a retrospective cohort study of California linked hospital discharge-vital statistics data from 2008-2019. We included singleton, live-born infants with gestational age of 23-42 weeks in those with pre-gestational diabetes. We compared neonatal outcomes in pregnancies of individuals with T1D and T2D who received a diagnosis of DKA during pregnancy to those who did not. Chi-squared and multivariable logistic regression were utilized for statistical analyses.

RESULTS: A total of 7,401 pregnancies with T1D and 38,062 pregnancies with T2D were included, of which 786 (10.6%) and 703 (1.9%) had DKA during the pregnancy, respectively. Although not significant between the groups, those with T1D had high rates of NICU admission both with or without a diagnosis of DKA in pregnancy (33.4 vs 22.5%). Among those with Type 2D, a diagnosis of DKA in pregnancy was associated with NICU admission (aOR: 1.62; 95% CI: 1.35, 1.95), respiratory distress syndrome (aOR: 1.33; 95% CI: 1.01, 1.75) and large for gestational age infants (aOR: 1.32; 95% 1.27, 1.80) as compared to those without DKA.

CONCLUSION: Our study suggests that in those with T2D, DKA in pregnancy significantly increases the risk of adverse neonatal outcomes. Although the findings were not significant for T1D, there are still high rates of NICU admission. This may suggest that the effect of DKA on placental function may vary for T1D and T2D.

Table 1. Multivariable logistic regression models showing adjusted odds ratios for neonatal outcomes

	DKA in Pregnancy	No DKA in Pregnancy	aOR (95% CI)[a]
T1D (n= 7,401)			
NICU admission	263 (33.4%)	1,491 (22.5%)	1.09 (0.90, 1.32)
Respiratory distress syndrome	107 (13.6%)	502 (7.5%)	1.25 (0.95, 1.63)
Large for gestational age	285 (36.2%)	2,440 (36.8%)	1.04 (0.88, 1.24)
Neonatal Death	5 (0.6%)	15 (0.2%)	1.42 (0.42, 4.76)
T2D (n= 38,062)			
NICU admission	255 (36.2%)	7,320 (19.5%)	1.62 (1.35, 1.95)*
Respiratory distress syndrome	74 (10.5%)	2,182 (5.8%)	1.33 (1.01, 1.75)*
Large for gestational age	228 (32.4%)	10,141 (27.5%)	1.52 (1.27, 1.80)*
Neonatal Death	1 (0.1%)	75 (0.2%)	0.46 (0.05, 3.68)

aOR—Adjusted odds ratio, CI-Confidence interval
[a] Adjusted for maternal race and ethnicity, age, education, pre-pregnancy BMI, insurance, parity, gestational age, tobacco use

404 Frequently Asked Questions in Prenatal Testing: Comparing Readability Between AI (ChatGPT) and ACOG

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OBJECTIVE: Gravid patients often seek answers to their pregnancy-related questions online, requiring simple and accurate responses to ensure adequate understanding. We aim to compare the readability between a natural language processing tool (ChatGPT) and the American College of Obstetricians and Gynecologists (ACOG) when responding to frequently asked questions (FAQs) about prenatal testing.

STUDY DESIGN: ACOG FAQ sheets were pooled under the topic "Prenatal Testing". Each question was queried in ChatGPT-3.5 (July 20 Version) - with some questions requiring contextualization, prompting "In the context of [topic], [question]?" Readability scores and grade level scores were calculated for each response. With the exception of the Flesch Kincaid Reading Ease score, each measure describes the amount of formal education required to understand a given response. Statistical analysis utilized a two-tailed t-test to compare ACOG and ChatGPT-3.5 responses.

RESULTS: Within the 11 FAQ sheets under "Prenatal Testing", 182 questions were assessed. In all readability indices, ACOG responses scored significantly better than ChatGPT-generated responses and were statistically significant. These readability indices include: Flesch Kincaid Reading Ease 57.23 (SD 19.49) vs 35.97 (9.07), Flesch Kincaid Grade Level 9.45 (3.88) vs 12.70 (1.60), Gunning Fog Score 12.31 (4.31) vs 16.33 (2.03), Smog Index 9.01 (3.07) vs 12.07 (1.34), Coleman Liau Index 11.72 (3.36) vs 15.11 (1.70), and Automated Readability Index 9.00 (4.64) vs 12.30 (1.84; all $p < 0.0001$).

CONCLUSION: ACOG FAQ responses are clearer and more readable when compared to ChatGPT-generated responses. This suggests that fewer years of formal education is required to comprehend the content. Patients can reliably use ACOG verified responses as a source of high-quality, "easy to read" and understandable information. ChatGPT is an accessible resource but caution should be taken when asking pregnancy-related questions. Further studies are needed to assess the quality of natural language processors and its impact on patient's knowledge.

405 Expectant management of Early Onset Preeclampsia with Severe Features Before 24 weeks

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OBJECTIVE: The recent ACOG practice bulletin offers no guidance on management of early onset severe preeclampsia (PreE) before 24 weeks (wks). Historically, delivery was recommended due to poor perinatal outcomes and risk of maternal morbidity. An increase in maternal age, medical co-morbidities, and advances in neonatal resuscitation have led to more cases of early onset severe PreE with the possibility of expectant management at gestational ages below the limit of viability. We aimed to report perinatal and maternal outcomes after expectant management of severe PreE < 24 wks to assist in counseling and shared decision making.

STUDY DESIGN: A retrospective case series of individuals with severe PreE at < 24 wks gestation managed at a Level IV center between 2017-2022. Individuals requiring delivery within 24 hours of diagnosis were excluded. Perinatal and maternal outcomes were abstracted from electronic medical records.

RESULTS: Of 27,626 births during the study period, 51 (0.2%) had severe PreE < 24 wks and 9 (18%) were excluded due to delivery < 24 hours. Among 42 undergoing expectant management, the median gestational age of diagnosis was 23 wks. 55% had chronic

hypertension, 33% had PreE in a prior pregnancy, and 71% had a BMI >30 kg/m^2. There was one surviving neonate when PreE developed at < 22 wks. Neonatal survival was highest at 22-23 wks (43%; 95%CI 21-67% and 58%; 95%CI 36-77%, respectively). Median latency at 22 and 23 wks was 6 (range 1-38) and 4 days (range 1-46), respectively. Median NICU stay at 22 and 23 wks was 124 (range 15-271) and 88 days (range 2-151), respectively. The most common indication for delivery was uncontrolled hypertension (49%). Adverse maternal outcomes were rare, the most common being transient renal insufficiency (7%; 95%CI 2-19%) and pulmonary edema (7%; 95% CI 2-19%) (Table 1).

CONCLUSION: Our findings suggest that perinatal survival is markedly improved during expectant management of severe PreE at 22-23 weeks with minimal increase in maternal morbidity. This information should be available when counseling individuals on expectant management of severe PreE < 24 weeks.

Table 1: Perinatal and Maternal Outcomes

GA at diagnosis (weeks)	N	GA at delivery (weeks) Median (Range)	Latency (days) Median (Range)	SGA N (%) (95% CI)	Fetal death N (%) (95% CI)	Neonatal death N (%) (95% CI)	Length of NICU stay Median (Range)	BPD N (%) (95% CI)	IVH N (%) (95% CI)	NEC N (%) (95% CI)
19-21	9	21 (19-31)	8 (1-51)	5 (56%) (27-81%)	6 (67%) (35-88%)	2 (67%) (21-94%)	91 (49-60)	0 (0%) (0-56%)	0 (0%) (0-56%)	0 (0%) (0-56%)
22	14	22.5 (22-28)	6 (1-38)	5 (36%) (16-61%)	6 (43%) (21-67%)	2 (25%) (7-59%)	124 (15-271)	4 (50%) (22-78%)	1 (13%) (22-47%)	1 (13%) (22-47%)
23	19	24 (24-30)	4 (1-46)	9 (47%) (27-68%)	4 (21%) (9-43%)	4 (27%) (11-52%)	88 (2-151)	1 (7%) (12-30%)	1 (7%) (12-30%)	1 (7%) (12-30%)
Total	42	-	-	19 (45%) (31-60%)	16 (38%) (25-53%)	8 (31%) (17-50%)	-	5 (19%) (9-38%)	2 (8%) (2-24%)	2 (8%) (2-24%)
GA at diagnosis (weeks)	N	HELLP N (%) (95% CI)	Placental Abruption N (%) (95% CI)	Pulmonary edema N (%) (95% CI)	Renal insufficiency N (%) (95% CI)	Eclampsia N (%) (95% CI)	Pericardial/ pleural effusion N (%) (95% CI)	Myocardial Infarct N (%) (95% CI)	Stroke N (%) (95% CI)	Composite N (%) (95% CI)
19-21	9	1 (11%) (2-44%)	0 (0%) (0-30%)	1 (11%) (2-44%)	0 (0%) (0-30%)	0 (0%) (0-30%)	0 (0%) (0-30%)	0 (0%) (0-30%)	0 (0%) (0-30%)	2 (22%) (6-55%)
22	14	1 (7%) (1-31%)	1 (7%) (1-31%)	0 (0%) (0-22%)	1 (7%) (1-31%)	0 (0%) (0-22%)	1 (7%) (1-31%)	0 (0%) (0-22%)	0 (0%) (0-22%)	4 (29%) (12-55%)
23	19	0 (0%) (0-17%)	0 (0%) (0-17%)	2 (11%) (3-31%)	2 (11%) (3-31%)	0 (0%) (0-17%)	0 (0%) (0-17%)	0 (0%) (0-17%)	0 (0%) (0-17%)	4 (21%) (9-43%)
Total	42	2 (5%) (1-16%)	1 (2%) (0-12%)	3 (7%) (2-19%)	3 (7%) (2-19%)	0 (0%) (0-8%)	1 (2%) (0-12%)	0 (0%) (0-8%)	0 (0%) (0-8%)	10 (24%) (13-39%)

*Data presented as Median (Range) or N (%; 95% confidence intervals (CI))
**GA=gestational age, SGA=small for gestational age, NICU= neonatal intensive care unit, BPD=bronchopulmonary dysplasia, IVH=intraventricular hemorrhage, NEC=necrotizing enterocolitis, HELLP= hemolysis, elevated liver enzymes, and low platelets

406 Cost-effectiveness of virtual Mindfulness Based Cognitive Therapy on pregnancies at high risk of perinatal depression

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OBJECTIVE: Previous research has shown preventive counseling for women at high risk of perinatal depression to be cost-effective. Barriers of cost, transit, time, and staffing limit accessibility of these services. We examined whether a theoretical virtual, group, social worker (SW)-administered Mindfulness Based Cognitive Therapy (MBCT) program for patients at high risk of perinatal depression would be cost-effective.

STUDY DESIGN: We used TreeAge to create a cost-effectiveness model of outcomes in pregnant patients at high risk of perinatal depression who received antenatal virtual group MBCT curriculum versus standard of care. We used a theoretical cohort of 480,390 patients, representing pregnancies at high risk of postpartum depression annually. Outcomes included perinatal depression, maternal suicide, postpartum psychosis, infanticide, preterm birth, neonatal death, and cerebral palsy in addition to cost and quality-adjusted life years (QALYs). The willingness-to-pay threshold was set to $100,000/QALY. Literature searches found model inputs, and sensitivity analysis assessed model strength.

RESULTS: Within the theoretical cohort, the virtual, group, SW-led MBCT curriculum prevented 26,821 cases of perinatal depression, 2 cases of maternal suicide, 3 cases of postpartum psychosis, 4,142 cases of preterm delivery, 40 cases of neonatal death, and 48 cases of neurodevelopmental delay. There was no significant reduction in infanticide. The MBCT strategy was cost-saving. Sensitivity analyses demonstrated that MBCT remained cost-effective until treatment costs reached $4,015, significantly higher than expected cost. The incremental cost-effectiveness ratio (ICER) was -$10,141/QALY, indicating cost savings per QALY gained. SW-administered MBCT is superior to standard of care, yielding higher QALYs at lower cost.

CONCLUSION: We found it cost-saving to offer virtual, group SW-administered MBCT to pregnant patients at high risk of depression. Clinicians should pursue implementing similar programs.

Table 1. Outcomes prevented in a theoretical cohort of 480,390 pregnancies at high risk of perinatal depression assigned to either MBCT treatment or standard of care.

Outcome	Standard of Care	MBCT Treatment	Difference
Perinatal depression	68,193	41,372	-26,821
Maternal suicide	35	33	-2
Postpartum psychosis	618	615	-3
Infanticide	26	26	0
Preterm delivery	50,393	46,251	-4142
Neonatal death	927	887	-402
Neurodevelopmental delay	1,115	1066	-48
Cost (USD)	$10,034,315,243	$9,877,955,055	-$1,563,601,188
Effectiveness (QALYs)	12,751,827	12,767,245	15,418
Incremental Cost-Effectiveness Ratio (ICER)	-$10,141		

407 Development and validation of an early-pregnancy score predictive of stillbirths: an Italian population-based study

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OBJECTIVE: Although stillbirth rates in high-income countries have decreased significantly, ending preventable stillbirth is still a major global public health challenge. We developed a score to determine the risk of stillbirth at an early stage of pregnancy to guarantee the appropriate antenatal identification and prevent intrauterine fetal demise using an Italian population-based cohort.

STUDY DESIGN: We conducted a population-based cohort study including 316,149 deliveries with gestational age between 22 and 42 weeks of women aged 15-55 years from January 2017 to December 2021 in the Lombardy region of Italy using the administrative database. A StillBirth score (SB score) was built considering the independent variables able to explain the stillbirth at the 22 gestational weeks selected through a logistic regression model. A weight proportional to the coefficient estimated by the model was assigned to each of the selected variables contributing to the SB score. Discrimination and calibration of the SB score were assessed using an internal validation set. Moreover, we evaluated the risk of stillbirth among the risk classes based on the SB score (i.e., low $\leq$5 points, intermediate 6-8 points, high $\geq$9 points).

RESULTS: We identified 869 cases of stillbirth with an incidence rate of 2.7 x1000 person-year. The AUC of the SB score was 65% in the training set and 60% in the validation set. Analysis showed a 1.4-fold (95% IC: 1.1-1.7) greater risk of experiencing the outcome of

interest among deliveries with intermediate SB score and a 2.4-fold (95% IC: 2.0-2.8) greater risk among deliveries with high SB score, respectively to deliveries with a low SB score.

CONCLUSION: Despite the limited discriminatory power, the SB score can stratify women according to their risk of stillbirth, allowing the early identification of mothers who are more likely to have a stillbirth and facilitating appropriate monitoring and timely intervention based on individual risk factors.

408 Blood pressure control in patients with pregestational diabetes and perinatal outcomes

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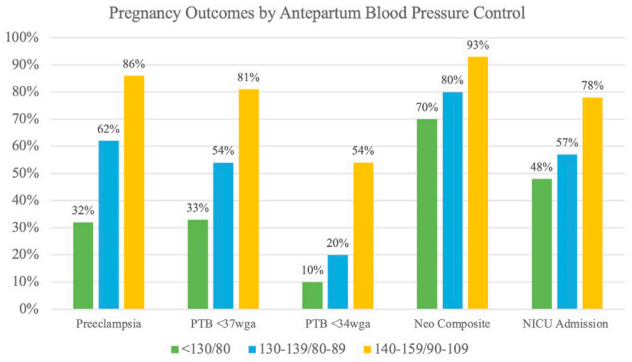
OBJECTIVE: ACOG/SMFM recommends BP < 140/90mmHg for cHTN in pregnancy. A secondary analysis of CHAP suggested BP < 130/80 reduced adverse outcomes for individuals with DM. Data on diabetes type or glycemic control was not presented. We aimed to determine optimal BP goals for patients with pregestational DM and evaluate for differences by diabetes type or glycemic control.

STUDY DESIGN: Retrospective cohort study of patients with DM and cHTN who entered care < 20wga and had ^{3} 3 prenatal visits at a single center from 2012-2023. Fetal anomalies, multiple gestations, pregnancy loss < 20wga, and average BP ^{3} 160/110 were excluded. Individuals were characterized by average BP at visits: < 130/80, 130-139/80-89, and 140-159/90-109. The primary outcome was preeclampsia. Secondary outcomes were PTB, composite neonatal morbidity, and NICU admission. Outcomes were compared between groups and multivariable logistic regression estimated the association between BP and outcomes. ROC curves were constructed for the prediction of preeclampsia by BP. Optimal cutpoints were determined using the Liu method.

RESULTS: Of 486 patients with DM and cHTN, 184 (38%) had average BP < 130/80, 201 (41%) < 130-139/80-89, and 101 (21%) 140/90-159/109. Those with higher BP were more likely to use antihypertensives and aspirin. Diabetes type, prepregnancy A1c, and last A1c did not differ. Patients with BP < 130/80 or 130-139/80-89 were less likely to have preeclampsia regardless of diabetes type and prepregnancy A1c (interaction p 0.92 and 0.22). Patients with lower BP were less likely to have PTB, composite neonatal morbidity and NICU admission. When analyzed as continuous measures, SBP and DBP were good predictors of preeclampsia (AUC 0.76 and 0.71) with optimal cutpoints of 129 mmHg and 78 mmHg.

CONCLUSION: For pregnant individuals with pregestational DM and cHTN, antepartum BP control to < 130/80 may be associated with lower odds of preeclampsia, PTB, and neonatal morbidity. Statistically optimal BP cutoffs support the BP goal < 130/80 mmHg for all individuals with pregestational DM regardless of diabetes type and glycemic control.



	<130/80 aOR (95% CI)*	130-139/80-89 aOR (95% CI)*	140-159/90-109 aOR (95% CI)*
Preeclampsia	0.09 (0.05-0.18)	0.28 (0.15-0.53)	Referent
PTB <37wga	0.19 (0.10-0.34)	0.35 (0.19-0.62)	Referent
PTB <34wga	0.19 (0.10-0.38)	0.33 (0.19-0.60)	Referent
Neo Composite**	0.22 (0.09-0.54)	0.29 (0.12-0.74)	Referent
NICU admission	0.33 (0.18-0.60)	0.41 (0.23-0.74)	Referent

*Adjusted for gestational weight gain, aspirin use, antihypertensive medications, diabetes type
**Fetal/neonatal death, SGA, NICU admission, hypoglycemia, hyperbilirubinemia

409 Evaluating mean gestational age at delivery following early identification of short cervical length

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OBJECTIVE: To compare mean gestational ages at delivery between different interventions after early identification of short cervical length.

STUDY DESIGN: Retrospective cohort analysis of pregnant women who were identified with a short cervix at an initial 16 week to 22 week ultrasound at a teaching community hospital were performed from January 2016 to December 2021. All patients with a short cervix defined as 25mm or less were offered treatment with vaginal progesterone, cerclage, 17-hydroxyprogesterone (17-OHP), or with a combination of the therapies.

RESULTS: A total of 293 pregnant patients were identified and evaluated for having a short cervix as defined by less than 25mm. They received either vaginal progesterone, cerclage, vaginal progesterone and cerclage, 17 OHP, or cerclage with 17 OHP for prevention of preterm birth in their pregnancies. In the less than 15mm cervical length group, there was no statistically significant difference in the gestational age of delivery (F value 1.49, p value: 0.19). In the less than 15-20mm, cervical length group, there was no statistically significant difference in the means of all treatment groups (F value 0.85, p value: 0.53). And in the 20-25mm cervical length group, there was no statistically significant difference in the means of all treatment groups (F value 0.56, p value: 0.76).

CONCLUSION: Our results show there is no significant difference in mean gestational age at delivery for women who received a cerclage, vaginal progesterone, 17-OHP, or a combination of the treatments after short cervix identification at 16-18 weeks.

		Cerclage	Vaginal Progesterone	17 OHP	Cerclage & VP	Cerclage & 17OHP	None	F Value	P Value
Mean Gestational Age At Delivery (days)	<15mm	201.3	234.3	223.9	219.6	223.5	245.7	1.49	0.19
	15-20mm	248.3	249.1	244.4	265.6	243.2	261.1	0.85	0.53
	20-25mm	NA	NA	255.1	259	243.1	255.7	0.56	0.72

Table 1: Mean Gestational Age at Delivery Stratified by Treatment after Early Identification of Short Cervical Length

410 Clinical Implications of Group Residential Treatment on Pregnant Individuals with Substance Use Disorder

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OBJECTIVE: Unstable housing has been associated with obstetric (OB) outcomes of increased risk of preterm birth and longer hospital stays. As clinical care for substance use disorder (SUD) may involve recovery housing, this study evaluates group residential living effects on maternal and neonatal outcomes for women with SUD.

STUDY DESIGN: This was a longitudinal cohort study of OB patients with SUD within a multi-specialty treatment program from 2015 to 2023. The intervention group included patients in group housing (i.e., residential treatment, recovery housing, or sober living facilities) at time of initial prenatal visit. Outcomes including maternal trauma, medications for opioid use (MOUD), infant birth weight, APGARs, and neonatal hospital stay length were observed. Fisher's exact and two-sample t-tests were used for analysis.

RESULTS: Overall, 87 patients resided in group housing and 380 resided in alternative housing (controls). Age, parity, race, and BMI did not differ significantly between groups. Patients in group housing had significantly greater history of past overdose (63% vs. 42%, p=0.01), violence or trauma experience (82% vs. 69%, $p < 0.05$), less likelihood of private insurance (0 vs. 5%, $p < 0.05$), higher anxiolytic use (17% vs. 9%, $p < 0.05$), and less satisfaction with living condition (56% vs. 66%, $p < 0.05$). Women in group housing reported different MOUD from those in alternative housing ($p < 0.05$), as they used more methadone (4.7% vs. 0.5%) or no MOUD at all (16% vs. 12%). Women in alternative housing reported more buprenorphine use (87% vs. 79%). Mean infant birth weight differed for those in group housing (3049 vs. 2926 grams, p=0.05). There were no significant differences in delivery mode or gestational age, APGARS, or neonatal length of hospital stay.

CONCLUSION: Despite a higher allostatic load, patients in group housing had differing infant birth weights and similar pregnancy and neonatal outcomes albeit small numbers. Further review may be valued to maximize OB outcomes and SUD treatment in this population.

Table 1. Combined Maternal and Neonatal Outcomes

	Group Housing (n=87)	Alternative Housing (n=380)	P-value
Maternal			
Outcomes			
Cigarette smoking at enrollment	79	314	0.21
Fagerstrom Test	4.7 +/- 2.0	4.6 +/- 2.1	0.92
MAT at enrollment			**0.02**
Buprenorphine	68 (79.1%)	325 (86.9%)	
Methadone	4 (4.7%)	2 (0.5%)	
No MAT	14 (16.3%)	45 (12%)	
Psychiatric comorbidity			
Depression	51 (62%)	206 (59%)	0.62
Bipolar disorder	9 (11%)	52 (15%)	0.48
Anxiety	51 (62%)	203 (58%)	0.53
ADHD	8 (10%)	18 (5%)	0.12
PTSD	12 (15%)	45 (13%)	0.72
GAD-7 Score	9.0	9.1	0.91
ACE Score	4.1	4.2	0.74
Anxiolytic	12 (17%)	28 (9%)	**0.05**
Anti-depressant	15 (21%)	40 (12%)	0.06
Experienced violence or trauma	51 (82%)	212 (69%)	[1]**0.04**
Edinburgh score	11.4	11.5	0.91
Food Insecurity	19 (22%)	76 (20%)	0.77
Living Condition Satisfaction	14 (56%)	76 (66%)	**0.05**
Neonatal			
Outcomes			
Delivery Gestational Age	39.1 [37.4 to 39.5]	38.4 [37.3 to 39.3]	0.06
Mode of Delivery			0.62
Vaginal	54 (63%)	222 (59%)	
Primary Cesarean	9 (11%)	55 (15%)	
Repeat Cesarean	23 (27%)	100 (27%)	
Fetal Growth Restriction	8 (9%)	37 (10%)	1
Birthweight (grams)	3049 +/- 510	2926 +/- 539	**0.05**
APGAR – 1 minute	8 [8 to 9]	8 [8 to 9]	0.61
APGAR – 5 minutes	9 [9 to 9]	9 [9 to 9]	0.13
Hospital Length of Stay	11 [6 to 21]	11 [6 to 20]	0.94
NICU Admission	67 (77%)	277 (73%)	0.50

411 Effect of aspirin on mechanical properties of mesenteric arteries in a mouse model of preeclampsia

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OBJECTIVE: Prior ex vivo animal studies have shown that acetylsalicylic acid (ASA) causes direct vasodilation of resistance vessels. The objective of this study is to understand the effect of ASA on the mechanical properties of mesenteric arteries in a murine model of preeclampsia (PE) and to further characterize ASA's mechanism of PE risk reduction.

STUDY DESIGN: Mesenteric arteries from a mouse model of PE and healthy gravid mice at 17.5 days gestation were dissected into rings and mounted to a Multi-Wire Myograph System. Arterial rings were precontracted with norepinephrine. Cumulative dose-response curves were calculated for ASA (0.001-0.006 μM), Calcitonin Gene-Related Peptide/CGRP ($10^{-10} - 10^{-7}$ M), a known endothelium-independent vasodilator, and acetylcholine ($10^{-10} - 10^{-5}$ M), a known endothelium-dependent vasodilator. The relaxation response was calculated as percent inhibition of the initially induced contraction, and the maximum possible effect for the reagent (E_{max}) was calculated accordingly. The concentration of each reagent required to

reduce tension by 50% (ED_{50}) was calculated when able. Student's t-test was used for statistical analysis.

RESULTS: Sixteen arterial rings from the PE model (n=4 mice) and 14 from healthy gravid mice (n=4) were included after excluding non-functioning channels and rings that did not demonstrate sustained contraction. E_{max} values (mean ± standard error of the mean) in PE and healthy mice respectively were 34.70±3.97 and 71.63±5.25% for ASA, 90.09±1.67 and 94.53±1.43% for CGRP, and 86.43±2.5 and 95.08±1.57% for acetylcholine. Mean E_{max} was significantly different between the PE and healthy groups for all reagents. ED50 could not be calculated for ASA. ED50 was significantly different between the PE and healthy groups for acetylcholine but not for CGRP, demonstrating altered endothelium in PE.

CONCLUSION: ASA does not have a direct vasodilatory effect on mesenteric arteries in a mouse model of PE. Thus, the ability of ASA to reduce preeclampsia risk may be due to its effects in early pregnancy at sites outside of the vasculature which alter the endothelium.

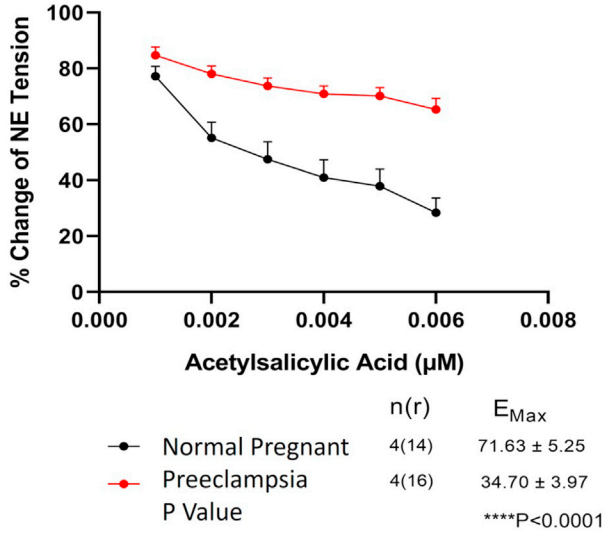

Figure 1: Percent inhibition of initial contraction induced by norepinephrine (NE) versus concentration acetylsalicylic acid (micromolar). N = number of mice, r = number of replicates, E_{max} = maximum possible effect (percent inhibition) ± standard error of the mean.

412 Flow mediated dilatation of brachial artery to evaluate endothelial dysfunction in gestational diabetes mellitus

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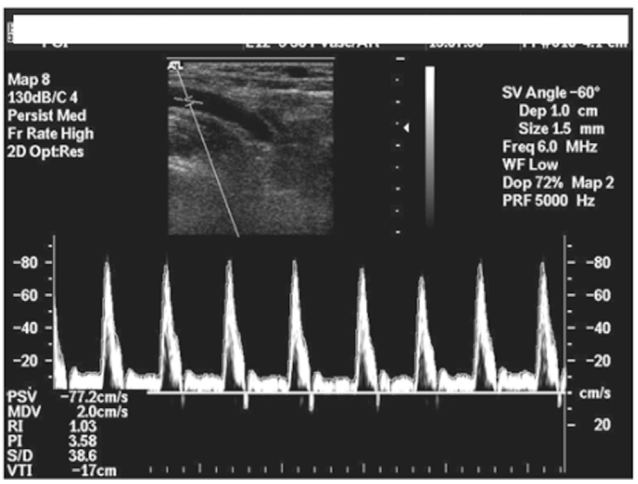
OBJECTIVE: To evaluate flow mediated dilatation in pregnant women with GDM as a measure of endothelial dysfunction.

STUDY DESIGN: Prospective case control study conducted in OBG department PGIMER, Chandigarh, India. We included 40 women with GDM, and 40 normoglycemic age and parity matched women. FMD was measured in brachial artery in antecubital fossa with clear anterior and posterior intimal interfaces between the lumen and vessel wall as continuous 2-D gray scale imaging at a frequency 10 MHz (figure 1). Baseline vessel diameter (D1), and after flow stimulus by inflation of sphygmomanometer cuff for five minutes above the systolic blood pressure and subsequent release of pressure (D2) were measured. FMD(%)was expressed as (D2-D1/D1) x 100. Continuous variables were analyzed using Student's T test and categorical data were analyzed using Chi square test.

RESULTS: Difference in mean FMD (15.93±11.21%) in GDM group and 18.10±7.62% in normoglycemic group was not significant (p = 0.32), it was statistically significant(p = 0.01)when compared with GDM sub group on MNT(medical nutritional therapy) and insulin(FMD 10.56 ± 11.2%). Within GDM group itself, mean FMD showed a trend towards significance(p = 0.056)in women with fasting blood sugar < 126 mg% versus FBS >126mg%.It was statistically significant(p= 0.042) between MNT plus insulin compared to MNT alone. Gestation at and mode of delivery, perinatal outcome were comparable in cases and controls. 6/40 (2.25%) GDM women had persistent hyperglycemia at 6 weeks post partum.

CONCLUSION: We conclude that women with GDM who require MNT and insulin have endothelial dysfunction. This can be explored further as cause of concurrent hypertension in GDM and cardiovascular morbidity in later life.



413 Differential exposure to antenatal steroids by sociodemographic factors among late preterm births

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OBJECTIVE: To determine if antenatal steroid exposure among late preterm births varies based on a patient's sociodemographic characteristics.

STUDY DESIGN: This is a cross-sectional analysis using the 2021 US natality data. The primary outcome was receipt of steroids among singleton late preterm births (34-36 weeks of gestation). The rates of steroid exposure were compared among the following sociodemographic factors: age, race, ethnicity, primary payer, and education. A multivariable logistic regression model was constructed with all the sociodemographic factors and clinical factors that were hypothesized to potentially influence clinical decision-making around steroid use, including gestational age, parity, fetal sex, chronic and pregnancy-related hypertension, and pre-existing and diabetes. Models used cluster robust standard errors based on county of birth.

RESULTS: In 2021, there were 279,305 singleton late preterm births, of which 17.5% were exposed to antenatal steroids. The rates of steroid exposure varied by all examined sociodemographic factors, with the largest range observed for payer (12.5% for self-pay to 20.1% for private insurance) (Table). In the multivariable model that accounted for clinical factors, there were no differences by maternal age; however, other sociodemographic factors were associated with steroid exposure (adjusted odds ratios shown in Table). Compared with White, Non-Hispanic, and privately individuals, odds of steroid exposure were lower in most other racial groups, in Hispanic individuals, and in non-commercially insurance patients. Higher levels of education were associated with higher odds of steroid exposure.

CONCLUSION: Despite no recommendations to consider sociodemographic factors when offering the intervention, steroid exposure among late preterm infants varied significantly by these observed factors. Additional work to understand the drivers of these differences, such as physician, hospital, or regional factors, can inform policy solutions to eliminate potential disparities.

Sociodemographic Factor	Steroid Exposure (%)	p-value for comparison	Adjusted Odds (95% CI)
Maternal Age			
<18	15.1%	<0.001	0.96 (0.86, 1.07)
18-34	18.7%		*Reference*
>35	18.4%		0.92 (0.89, 0.96)
Race *per US Birth Certificate Designation*			
AIAN	18.3%	<0.001	0.98 (0.75, 1.28)
Asian	17.8%		0.89 (0.79, 0.997)
Black	17.6%		0.86 (0.80, 0.93)
More than 1 race	19.3%		1.00 (0.89, 1.13)
NHOPI	12.6%		0.62 (0.47, 0.83)
White	18.9%		*Reference*
Ethnicity			
Non-Hispanic	19.8%	<0.001	*Reference*
Hispanic	14.9%		0.79 (0.72, 0.87)
Payer			
Medicaid	16.7%	<0.001	0.85 (0.81, 0.89)
Private	20.1%		*Reference*
Self-pay	12.5%		0.68 (0.60, 0.75)
Other	18.7%		0.88 (0.77, 1.02)
Unknown	15.8%		0.75 (0.60, 0.95)
Education			
< High school	14.3%	<0.001	*Reference*
High school	17.2%		1.12 (1.06, 1.18)
Post-secondary	20.3%		1.26 (1.20, 1.32)

AIAN, American Indian and Alaskan Native.
NHOPI, Native Hawaiian and Other Pacific Islander.

414 County-level antenatal steroid exposure among late preterm births, 2016-2021

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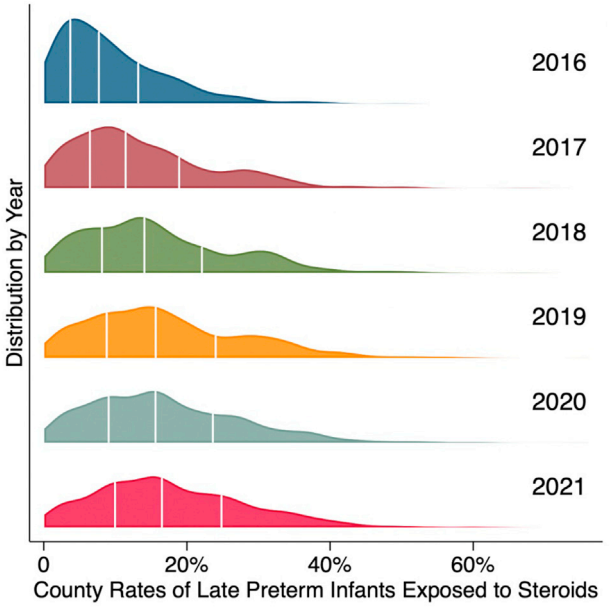
OBJECTIVE: To examine the pace of adoption of new evidence demonstrating the benefits of antenatal steroids among late preterm births throughout the United States.

STUDY DESIGN: This is a cross-sectional analysis using the late preterm births between 2016 and 2021 using US natality data. County-level proportions of late preterm births exposed to antenatal steroids were calculated by year for counties and reported at least one steroid exposed infant per year. Ridgeline plots, weighted by a county's annual late preterm birth delivery volume, were constructed to demonstrate if and how the county-level proportions changed by year. Yearly county proportions of late preterm births exposed to steroids were compared using nonparametric K-sample test on the equality of medians.

RESULTS: There were 995 counties, and 1,338,973 late preterm births were included in this analysis. Figure 1 shows the proportion of late preterm births exposed to steroids increased significantly in US counties between 2016 and 2021 and the interquartile range widened: median (IQR) 7.1% (3.7-12.5%) to 15.4% (7.7-24.4%), $p< 0.001$. There was no significant difference in the medians between 2020 and 2021.

CONCLUSION: The proportion of late preterm births exposed to steroids increased significantly among US counties after the publication of the ALPS Trial, though practice variation widened over time. The observed increase in county-level proportions of steroid-exposed late preterm births plateaued in 2020, suggesting the practice change observed after the ALPS Trial may have reached a steady state. Studies examining the drivers of the wide variation in steroid exposure, including hospital, clinician, and patient factors, should be conducted to identify both barriers and facilitators to the adoption of this evidence-based recommendation.



The white lines in the ridgeline plots reflect the median (center line) and interquartile range (outside lines).

415 Fetoscopic laser outcomes for twin-twin transfusion syndrome with or without concomitant selective fetal growth restriction

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OBJECTIVE: Fetal growth discordance (FGD) and selective fetal growth restriction (sFGR), which often accompany twin-twin transfusion syndrome (TTTS), are caused by discordant placental territories. The objective of this study was to determine the impact of FGD and sFGR on survival following fetoscopic laser surgery for the primary diagnosis of TTTS.

STUDY DESIGN: This was a retrospective cohort study of cases of fetoscopic laser performed for TTTS in monochorionic diamniotic twin pregnancies in the North American Fetal Therapy Network (NAFTNet) Complicated MC Twin Registry. FGD was defined as a ≥25% weight discordance and sFGR as FGD with one fetus >10th percentile for gestational age (GA). Exclusion criteria were loss to follow-up, selective termination, monoamniotic pregnancies and triplet or higher order multiples. Primary outcome was fetal survival and secondary outcomes were GA at delivery and fetal complications.

RESULTS: 2880 pregnancies were identified in the registry, of which 1194 were excluded. Of the 1686 pregnancies who were included for analysis, 688 had FGD and 377 qualified as sFGR. The table shows the pre-laser ultrasound evaluation. Dual survival was 75.15% in TTTS only, 62.50% in the TTTS+FGD and 61.01% in TTTS+sFGR (p< 0.001). Donor survival was 86.24%, 69.72% and 67.90% respectively (p< 0.001). Compared to TTTS alone, odds ratios for dual survival were 0.546 (0.442-0.675) in TTTS+FGD and 0.540 (0.421-0.692) in TTTS+sFGR. Odds ratios for donor survival were 0.367 (0.288-0.468) and 0.384 (0.292-0.506) respectively. Results remained statistically significant after adjusting for TTTS stage, Doppler anomalies and GA at laser. GA at delivery did not differ between groups. Fetal complications occurred in 2.56% of the TTTS-only group, 3.05% of the TTTS+FGD and 4.51% of the TTTS+sFGR.

CONCLUSION: Fetal dual survival is affected by the presence of FGD, even without sFGR, at the expense of the smaller twin.

Table: Prelaser ultrasound evaluation

	TTTS only	TTTS + FGD	TTTS + sFGR
GA at laser	20.69 (2.71)	20.92 (2.70)	21.04 (2.56)
TTTS stage at treatment n(%)			
1	150 (15.42%)	65 (9.64%)	41 (11.05%)
2	357 (36.69%)	163 (24.18%)	78 (21.02%)
3	424 (43.58%)	391 (58.01%)	223 (60.11%)
4	42 (4.32%)	55 (8.16%)	29 (7.82%)
Abnormal UA Donor Recipient	 174 (20.21%) 85 (9,86%)	 295 (45.88%) 29 (4.55%)	 181 (51.71%) 16 (4.58%)
Abnormal DV Donor Recipient	 53 (6,90%) 240 (41.38%)	 91 (15.69%) 166 (37.05%)	 53 (17.38%) 72 (34.29%)

416 Critical congenital heart disease: Contemporary prenatal screening performance in an Irish perinatology center

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OBJECTIVE: Prenatal detection of critical congenital heart disease (CCHD) optimises neonatal outcome. The objective of this study was to determine the prenatal screening performance of a program instituted in a tertiary-referral perinatology center with a prescribed screening protocol, multi-dimensional training support, senior in-person review of all suspected CCHD cases and extended support for secondary referral services.

STUDY DESIGN: A 4-year retrospective cohort study examined all cases of CCHD requiring intervention in the first 4 weeks of life among infants delivered in a perinatology center and its affiliated regional sites. All cases of CCHD that underwent pregnancy termination, died in-utero or in the early neonatal period were also ascertained. The protocolised prenatal screening service included a scan at 18-22 weeks, repeat screening for cases of non-acquisition of defined 4-chamber or outflow tract views and Fetal Medicine review in the event of non-acquisition on 2nd attempt. CCHD was defined as duct-dependency or cardiac abnormality requiring urgent intervention in the first 4 weeks of life. All cases were referred to a single national pediatric cardiac centre. Data sources included dedicated prenatal ultrasound and pediatric cardiology databases, perinatal, neonatal and pediatric chart review.

RESULTS: From 01/2019 to 12/2022, among a consecutive cohort of 49,950 pregnancies who underwent prenatal screening for congenital heart disease, 104 cases (0.2%) were significant for CCHD, of whom 91% (95/104) were detected in the prenatal period. Aortic coarctation represented 78% (7/9) of CCHD cases first identified in the neonatal period, with 2 additional cases of postnatally-identified pulmonary stenosis. No case of single-ventricle pathology nor of transposition of the great arteries was missed by the prenatal screening program.

CONCLUSION: Prenatal detection of CCHD in a tertiary care unit and its affiliated sites exceeds 91%, with undetected cases limited to outflow tract obstructive lesions that may not be amenable to prenatal detection.

Table 1: Critical Congenital Heart Disease identified in screened cohort*

CCHD 2019-2022 N =104	Cases detected prenatally N = 95/104 (91%)	Cases 1st identified in Postnatal period N = 9/104 (9%)
Duct-dependent Left: Aortic arch/valve stenosis/ Hypoplastic left heart disease	39/46 (85%)	7/46 (15%)
Duct-dependent right: Pulmonary atresia/stenosis/ Hypoplastic right heart disease	38/40 (95%)	2/40 (5%)
Transposition of great arteries (TGA)	15/15 (100%)	0/15 (0%)
Congenital heart block (CHB)	3/3 (100%)	0/3 (0%)

*N = 49,950 pregnancies screened between Jan 2019 and December 2022

CCHD = Critical congenital heart disease (duct-dependency or requirement for urgent cardiac intervention in 1st 4 weeks of life)

417 Does the allowable blood loss calculator predict postpartum blood transfusion?

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[1]Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, NY, [2]Montefiore Medical Center, Albert Einstein College of Medicine, New York, NY, [3]Population Council's Center for Biomedical Research, New York, NY, [4]Albert Einstein College of Medicine, New York, NY, [5]New York University Grossman Long Island School of Medicine, New York, NY

OBJECTIVE: The allowable blood loss (ABL) calculator is a patient specific computation used in surgery, trauma and pediatrics that determines at what surgical blood loss transfusion should be considered. This calculator has not yet been studied in the obstetric population. The aim of this study was to investigate if the ABL calculator accurately predicted postpartum blood transfusion in obstetric patients with postpartum hemorrhage (PPH).

STUDY DESIGN: This retrospective cohort study included all gravidas with PPH at our regional perinatal referral center between January 2020−December 2022. Patients with BMI > 40kg/m2 were excluded. PPH was defined as quantitative blood loss (QBL) > 1L within 24 hours of delivery. ABL calculation is based on patient's weight, hemoglobin and average blood volume, with a threshold hemoglobin of 7.0g/dl. The primary outcome was the performance of ABL to predict the need for blood transfusion. We used actual QBL greater than ABL (QBL > ABL) as the threshold for prediction. Sensitivity, specificity, and positive and negative predictive values of QBL > ABL were determined using actual transfusion as the gold standard. Chi-square test and unpaired student t-test were used to compare categorical and continuous variables, respectively. Multivariable logistic regression analysis was also performed.

RESULTS: Overall, 1387 patients met inclusion criteria. Of them, 504 (36.3%) received a blood transfusion. The predictive performance of the QBL > ABL calculation for requiring blood transfusion in gravidas with PPH is presented inTable 1.The positive predictive value for transfusion requirement was 91% (table 1). Gravidas with a QBL > ABL were 21.66 times more likely to be transfused compared to those with a QBL less than ABL, after adjusting for potential confounders (95% CI 9.731−48.2, p < 0.01).

CONCLUSION: ABL calculation can assist in predicting the need for blood transfusion requirement in gravidas with PPH.

Table 1. Predictive performance of QBL > ABL calculation for requiring blood transfusion in gravidas with postpartum hemorrhage

	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value	Odds Ratio* (95% CI)
Transfusion	16%	99%	91%	74%	21.66 (9.731 – 48.2)

*Adjusted for age, BMI, race/ethnicity, pre-eclampsia, pre-delivery anemia, infection, abruption
QBL, quantitative blood loss; ABL, allowable blood loss;

418 Effectiveness of music therapy in reducing anxiety levels among women undergoing induction of labor

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OBJECTIVE: Induction of labor (IOL) can trigger anxiety and fear due to its prolonged process and uncertainty. Music therapy, an evidence-based intervention, has demonstrated potential in reducing anxiety during medical procedures. This study aimed to assess the effectiveness of music therapy in alleviating anxiety among women undergoing IOL.

STUDY DESIGN: This prospective study (2021-2023) included term pregnant women undergoing IOL using PGE_2 vaginal pessary, between 12:00PM-3:00PM. Participants were assigned to either the music group, having a 45 minutes music therapy session by a certified therapist starting one hour after IOL began, or the control group, without music therapy. Anxiety levels were measured using the State(S)-Trait(T) Anxiety Inventory (STAI) questionnaire (scale 20-80), anxiety and visual analogue stress (VAS) scores (scale 0-10) and salivary cortisol levels (in a subgroup of patients), before and immediately after the music therapy session.

RESULTS: A total of 89 women participated, with 49 in the music group and 40 controls. Maternal characteristics as marital status, education, religion, income and obstetric history were similar between the groups, as well as STAI-T scores representing general trait anxiety. Before intervention, STAI-S scores representing situational anxiety, were higher in the music group (46±11 vs. 39±10.4, p=0.004). Cortisol levels, anxiety scale scores, and VAS scores were comparable between groups. After the music therapy, there was a significant reduction in salivary cortisol levels, STAI-S, anxiety and VAS scores, in the music group compared to control: mean delta -0.08±0.07 μg/dL vs +0.04±0.18 μg/dL, p=0.032; mean delta -13.6±8.4 points vs -2.8±6.7 points, p< 0.001; mean delta -2.6±2.2 points vs -1.2±2.1 points, p=0.004, mean delta -0.9±2.1 points vs +0.7±1.2 points, p< 0.001, respectively. These results remained significant after adjusting for confounders (p≤0.02).

CONCLUSION: Music therapy effectively reduces anxiety levels among women undergoing IOL. Implementing music therapy during IOL may serve as a non-invasive approach to improve birthing experience.

Table 1. Anxiety levels in the music therapy group compared to control

Variable		Music Therapy (n=49) (n=14)*	Control (n=40) (n=20)*	P-value
Salivary cortisol levels (μg/dL)	Before intervention	0.43 ± 0.11	0.39 ± 0.12	0.305
	After intervention	0.36 ± 0.09	0.42 ± 0.27	0.408
	Delta	**-0.08 ± 0.07**	**+ 0.04 ± 0.18**	**0.032**
STAI Trait score (points)		34.6 ± 7.7	33.0 ± 6.1	0.324
STAI State score (points)	**Before intervention**	**46.0 ± 11.0**	**39.0 ± 10.4**	**0.004**
	After intervention	**32.4 ± 6.8**	**36.1 ± 9.1**	**0.032**
	Delta	**- 13.6 ± 8.4**	**- 2.8 ± 6.7**	**<0.001**
Anxiety Scale Score (points)	Before intervention	5.0 ± 2.8	4.1 ± 2.7	0.118
	After intervention	2.4 ± 2.5	2.8 ± 2.3	0.395
	Delta	**-2.6 ± 2.2**	**-1.2 ± 2.1**	**0.004**
VAS Score (points)	Before intervention	3.1 ± 2.8	2.2 ± 2.0	0.075
	After intervention	2.2 ± 2.4	2.8 ± 2.4	0.247
	Delta	**- 0.9 ± 2.1**	**+ 0.7 ± 1.2**	**<0.001**

n: Number; Data presented as mean ± SD

*Subgroup of patients in whom salivary cortisol levels were measured

419 Can postpartum HbA1C replace oral glucose tolerance test among gestational diabetes mellitus patients?

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OBJECTIVE: Gestational Diabetes Mellitus (GDM) raises the risk of developing Type 2 Diabetes Mellitus (T2DM). The American College of Obstetricians and Gynecologists (ACOG) recommends a postpartum 2-hour 75-gram Oral Glucose Tolerance Test (2h-OGTT) for T2DM detecting. However, global reports indicate low OGTT compliance. Nowadays, Glycated Hemoglobin (HbA1C) is a common diagnostic and follow-up exam for T2DM. Previous studies explored HbA1C as an OGTT replacement for diagnosing T2DM in patients with GDM, but different methodologies have led to

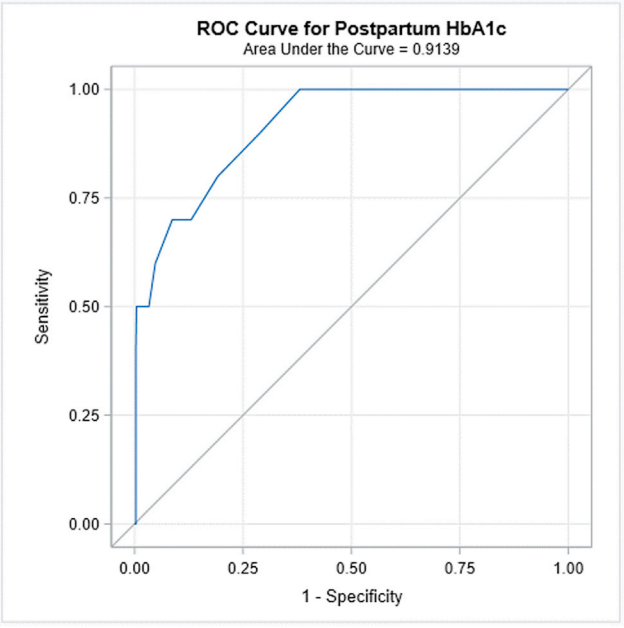
conflicting results. We aimed to assess 3-12 months postpartum HbA1C's sensitivity and specificity for T2DM detection in previous GDM cases.

STUDY DESIGN: We conducted an analysis of the largest health care organization in Israel. Inclusion criteria were pregnant individuals diagnosed with gestational diabetes mellitus (GDM) according to the Carpenter and Coustan's criteria and had records of both postpartum 2h-OGTT and HbA1C. We hypothesized that 3-12 months HbA1C postpartum, show equivalence to the OGTT gold standard.

RESULTS: Among 9,118 individuals $\geq$ 2 abnormal OGTT values, mean baseline characteristics were: age at delivery: 33.4 years, BMI before delivery: 28.6, gravidity: 3.4, parity: 2.8. Postpartum: mean HbA1C: 5.4%, fasting glucose: 92.6 mg/dL, 2-hours OGTT: 101.8 mg/dL.

677 individuals had HbA1C records at 3 to 12 months postpartum, along with records of the 2-OGTT performed up to 12 months post-delivery. The overall Pearson correlation coefficient between HbA1C and 2h-OGTT was 0.21 ($P < 0.0001$). However, when the 2h-OGTT results were stratified into values > 200 mg/dL, the ROC curve Area Under the Curve (AUC) of 91.4% [95% CI: 83.9%-98.9%], and HbA1C levels of 5.6% had 90.0% sensitivity and 71.1% specificity (95% CI: 55.5%-99.8%).

CONCLUSION: 3-12 months postpartum HbA1C can be a valid alternative to screen for Type 2 Diabetes in high-risk GDM cases.



420 CS in Single Cephalic Term Nulliparas: The Changing Size of Robson Group 1 and 2

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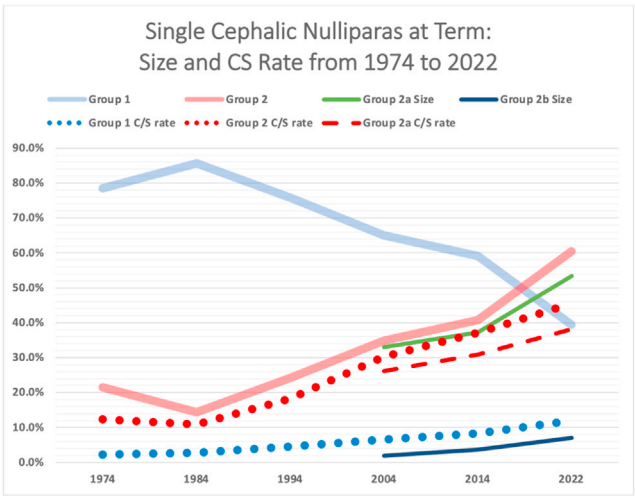
OBJECTIVE: To describe the change in sizes, pathway to delivery and and caesarean section (CS) rates in Single Cephalic Nulliparas >=37 weeks' gestation from 1974 to 2022.

STUDY DESIGN: This is a single centre longitudinal cohort study at an Irish tertiary maternity centre. The study population was singleton cephalic pregnancies at >=37 weeks' gestation with spontaneous or induced labour or prelabour caesarean section (Robson Group 1, 2a and 2b) delivered between 1974 and 2022. Regression analysis was performed to analyze trends in the size of each group as proportion of the overall population, and for CS rates within the groups.

RESULTS: From 1974 to 2022, the CS Rate in Single Cephalic Nulliparas >=37 weeks' gestation (SCNT) increased from 4.5% to 32.3% (115/2575 to 811/2515). Group 1 made up a decreasing proportion of the SCNT from 78.4% (2020/2575) to 39.5% (993/2515) and Group 2 made up an increasing proportion from 21.6% (555/2575) to 60.5% (1522/2515, R-Squared 0.951, p=0.005, Figure 1). Within Group 1, the CS Rate increased from 2.3% in 1974 to 11.9% in 2022 (R-Squared 0.9644, p=0.003). The CS Rate in Group 2 increased from 12.3% to 45.5% (R-Squared 0.994, p=0.002). Since the first recording of Group 2a and 2b in 2004, , the absolute size of Group 2a increased from 33.0% of the Singleton Cephalic Nulliparous population >=37 weeks gestation to 45.5% (R-Squared=0.829, p< 0.001). The absolute size of 2b also increased from 1.9% to 7.1% of the single cephalic nulliparous population >=37 weeks' gestation (R-Squared 0.829, p< 0.001).

CONCLUSION: Among Single Cephalic Nulliparas >=37 weeks' gestation, the primary pathway to delivery is now induced labour, where it was once spontaneous labour. Induced labour is associated with higher rates of CS than spontaneous labour, and CS within both have also increased over the last sixty years. When analysing CS rates in SCNT >=37 weeks' gestation, examination of the size of Group 1, 2a and 2b is critical as the first step to interpretation.



421 Association between placental gene expression and IL-10 levels in maternal serum

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OBJECTIVE: Maternal inflammation is associated with adverse pregnancy outcomes. Interleukin 10 (IL-10), an immunoinhibitory

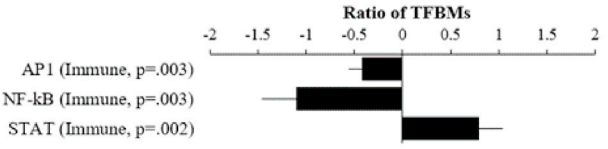
cytokine found in serum, is indicative of systemic inflammation. We utilized novel placental gene expression analysis to evaluate differently expressed placental genes and IL-10 serum levels to explore pathways that may increase risk of adverse pregnancy outcomes.

STUDY DESIGN: This is a secondary analysis of a prospective randomized controlled trial of a racially diverse, low-income sample. Serum was collected twice during gestation between 12-24 and 32-40 weeks, and fresh placental villous tissue was collected at delivery. Serum IL-10 levels were log-transformed, standardized, and averaged across time points with standard deviation marking the increase. Placental genome-wide mRNA profiles were analyzed to identify transcripts showing >2-fold differential expression over the 4-SD range of maternal IL-10 variation, adjusting for potential confounders, including age, first prenatal BMI, race and ethnicity, newborn sex, GA at delivery, and mode of delivery. TELiS analyzed transcription factor activity.

RESULTS: Maternal serum and placental biopsies were available for 428 patients. Mean gestational age at serum collections were 16.3±2.9 weeks and 34.3±1.6weeks. Higher maternal IL-10 in serum was associated with lower activity of key pro-inflammatory signaling pathways in placentas (AP1↓25%, p=.003; NF-kB↓53%, p=.003) and higher activity of the STAT family signaling pathways that mediate signaling through the IL-10 receptor (↑73%, p=.002) (Figure 1). There were no differences in pathways related to tissue hypoxia, immune response or neural signaling.

CONCLUSION: Circulating IL-10 in maternal blood in pregnancy is associated with reduced inflammatory signaling in placental tissues at delivery. Caution is needed in interpreting this correlation, but these data are consistent with the hypothesis that maternal IL-10 serum levels are related to placental inflammation, and could represent a target for clinical intervention.

Figure 1. Differential Transcription Factor Activity in Placentas with High Levels of IL-10 in Maternal Serum



X axis is the log2 ratio of transcription factor-binding motifs (TFBMs) in core promoter sequences of differentially expressed genes with >2-fold variation in expression over a 4-SD range of IL-10 levels in maternal serum. Error bars reflect standard error.

422 Differences in placental gene expression in term and preterm birth

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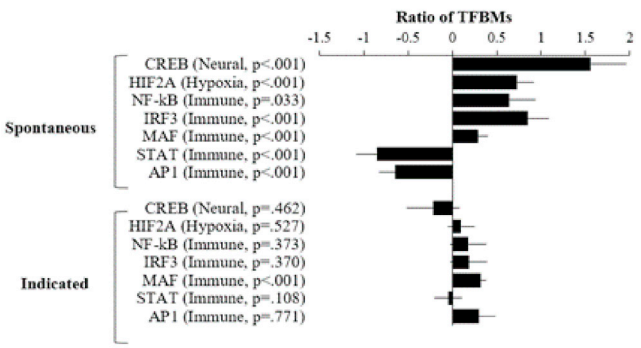
OBJECTIVE: We used novel placental gene expression analysis to compare placental gene expression of preterm birth (PTB) vs term birth (TB) participants and evaluate underlying biological mechanisms of PTB.

STUDY DESIGN: This is a secondary analysis of a prospective randomized controlled trial of a racially diverse, low-income sample. Genome-wide mRNA profiles from fresh placental villous tissues were analyzed to identify transcripts showing >2-fold differential expression in spontaneous PTB (sPTB) vs TB, controlling for potential confounders, including maternal age, first prenatal BMI, race, ethnicity, and smoking. Parallel analyses examined indicated PTB (iPTB) vs TB with a >1.5-fold differential to accommodate the more modest transcriptomic correlates.

RESULTS: Of the 700 placentas biopsied, 69 were PTB: 28 sPTB and 41 iPTB. 493 differently expressed genes between sPTB vs TB indicated increased activity of multiple gene regulation pathways (Figure 1), including hypoxia-induced pathways (HIF2A↑66%, p< .001), innate immune response pathways (NF-kB↑56%, p=.033; IRF3↑80%, p< .001; MAF↑23%, p=.004), and neural signaling (CREB↑195%, p< .001). Other inflammatory pathways were conversely down-regulated (AP1↓36%, p< .001; STAT↓45%, p< .001). Transcript origin analyses implicated myeloid dendritic cells and non-classical monocytes in mediating differential gene expression in sPTB placentas (both p< .05). Most of these patterns were not seen in iPTB placentas (no significant difference in HIF2A, NF-kB, IRF3, AP1, CREB), although iPTB showed elevated MAF activity (↑25%, p< .001) and indicated dendritic cell and monocyte activity (both p< .010).

CONCLUSION: Placental tissue from sPTB showed activation of multiple gene regulation pathways involved in hypoxia, innate immune function, and neural signaling, and indicated myeloid lineage immune cell activation. Activation of these transcription control pathways are distinct to sPTB compared to iPTB and independent of maternal characteristics. These gene regulatory alterations may illuminate novel biological pathways underlying sPTB.

Figure 1. Differential Transcription Factor Activity in Placentas that gave birth Preterm



X axis is the log2 ratio of transcription factor-binding motifs (TFBMs) in core promoter sequences of differentially expressed genes in those who gave birth to preterm newborn, shown by spontaneous preterm birth and indicated preterm birth, compared to term birth (reference). Error bars reflect standard error.

423 Cannabis use and development of hypertension in the nuMoM2b Heart Health Study

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OBJECTIVE: Cannabis use is increasing among reproductive age people with largely unknown health effects. Prior research demonstrates an association between cannabis use and hypertension (HTN). We aimed to quantitatively evaluate if cannabis exposure after pregnancy is associated with incident HTN 2-7 years after pregnancy.

STUDY DESIGN: Secondary analysis of the nuMoM2b Heart Health Study. Nulliparous participants were followed from the first trimester of their index pregnancy to an in-person study visit 2-7 years after their pregnancy for development of adverse cardiovascular outcomes. The primary outcome was incident stage II HTN (systolic blood pressure ≥140 or diastolic blood pressure ≥90) or use of an antihypertensive agent at the time of the 2-7 year follow up visit. The primary exposure was cannabis exposure after pregnancy defined as urine positive for THC-COOH (11-nor-9-carboxy-delta-9-tetrahydrocannabinol) metabolite (cutoff ≥15 ng/ml) at the 2-7 year study visit. A multivariable logistic regression model was fit and adjusted for covariates that were selected *a priori* including nicotine exposure assessed at the 2-7 year visit (measured via serum cotinine levels or self-report), and occurrence of any adverse pregnancy outcome (APO), race/ethnicity, area deprivation index, maternal age, and diabetes mellitus at the time of the index pregnancy.

RESULTS: Of 4079 participants, 406 (9.95%) had exposure to cannabis and 216 (5.30%) developed HTN by the 2-7 year study visit (mean (SD) time to follow up: 3.2 (0.9) years). Neither cannabis (aOR 1.05, 95% CI 0.63-1.76) nor active nicotine (aOR 1.03, 95% CI 0.66-1.63) exposure were associated with incident HTN in multivariable modeling (Table). Factors collected at the index pregnancy that were associated with incident HTN included maternal age, index pregnancy APO, Black race, Hispanic ethnicity, and pregestational and gestational diabetes (Table).

CONCLUSION: Cannabis exposure following pregnancy was not associated with incident HTN within 2-7 years after controlling for nicotine exposure and known risk factors measured during the first pregnancy.

Table. Association between participant characteristics and incident hypertension 2-7 years after index pregnancy delivery among nuMoM2b Heart Health Study participants

Participant characteristics	All participants	Incident Hypertension		aOR (95% CI)
		Absent	Present	
	N = 4079	N =3863	N =216	
Characteristics during index pregnancy				
Maternal age (y)	27.1 (5.6)	27.0 (5.5)	28.1 (6.0)	1.28 (1.12-1.47)[1]
Maternal race and ethnicity				
White Non-Hispanic	2601 (63.8)	2488 (64.4)	113 (52.3)	
Black Non-Hispanic	496 (12.2)	451 (11.7)	45 (20.8)	2.16 (1.42-3.29)
Hispanic	667 (16.4)	631 (16.3)	36 (16.7)	1.51 (1.00-2.29)
Other	315 (7.7)	293 (7.6)	22 (10.2)	1.51 (0.93-2.46)
ADI (national), median (IQR)[2]	42 (22, 73)	42 (22, 72)	49 (22, 79)	1.02 (0.97-1.08)[3]
Diabetes mellitus				
No diabetes mellitus	3875 (95.0)	3691 (95.5)	184 (85.2)	
Pregestational diabetes	39 (1.0)	31 (0.8)	8 (3.7)	3.33 (1.46-7.59)
Gestational diabetes	165 (4.0)	141 (3.7)	24 (11.1)	2.57 (1.58-4.17)
Adverse pregnancy outcome[4]	1,260 (30.9)	1,126 (29.1)	134 (62.0)	3.61 (2.70-4.82)
Characteristics 2-7 years after index pregnancy delivery				
THC-COOH-based marijuana exposure[5]	406 (10.0)	379 (9.8)	27 (12.5)	1.05 (0.63-1.76)
Nicotine exposure[6]				
None	2866 (70.3)	2,728 (70.6)	138 (63.9)	
Passive	571 (14.0)	532 (13.8)	39 (18.1)	1.32 (0.89-1.95)
Active	642 (15.7)	603 (15.6)	39 (18.1)	1.03 (0.66-1.63)

[1] per 5-year increase
[2] Area Deprivation Index (ADI)
[3] per 10-unit increase
[4] Includes the presence of a hypertensive disorder of pregnancy (antepartum/intrapartum/postpartum hypertension, preeclampsia, and eclampsia); small for gestational age with birth weight less than the 5th percentile; preterm birth (iatrogenic or spontaneous) and/or stillbirth.
[5] Defined as 11-nor-9-carboxy-delta-9-tetrahydrocannabinol (THC-COOH) ≥ 15 ng/ml via liquid chromatography mass spectrometry assays of banked urine specimens.
[6] Nicotine exposure was defined by serum cotinine levels (>3 ng/mL for active exposure, 1-3 ng/mL for passive exposure) or self-report.
Note: Categorical variables are represented as n(%). Continuous variables are represented by mean (SD), unless otherwise indicated.
Note: Incident hypertension defined as stage II hypertension (140/90 mm Hg) or the use of antihypertensive agents 2-7 years after index pregnancy delivery.

424 Association between resilience and depression in patients with gestational diabetes

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OBJECTIVE: Research has shown higher rates of postpartum depression among patients diagnosed with gestational diabetes (GDM). Resilience could be a protective factor against depression and improve maternal adjustment to GDM diagnosis. Our objective was to examine the association between resilience and depression in patients with GDM.

STUDY DESIGN: Secondary analysis of the Nulliparous Pregnancy Outcomes study: Monitoring Mothers-to-be (nuMoM2b) dataset. Primary exposure was resilience, measured by Connor-Davidson Resilience Scale early in pregnancy and analyzed by tertiles, with the first tertile including patients with the lowest resilience score, and the third tertile with the highest resilience. The primary outcome was depression measured later in pregnancy, defined as Edinburgh Postnatal Depression (EDPS) score ≥ 10. Logistic regression was done to examine the association between maternal resilience and depression in GDM pregnancies, adjusting for marital status, insurance, maternal education, age, and BMI.

RESULTS: Of 340 participants included, 34.4% had resilience score in the lowest tertile, 32.9% had resilience in the second tertile, and 32.6% in the third tertile. EDPS score was significantly higher in the first and second tertile compared to the third tertile (7.6.2 ± 4.2, 5.6 ± 3.2, and 3.9 ± 3.6 respectively, $p < 0.001$). A total of 56 (18.2%) patients in this cohort had EDPS ≥ 10, and the rates were higher with lower resilience tertile (31.6% in the 1st tertile, 8.9% in the 2nd

tertile, and 8.1% in the 3rd tertile, p< 0.001). In unadjusted analysis, participants with higher resilience had lower odds of EDPS ≥ 10 (Table). In a multivariable analysis, higher resilience tertile remained to be independently associated with lower depression/EDPS ≥ 10 (aOR 0.22, 95% CI 0.10-0.47 for tertile 2, and aOR 0.20, 95% CI 0.09-0.46 for tertile 3), compared to the lowest tertile of resilience score (Table).

CONCLUSION: In pregnancies complicated by GDM, higher maternal resilience at the beginning of pregnancy was associated with lower odds of depression.

Table: Unadjusted and adjusted odds ratios for the association between resilience early in pregnancy and depression among patients with gestational diabetes*

Edinburg Depression Score ≥ 10	Odds Ratio (95% CI)	Adjusted Odds Ratio** (95% CI)
Resilience		
Tertile 1 (lowest resilience score)	Ref	Ref
Tertile 2	0.21 (0.10 - 0.45)	0.22 (0.10 – 0.47)
Tertile 3 (highest resilience score)	0.19 (0.09 - 0.42)	0.20 (0.09 – 0.46)

*Depression was measured with Edinburgh Postnatal Depression Scale and score ≥10 was defined as depression. Resilience was measured by Connor Davidson Resilience Scale and was reported by tertiles.
** Adjusted for age, marital status, insurance, maternal education, and BMI.

425 Effect of the COVID-19 pandemic on population-level mean arterial pressure during pregnancy and postpartum

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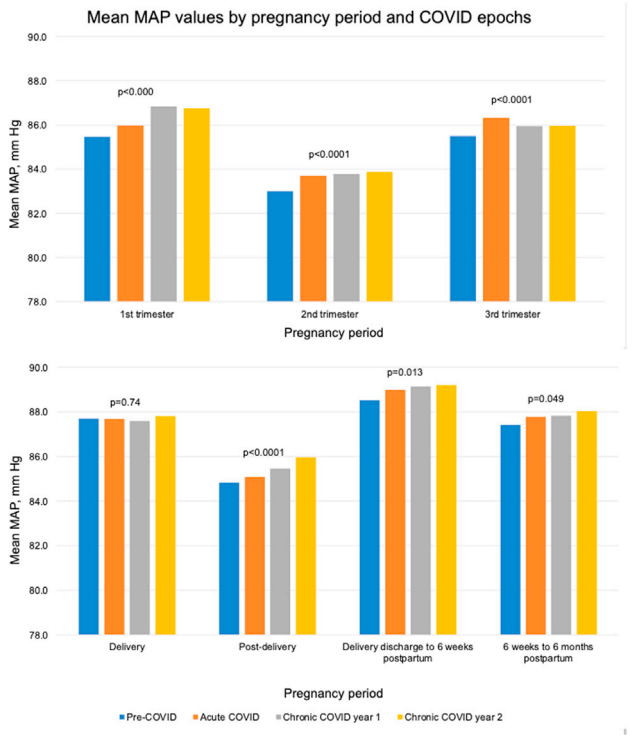
OBJECTIVE: We aimed to assess if population-level mean arterial pressures (MAP) in pregnancy and postpartum changed as a result of the COVID-19 pandemic and if any of these observed changes persisted.

STUDY DESIGN: This was a retrospective cohort study of pregnancies within a single healthcare system. Using EMR data, patients were assigned to one of four COVID-19 epochs (pre-, acute, and chronic years 1 and 2). Patients were assigned to acute COVID if their estimated due date was before 1/1/2021 and their gestational age was < 20 weeks by 3/10/2020. Pre-COVID and chronic 1 and 2 comprised matched months for the two years prior to, and post, acute COVID. MAP (mm Hg) was calculated for every blood pressure recorded for each patient. The mean MAP (μMAP) was computed for 7 discrete pregnancy periods (1st, 2nd, 3rd trimesters, admission for delivery-delivery [delivery], delivery-discharge [post-delivery], discharge-6 weeks postpartum, and 6 weeks-6 months postpartum). One-way ANOVA with post-hoc Tukey's honest significance test was employed to compare the μMAP across COVID epochs for each pregnancy period.

RESULTS: A total of 22,998 pregnancies occurred during the COVID epochs with the following distribution: pre-COVID n=9,174; acute COVID n=4,380; chronic 1 n=4,690; chronic 2 n=4,754. Significant elevations in μMAP were observed for the 1st, 2nd, and 3rd trimesters when comparing acute and chronic 1 and 2 to pre-COVID ($p< 0.05$; Figure). During delivery, no differences in μMAP across epochs were observed. However, we observed significant elevations post-delivery in μMAP for chronic 1 and 2 compared to pre-COVID. μMAPs were significantly higher in both postpartum periods when comparing chronic 2 to pre-COVID.

CONCLUSION: In general, μMAPs increased during acute COVID and remained elevated in the two chronic COVID epochs across pregnancy and up to 6 months postpartum. These results suggest that the COVID-19 pandemic was associated with population blood pressure elevations in pregnancy and that, at least to date, these changes have not remitted and appear to be durable.



426 Brain natriuretic peptide testing and severe maternal morbidity in pregnancies affected by heart disease

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OBJECTIVE: We aimed to describe patterns of brain natriuretic peptide (BNP) testing and levels prior to delivery hospitalization among pregnant patients with and without heart disease, and the association between BNP and severe maternal morbidity (SMM).

STUDY DESIGN: This retrospective cohort study included a nationwide sample of pregnant patients in EPIC Cosmos from 2018-2022 who delivered at 22-42 weeks. BNP or NT-proBNP drawn within 90 days preceding delivery were identified and categorized as normal or elevated (BNP ≥ 100 or NT-proBNP ≥ 300 pg/mL). Patients were classified as having no heart disease (no HD), congenital heart disease (CHD), acquired (AHD), or both by ICD-10 code. The primary outcomes were SMM and non-transfusion SMM per CDC definitions. Heart disease, race/ethnicity, social vulnerability index, insurance, obesity, chronic renal disease, diabetes, and gestational diabetes were included as covariates in logistic regression models exploring the association between BNP testing and SMM.

RESULTS: 1,817,361 pregnant individuals were included, of whom 1,679,306 (92.4%) had no HD, 13,648 (0.75%) CHD, 117,963 (6.49%) AHD, and 6,444 (0.35%) both. The groups differed with respect to all covariates (p< 0.001), including the proportion with a BNP within 90 days of delivery (no HD 4,685 (0.3%), CHD 131 (1.0%), AHD 2,030 (1.7%), and both 340 (5.3%); p< 0.001). Of

those who experienced SMM (N=39,331), 38,652 (98.3%) had no BNP testing, 512 (1.3%) had normal BNP, and 167 (0.4%) had elevated BNP levels. The odds of SMM and non-transfusion SMM were higher in patients who had a BNP within 90 days of delivery even if it was normal (SMM aOR 2.5, 95% CI 2.3, 2.8; non-transfusion SMM aOR 3.4, 95% CI 3.1, 3.8), and higher still if BNP was elevated (SMM aOR 8.6, 95% CI 7.1, 10.3; non-transfusion SMM aOR 12.4, 95% CI 10.0, 15.3).

CONCLUSION: Clinical judgment triggering BNP collection within 90 days of delivery likely identifies a cohort of patients at higher risk of SMM regardless of the result, but elevated results are associated with higher SMM risk.

Logistic regression of BNP testing within 90 days of delivery and severe maternal morbidity during delivery hospitalization.

	SMM			Non-transfusion SMM		
	N = 39,331			N = 17,349		
	N (%)	OR	aOR* (95% CI)	N (%)	OR (95% CI)	aOR* (95% CI)
No BNP testing	38,652 (98.3)	Ref	Ref	16,861 (97.2)	Ref	Ref
Normal BNP	512 (1.3)	3.91 (3.6-4.3)	2.5 (2.3-2.8)	360 (2.1)	6.31 (5.7-7.0)	3.4 (3.1-3.8)
Elevated BNP	167 (0.4)	16.1 (13.4-19.1)	8.6 (7.1-10.3)	128 (0.7)	28.1 (23.0-34.1)	12.4 (10.0-15.3)

aOR: adjusted odds ratio; BNP: brain natriuretic peptide or N-terminal pro-brain natriuretic peptide; CI: confidence interval; OR: odds ratio; SMM: severe maternal morbidity
* Maternal heart disease, race/ethnicity, social vulnerability index, insurance, obesity, hypertensive disorders of pregnancy, chronic renal disease, diabetes, and gestational diabetes

427 Delivery and neonatal outcomes associated with delivery versus expectant management following term decreased fetal movement

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OBJECTIVE: To compare delivery and neonatal outcomes among patients presenting to triage with a chief complaint of decreased fetal movement (DFM) at term who were either admitted for delivery < 24 hours, between 24-48 hours, or >48 hours.

STUDY DESIGN: This was a retrospective cohort study of patients with singleton gestations delivering at a large hospital system from 2013-2023. Using electronic medical records, patients presenting with the chief complaint of DFM at ≥37 weeks gestation were identified. Using timestamps, latency between DFM presentation and delivery admission was calculated. Patients were grouped into 3 categories: 1) < 24 hours, 2) 24-48 hours, 3) >48 hours. For patients who presented with DFM more than once beyond 37 weeks, the presentation most proximal to delivery was used. Comparisons across the categorical measure of time to admission were performed using chi-square tests or Fisher's exact tests as appropriate for categorical variables and means and standard deviations were compared using analysis of variance (ANOVA) test for continuous variable.

RESULTS: Of the 2,015 patients, 193 (9.6%) were admitted for delivery at < 24 hours, 131 (6.5%) between 24-48 hours, and 1,691 (83.9%) at >48 hours. The mean gestational ages at presentation for DFM were 39w3d +/- 7.0 days (< 24h group), 39w3d +/- 7.0 days (24-48h group), and 38w4d +/- 6.7 days (>48h group). The mean gestational ages at delivery were 39w4d +/- 7.1 days (< 24h group), 39w5d +/- 7.0 days (24-48h group), and 40w0d +/- 6 days (>48h group). There were no cases of stillbirth or neonatal demise. There were no significant differences in mode of delivery, rates of induction of labor, infectious or hemorrhagic maternal morbidities, or maternal length of stay by timing of delivery admission from DFM presentation. Neonatal outcomes were also similar such as birthweight and NICU admission (Table).

CONCLUSION: Among patients presenting with DFM to triage at term, expectant management with delivery beyond 48 hours was not associated with adverse perinatal outcomes as compared to admission for delivery within 24 hours or 24-48 hours.

Table: Delivery and neonatal outcomes among patients presenting to triage with DFM at term who were admitted for delivery within 24 hours, between 24-48 hours, or after 48 hours

	Delivery admission within 24h (n=193)	Delivery admission 24-48h (n=131)	Delivery admission >48h (n=1691)	p-value
Delivery outcomes				
Vaginal delivery	152 (78.8)	94 (71.8)	1208 (71.7)	0.11
Induction of labor	54 (28.0)	39 (29.8)	507 (30.0)	0.85
PPH	18 (9.3)	14 (10.7)	171 (10.1)	0.92
Chorioamnionitis or endometritis	7 (3.6)	9 (6.9)	86 (5.1)	0.43
ICU admission	0 (-)	0 (-)	3 (0.2)	0.75
Maternal LOS > 72h	67 (34.7)	46 (35.1)	673 (39.8)	0.25
Neonatal outcomes				
Birthweight (grams)	3410.7 +/- 454.0	3454.3 +/- 431.3	3467.2 +/- 417.3	0.21
SGA	23 (11.9)	6 (4.6)	169 (10.0)	0.08
LGA	15 (7.8)	12 (9.2)	166 (9.8)	0.65
NICU admission	18 (9.3)	11 (8.4)	190 (11.2)	0.46

Data are presented as N (%) or mean +/- standard deviation

PPH=postpartum hemorrhage (composite criteria fulfilled if estimated blood loss > 1000mL, patient received red blood cell transfusion, or had ICD-10 diagnostic code of postpartum hemorrhage), ICU=intensive care unit, LOS=length of stay, SGA=small for gestational age, LGA=large for gestational age, NICU=neonatal intensive care unit

428 Cost-effectiveness of BRCA1 testing at time of obstetrical prenatal carrier screening for cancer prevention

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OBJECTIVE: Incorporation of BRCA1 mutation testing at time of obstetrical carrier screening could provide a potential avenue for identifying patients with mutations. We developed a cost-effectiveness analysis to simulate BRCA1 testing versus no BRCA1 testing at the time of obstetrical carrier screening to assess population outcomes of such an approach.

STUDY DESIGN: A decision analysis and Markov model was creating in a theoretical cohort of 1,429,074 pregnant patients who annually undergo expanded carrier screening in the U.S. The initial decision point in the model was BRCA1 testing at time of expanded carrier screening. Model probabilities, cost and utility values were derived from published literature. For BRCA1 positive patients, the model simulated breast cancer screening and risk-reducing surgical interventions. A cycle length of 1 year and a time horizon of 47 years was used to simulate the lifespan of pregnant patients. Clinical outcomes included BRCA1 mutation positivity, cancer cases, and cancer deaths. Effectiveness was calculated in terms of average quality adjusted life years (QALYs). The primary outcome was incremental cost-effectiveness ratios (ICERs), expressed in 2022 US dollars/QALYs. One-way and two-way sensitivity analyses were performed to vary the assumptions across a range of plausible values.

RESULTS: Among our cohort, BRCA1 testing resulted in 3,716 additional BRCA1 patients being identified, 1,394 breast and ovarian cancer cases prevented, and 1,084 fewer deaths (Table 1). BRCA1 testing was a cost-effective strategy compared to no BRCA1 testing with an ICER of $86,001/QALYs. Multiple one-way and two-way sensitivity analyses did not substantially impact the cost-effectiveness.

CONCLUSION: Among pregnant women, BRCA1 testing at time of obstetrical prenatal carrier screening is a cost-effective management strategy to identify at risk women at a time when cancer screening

and preventive strategies can be effective. Despite the burden of additional genetic counseling, prenatal care represents a unique opportunity to implement population based genetic testing.

Table 1. Outcome of Study Population

Strategy at time of obstetrical carrier screening	N	BRCA1 patients identified by screening	Cancer cases	Deaths	Total cost ($)*	Total QALYs	ICER ($/QALYs)
BRCA1 testing	1,429,074	3,716	2,322	1,393	75,748,177,401	33,924,267	-
No BRCA1 testing	1,429,074	0	3,716	2,477	75,015,797,037	33,915,751	86,001

Assuming a population of 1,429,074 patients undergoing obstetrical carrier screening annually
* All costs in 2022 dollars.

429 Does Vaginal Progesterone prevent preterm birth in women with shortened cervix after 24 weeks?

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OBJECTIVE: To determine the association of vaginal progesterone treatment and the risk of spontaneous preterm birth (sPTB) in women with a short cervix diagnosed at 24-34 weeks of gestation.

STUDY DESIGN: A retrospective cohort study in a single university affiliated medical center with approximately 12,500 annual deliveries (2011-2022). Women with a singleton pregnancy and a newly diagnosed short cervix (≤25mm) at 24+0-33+6 weeks who were given vaginal progesterone were compared to those that were not treated. The initiation of progesterone treatment was based on physician's preference and continued until 36 weeks. Severe short cervix was defined as cervical length (CL) ≤15 mm. Exclusion criteria were: prior progesterone or tocolysis usage, cerclage and previous PTB. The primary outcome was sPTB < 37 weeks of GA.

RESULTS: 1. Overall, 862 women were eligible for analysis, among them 471 (54.6%) women were treated with vaginal progesterone and 391 (45.4%) did not. 183 women (21.2%) were diagnosed with CL≤15mm.

2. There was no significant difference between the groups in the rate of sPTB at < 37 weeks (29.4% vs.33.5%, p=0.19), 34 weeks (8.7% vs 12.1%, p=0.11) and 32 weeks (4.9% vs 7%, p=0.19).

3. No significant differences were found in background characteristics. Women in the progesterone group were diagnosed earlier (29.5 ± 2.7 vs. 31.5 ± 2.3, weeks P< 0.001), had a shorter CL at diagnosis (17.5 ± 5.3 Vs 19.6 ± 5 mm, P< 0.001), and higher rate of CL≤15 mm (25.9% vs 15.6%, P=0.01).

4. Progesterone treatment was associated with a longer interval from diagnosis to delivery, in women with CL≤ 25mm and CL≤15mm as comparted to no treatment [Mean time of 54 ± 27 vs. 41.8 ± 23.5 days, and 52.6 ± 29.5 vs 33.2 ± 27 days, respectively. (P< 0.001)]. Hazard Ratio of 1.9, 95% CI [1.7-2.3], and 2.2, 95% CI [1.4-3.3], respectively. (Figure).

CONCLUSION: Vaginal progesterone given to women with a short cervix at 24-34 weeks of GA is associated with mean prolongation of pregnancy of 12-19 days, with not significant impact on the rate of sPTB.

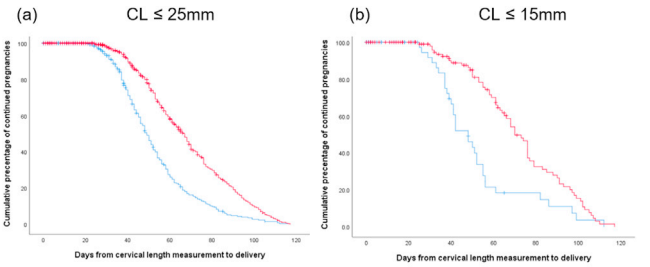

Figure:
Kaplan–Meier plot. Survival analysis shows the probability of women continuing pregnancy without spontaneous delivery (< 37 weeks) by days from the cervical length measurement to delivery for the progesterone treatment group (red line) and the no-treatment group (blue line). Progesterone showed prolongation of pregnancy for women with (a) CL ≤ 25mm, HR of 1.9, 95% CI [1.7-2.3], and (b) CL ≤ 15mm, HR 2.2, 95% CI [1.4-3.3].

430 Evidence-based stillbirth evaluation deficiencies remain following publication of national guidelines

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OBJECTIVE: Optimal evaluation of stillbirth has previously been limited by lack of clear evidence. Recent data from the Stillbirth Collaborative Research Network has informed new national guidelines. We sought to evaluate the impact of updated guidelines on stillbirth evaluation in a large health system.

STUDY DESIGN: This was a cohort study of patients with stillbirth delivering at 14 system hospitals from 2018 to 2022. Singleton pregnancies with antepartum stillbirth ≥ 20 weeks gestation or birthweight ≥ 350 grams were included. Multi-fetal gestations were excluded. Stillbirths from 1/2018 to 12/2019 (pre-release) were compared with those from 2/2021 to 2/2022 (post-release). The primary outcome was optimal stillbirth evaluation, defined as placental pathology, fetal autopsy/cytogenetic test counseling, and antiphospholipid testing. Secondary outcomes included evaluation of excess tests. Statistical analysis included Student's T test, chi square, and Fischer exact test when appropriate.

RESULTS: We evaluated 162 patients, with 81 pre-release and 81 post-release. Baseline characteristics were similar between groups. Prior to guideline release, 8.6% of workups were optimal compared to 18.5% post-release (OR 2.4, 0.9-6.1). Excess tests ordered were similar after release (56.8% vs 68.8%; OR 1.7, 0.9-3.2). Optimal evaluation improved at a primary teaching hospital from 14.3% to 66.7% (OR 12.0, 2.0-56.4).

CONCLUSION: In a large health system, optimal stillbirth evaluation improved at a primary teaching hospital following update of national guidelines. However, no improvement was documented system-wide, signaling obstacles to dissemination of evidence-based stillbirth evaluation.

	Pre-Guidelines (N=81)	Post-Guidelines (N=81)	Odds Ratio (95% CI)
Complete Stillbirth Evaluation	7 (8.6)	15 (18.5)	2.4 (0.9-6.1)
Placental Pathology	78 (96.3)	73 (90.1)	0.35 (0.1-1.2)
Fetal Autopsy Counseling	17 (21.0)	15 (18.5)	0.85 (0.4-1.8)
Genetic Counseling	26 (32.1)	21 (25.9)	0.87 (0.4-1.6)
Antiphospholipid Assessment	10 (12.3)	18 (22.2)	2.03 (0.9-4.7)
Excess Testing	46 (56.8)	55 (67.9)	1.61 (0.9-3.1)
Local Improvement at Ochsner Baptist	4 (14.3)	8 (66.6)	12 (2.0-56.4)

431 Examining the Cost-Effectiveness of the RSV Vaccination in Pregnancy

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OBJECTIVE: Respiratory syncytial virus (RSV) causes severe infections in neonates at increasing rates. A new vaccine has been shown to increase health benefits for neonates if given during pregnancy. We examined the cost-effectiveness associated with vaccinating all pregnant patients against influenza.

STUDY DESIGN: We designed a cost-effectiveness model using TreeAge to compare outcomes in pregnant patients who received the RSV vaccine to those who did not. We used a theoretical cohort of 3,661,220 the number of births in the United States in 2022. While RSV is a seasonal disease, we assumed that all patients would have an equal risk of RSV in the neonate as we examined the rate of infection within the first 6 months of life. Our outcomes included RSV infections in neonates, severe RSV infections requiring hospitalization, infant death due to RSV, and asthma incurred from RSV infection in addition to cost and quality-adjusted life years (QALYs). Probabilities, costs, and utilities were derived from the literature, and QALYs generated at a discount rate of 3%. Sensitivity analyses were performed to assess the robustness of our model.

RESULTS: For a one-year theoretical cohort of 3,661,220 patients, the RSV vaccine resulted in a decrease of 63,382 RSV infections, 45,325 of which required hospitalizations. Furthermore, the RSV vaccine resulted in 4 fewer infant deaths and 3,399 fewer cases of asthma before the age of 5. Vaccination resulted in an increased cost of $52 million and increased QALYs by 20,998 leading to an incremental cost-effectiveness ratio (ICER) of $24,679/QALY. In addition, we used sensitivity analysis to vary the cost of the vaccine—currently estimated to be around $280. If the cost of the vaccine was under $140, the vaccine would additionally be cost-saving.

CONCLUSION: In our cohort, the RSV vaccine was strongly cost-effective. Our study indicates that providers should recommend that pregnant patients receive an RSV vaccine.

Table 1: Outcomes in a theoretical cohort of 3,661,220 patients

	RSV VACCINE	NO RSV VACCINE	DIFFERENCE
RSV INFECTIONS	57,911	123,093	-63,382
SEVERE RSV INFECTIONS (REQUIRING HOSPITALIZATION)	19,904	65,229	-45,325
INFANT DEATH	2	6	-4
ASTHMA (BEFORE THE AGE OF 5)	6601	3202	-3399
COST (THOUSANDS OF USD)	$25,039,444	$24,521,226	$518,218
EFFECTIVENESS (QALYS)	109,267,300	109,246,302	20,998
ICER		$24,679/QALY	

432 Examining The Cost-Effectiveness of Post-partum Medicaid Care in People with a History of SMM

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OBJECTIVE: Emergency Medicaid is a restricted benefits program that covers immigrants who are pregnant and low-income. 5 States and the District of Columbia have extended postpartum coverage for Emergency Medicaid to 60 days postpartum. We examined the cost-effectiveness of this program among people with a delivery complicated by severe maternal morbidity (SMM).

STUDY DESIGN: We designed a cost-effectiveness model using TreeAge to compare outcomes in people with SMM who received post-partum care under extended Emergency Medicaid coverage and those who did not. We used a theoretical cohort of 5,000 as an estimate of the number of SMM cases in the 5 states and DC that have this extension in place. Patients were then stratified by use of postpartum contraception as documented under Medicaid expansion and rates of subsequent pregnancy and SMM were calculated. Our outcomes included unintended pregnancy, repeat cases of SMM, and maternal death in addition to cost and quality-adjusted life years (QALYs). Probabilities, costs, and utilities were derived from the literature, and QALYs generated at a discount rate of 3%. Sensitivity analyses were performed to assess the robustness of our model.

RESULTS: For a theoretical cohort of 5,000 patients with a history of SMM in a previous pregnancy in an emergency Medicaid eligible population, extended post-partum coverage resulted in 206 fewer unintended pregnancies with 10 fewer repeat cases of SMM. Extended Emergency Medicaid post-partum coverage also resulted in a decreased cost of $2.48 million and increased QALYs by 3 thus making it a dominant cost-effective strategy.

CONCLUSION: Extending postpartum coverage for Emergency Medicaid patients with SMM is a dominant cost-effective strategy, resulting in reduced costs and increased quality of life. These results demonstrate the benefits of such an extension and highlight the importance of expanding coverage beyond 5 states.

Table 1: Outcomes in a cohort of 5,000 Emergency Medicaid eligible patients with SMM in a previous pregnancy

	Medicaid Expansion	*No Medicaid Expansion*	*Difference*
Unintended Pregnancy	793	999	-206
Repeat case of SMM	37	47	-10
Maternal Death	<1	<1	0
Cost (thousands of $)	$23,314	$25,795	-$2,481
QALYs	134,991	134,988	3
Strategy	Dominant	Dominated	

433 Does the Timing of Resolution of Low Placentation Affect the Risk of Postpartum Hemorrhage?

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OBJECTIVE: Low placentation, defined as placenta previa or low-lying placenta, is associated with increased risk of postpartum hemorrhage (PPH), both if resolved antepartum or persistent until delivery. This study investigates whether the gestational age (GA) at which low placentation resolves is associated with increased odds of PPH.

STUDY DESIGN: Retrospective cohort included patients who delivered at Mount Sinai Hospital from 2015-2019 and were diagnosed with low placentation via transvaginal ultrasound at second-trimester anatomical survey. Study subjects were divided into two groups based on GA at detection of low placentation resolution: early resolution (≤28 weeks GA) and late resolution (>28 weeks GA). Primary outcome was PPH, secondary outcomes included use of uterotonics or hemostatic procedures, blood transfusion, and ICU admission. Outcomes were analyzed using multivariable logistic or linear regression, adjusting for age, body mass index, use of in vitro fertilization, original low placentation diagnosis (previa vs low-lying), placental location at time of diagnosis, and uterine surgical history.

RESULTS: 634 patients were included, 454 in the early and 180 in the late resolution group. Demographics and risk factors were similar between cohorts, except late resolution cohort had a greater percentage of placenta previa (as opposed to low-lying placenta) at diagnosis (36% vs 25%, p=0.006), and increased proportion of Black and Hispanic persons (p=0.027). There was no significant difference in odds of PPH amongst the early compared to late resolution group (aOR 1.61, 95% CI 0.90-2.82). When assessed continuously, there was no association between GA at resolution and odds of PPH (aOR 1.06, 95% CI 0.97-1.16). There was no significant difference in the secondary outcomes.

CONCLUSION: Our analysis demonstrated no significant effect of GA at observation of low placentation resolution on the risk of PPH in a large, diverse, urban cohort. Future prospective studies, with more frequent placental surveillance, will be important in determining the impact of timing of low placentation resolution on risk of PPH.

Gestational Age of Low Placentation Resolution Cohort	Early, ≤28 weeks	Late, >28 weeks			
	N=454 N (%)	N=180 N (%)	P-value*	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Primary Outcome:					
PPH	39 (8.6%)	23 (13%)	0.11	1.56 (0.89, 2.67)	1.55 (0.87, 2.70)
Secondary Outcomes:					
Use of any Uterotonics	85 (19%)	45 (25%)	0.08	1.45 (0.95, 2.18)	1.53 (1.00 2.33)
Use of Tranexamic Acid	3 (0.7%)	3 (1.7%)	0.4	2.55 (0.47, 13.9)	2.19 (0.38, 12.8)
Hemostatic Procedure			0.5		
Any	11 (2.4%)	1 (0.6%)	0.2		
Bakri Balloon	6 (1.3%)	0 (0%)			
Dilation and Curettage	2 (0.4%)	1 (0.6%)			
Hysterectomy	1 (0.2%)	0 (0%)			
O'Leary/B Lynch Suture	3 (0.7%)	0 (0%)			
Blood Transfusion	16 (3.5%)	6 (3.3%)	>0.9	0.94 (0.33, 2.34)	0.93 (0.32, 2.34)
ICU Admission	3 (0.7%)	0 (0%)	0.6		
Maternal Death	0 (0%)	0 (0%)	>0.9		

* Pearson's Chi-squared test; Fisher Exact Test

434 Evaluating the Predictive Value of Risk Factors for Fetal Acidosis at Scheduled Cesarean Deliveries

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OBJECTIVE: This study evaluates the relative impacts of maternal and surgical risk factors, both separately and together, on the risk of fetal acidosis at scheduled cesarean delivery (CD).

STUDY DESIGN: This is a multi-center retrospective cohort study of non-labor, term, singleton, non-anomalous births via CD under neuraxial anesthesia from 2013-2019. Primary outcome was fetal acidosis defined as umbilical artery pH < 7.1. Univariable and multivariable logistic regression were used to determine the likelihood of fetal acidosis relative to maternal factors, surgical factors, and both. Receiver−operating characteristic (ROC) curves evaluated the predictive accuracy of each model, comparing the area under the curve (AUC) using the DeLong test. Best-subset selection identified the factors that best predicted the primary outcome with possible overfitting addressed via k-fold cross-validation (5 repeated 10 fold validation).

RESULTS: Fetal acidosis was present in 159 (2.5%) births included in this study. In a model of only maternal factors, predictors of fetal acidosis were body mass index (BMI), insurance type, and gestational diabetes (gDM). In a model of only surgical factors, predictors were time from anesthesia placement to delivery and hypotension (systolic blood pressure [BP] < 90 or diastolic BP < 50). In a combined model, predictors were BMI, gDM, time from anesthesia to delivery, and hypotension. Comparing the performance of all models, the combined maternal/surgical model performed better (AUC=0.77) than either the maternal (AUC=0.72) or surgical (AUC=0.70) (DeLong test p< 0.001). Using best-subset analysis, the model with the highest predictive accuracy included only obesity and hypotensive episodes (BIC=1383, AUC=0.74).

CONCLUSION: The etiology of fetal acidosis in non-labor, term, non-anomalous singleton births via CD is multifactorial, with the most predictive model including both maternal and surgical factors. Prenatal interventions to optimize metabolic health, as well as interventions to prevent hypotension or reduce time from anesthesia placement to delivery may reduce incidence of fetal acidosis.

Table 1: Components of combined maternal + surgical factors predictive model

	Arterial pH <7.1 (n=159)			Arterial pH >=7.1 (n=6106)			Adjusted OR for pH <7.1	P-Value
Maternal Risk Factors	N	Mean (SD)	Range	N	Mean (SD)	Range	aOR (95% CI)	
Maternal age (years)	159	32.8 (6.1)	19, 49	6106	34.4 (5.3)	18, 56	0.98 (0.95-1.01)	0.1413
		No. (%)			No. (%)			
Obesity Class*								
Not Obese (BMI < 30)		35 (22.0)			3131 (51.3)		Ref.	Ref.
Class I (BMI 30-34.99)		49 (30.8)			1693 (27.7)		2.2 (1.4-3.4)	**0.0006**
Class II (BMI 35-39.99)		38 (23.9)			807 (13.2)		3.1 (1.9-5.0)	**<0.0001**
Class III (BMI 40+)		36 (22.6)			475 (7.8)		4.1 (2.4-7.0)	**<0.0001**
Insurance Type								
Private/Commercial		77 (48.4)			4329 (70.9)		Ref.	Ref.
State/Clinic		79 (49.7)			1653 (27.1)		1.4 (0.9-3.0)	0.1118
Self-pay/None		3 (1.9)			124 (2.0)		0.8 (0.2-3.5)	0.7997
Pre-existing HTN (cHTN)		15 (9.4)			217 (3.6)		1.4 (0.8-2.6)	0.2318
Pre-existing DM		7 (4.4)			87 (1.4)		1.7 (0.8-4.0)	0.1932
Any PIH: gHTN, PEC with or without SF		14 (8.8)			265 (4.3)		1.4 (0.8-2.4)	0.3127
gDM		30 (18.9)			577 (9.4)		1.7 (1.1-2.5)	**0.0225**
Surgical Risk Factors	N	Median (IQR)	Range	N	Median (IQR)	Range		
Time from neuraxial anesthesia placement to delivery (min)	159	30 (24, 38)	12, 95	6103	27 (23, 33)	4, 100	1.02 (1.00-1.03)	**0.0267**
C-section Order	159	1 (0, 1)	0, 4	6106	1 (0, 1)	0, 7	0.9 (0.8-1.2)	0.5686
		No. (%)			No. (%)			
Type of Neuraxial Anesthesia								
Combined Spinal-Epidural		43 (27.0)			1170 (19.2)		0.882 0.565 1.377	0.5812
Epidural		2 (1.3)			121 (2.0)		0.451 0.106 1.915	0.2804
Spinal		114 (71.7)			4815 (78.9)		Ref.	Ref.
Presentation at Delivery								
Vertex/Cephalic		134 (84.3)			5076 (83.1)		Ref.	Ref.
Non-Vertex (Breech/Transverse)		25 (15.7)			1030 (16.9)		1.1 (0.7-1.8)	0.5735
Use of Maternal Pressor Agents		130 (81.8)			4669 (76.5)		1.3 (0.9-2.0)	0.224
Hypotension (SBP < 80 or DBP < 50)		106 (66.7)			2173 (35.6)		3.1 (2.2-4.3)	**<0.0001**

435 Characterizing Congenital Syphilis in California Between 2008-2019

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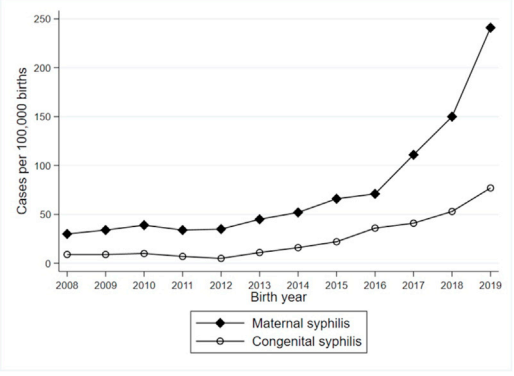
OBJECTIVE: To characterize the maternal syphilis rate, congenital syphilis rate, and maternal factors associated with congenital syphilis in California between 2008-2019.

STUDY DESIGN: We performed a retrospective cohort study among singleton, non-anomalous births delivered between 23 and 42 weeks in California between 2008 and 2019. Overall rates of maternal and congenital syphilis per 100,000 births were plotted across birth years of 2008-2019. Maternal demographic factors of interest included race/ethnicity, age, pre-pregnancy body mass index (BMI), parity, insurance type, and education level.

RESULTS: The rate of congenital syphilis in California between 2008-2019 mirrored the steep rise in the rate of maternal syphilis, but did not see as dramatic of an increase as the maternal syphilis rate between 2016-2019 (Figure 1). Relative to those unaffected by congenital syphilis, infants with congenital syphilis were more likely to have mothers who were non-Hispanic Black (11.4% vs. 4.9%) or Hispanic (61.2% vs. 50.9%); under 20 (7.4% vs. 6.6%) or between 20-34 years old (78.5% vs 73.7%); overweight (30.2% vs. 26.3%) or obese (26.1% vs. 22.5%); multiparous (72.3% vs. 60.8%); had public insurance (90.9% vs. 52.2%); and had completed high school education or less. (72.9% vs. 44.0%).

CONCLUSION: Congenital syphilis rates have increased alongside maternal syphilis rates in California between 2008-2019. Mothers of infants with congenital syphilis differ from the mothers of those who do not have congenital syphilis by numerous demographic factors, emphasizing the need to investigate the underlying structural factors leading to disparities in congenital syphilis rates.

Figure 1. Trends in maternal and congenital syphilis prevalence in California between 2008-2019.



436 Association of BMI on surgical and pregnancy outcomes in patients undergoing non-emergent vaginal cerclage

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OBJECTIVE: Patients with obesity (BMI $\geq$ 30 kg/m2) have more surgical and pregnancy complications than those without. We studied the association of BMI on surgical risks and perinatal outcomes in patients undergoing non-emergent vaginal cerclage.

STUDY DESIGN: Retrospective cohort study of patients with non-anomalous singleton gestations who had a non-emergent history (Hx)- or ultrasound (US)-indicated vaginal cerclage at a single tertiary center 1/2013-4/2021. Patients were defined as obese or non-obese (BMI $<$ 30). Our primary outcome was birth gestational age (GA). Secondary outcomes included preterm birth (PTB), operative morbidity, and selected perinatal outcomes. Baseline characteristics, primary, and secondary outcomes were compared in bivariate analysis. Linear regression modeled the relationship between BMI and birth GA; possible confounders were considered in these models.

RESULTS: Of 258 non-emergent vaginal cerclages analyzed, 110 (43%) were non-obese (BMI 25 $\pm$ 3.3) and 148 (57%) obese (BMI 38 $\pm$ 6.7). There were 175 Hx- and 83 US-indicated procedures. The obese group tended to be Non-Hispanic Black (n=148) and had more prior pregnancy losses (p=0.003). The obese group delivered at significantly earlier mean GAs, with greater rates of PTB across all viable GA ranges, had earlier GA at membrane rupture, and shorter cerclage durations (Table). For every BMI unit increase, there was a decrease of 0.14 weeks in birth GA (β= -0.14 wk/BMI unit, p=0.004). Obese patients also had significantly higher estimated blood loss and longer operative times, but similar operative morbidity, lengths of stay, and readmissions. Obesity was associated with different birth indications, as well as higher neonatal composite morbidity (Table). After controlling for race, cerclage indication, and obstetric history, there was still a significant effect of BMI on birth GA (β= -0.10, p=0.038).

CONCLUSION: Following non-emergent cerclage, patients with obesity delivered earlier than those without. The inverse effect of BMI on birth GA persisted after controlling for selected confounders.

Table. Operative and pregnancy outcomes among patients undergoing non-emergent vaginal cerclage 2013-2021 by maternal obesity

OUTCOMES	Non-obese patients (n=110)	Obese patients (n=148)	P-value
GA at delivery (wks)	36 ± 5.4	33 ± 6.9	<0.001
Preterm birth	34	57	<0.001
Preterm birth < 35 wks	23	43	<0.001
Extremely preterm birth < 28 wks	13	28	<0.001
Previable preterm birth < 24 wks	7	15	0.06
Intraoperative composite[1]	0.91	1.4	0.99
Operative blood loss (mL)	17 ± 12	25 ± 40	0.03
Operative time (min)	20 ± 10	25 ± 16	0.01
Maternal postoperative LOS (hours)	4.1 ± 5.0	4.2 ± 4.6	0.79
Readmission within 7 days	0	2.7	0.14
Number of postoperative triage visits	1 (0,2)	1 (0,2)	0.43
GA of rupture of membranes (wks)	36 ± 5.6	32 ± 8.0	<0.001
Time from cerclage placement to removal (wks)	18 ± 5.6	16 ± 7.0	0.034
Indication for delivery			<0.001
PPROM	8.2	24	
Preterm labor/Cervical insufficiency	19	13	
Chorioamnionitis	0	6.8	
Pregnancy loss/IUFD	1.8	2.7	
Maternal/medical indications	16	19	
Fetal indications	14	7.4	
Term delivery	41	28	
Cesarean birth	30	39	0.13
Cervical laceration	6.4	2.0	0.10
Postpartum hemorrhage	8.2	9.5	0.72
Fetal outcome			0.10
Liveborn	95	89	
Stillbirth	1.8	7.4	
Neonatal demise	2.7	3.4	
Neonatal composite morbidity[2]	40	55	0.02
Birthweight (grams)	2644 ± 998	2234 ± 1219	0.004

Data presented as % or mean ± SD as appropriate. GA = Gestational age
[1]Intraoperative composite = PPROM, pregnancy loss, transfusion, conversion to open procedure, bowel, bladder, vascular, nerve or other injury, failure to complete planned procedure, or unanticipated admission
[2]Neonatal composite morbidity = 5-minute APGAR < 4, base excess < -12, arterial pH < 7.0, neonatal ICU admission, neonatal death (within 4 wks)

437 Differences in Gestational Age at Preeclampsia Diagnosis and Delivery Across BMI Categories

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OBJECTIVE: Our objective was to determine if body mass index (BMI) category is associated with gestational age at time of diagnosis of preeclampsia-spectrum disorders, gestational age at time of delivery, and/or the latency period between the two. Obesity is associated with earlier onset of preeclampsia and shorter latency from diagnosis to delivery.

STUDY DESIGN: A single center, retrospective, cohort study was conducted of all deliveries that occurred at Loma Linda University Medical Center in Loma Linda, California in 2019. Patients with a diagnosis of preeclampsia were categorized into Underweight / Normal Weight (BMI $\leq$ 24.9 kg/m^2), Overweight (BMI 25-29.9 kg/m^2), Class I Obesity (BMI 30-34.9 kg/m^2), Class II Obesity (BMI 35-39.9 kg/m^2), and Class III Obesity (BMI $\geq$ 40 kg/m^2). Median number of gestational age at time of preeclampsia diagnosis, gestational age at time of delivery, and the latency period were compared across BMI categories. Completed weeks of gestation was used for gestational age.

RESULTS: For all patients with a diagnosis of preeclampsia, BMI category was significantly associated with gestational age at time of diagnosis ($p = 0.0017$) and gestational age at time of delivery ($p = 0.0038$). BMI category was not associated with the latency period between the two ($p = 0.46$).

CONCLUSION: In our population, BMI category is significantly associated with gestational age at time of preeclampsia diagnosis and gestational age at time of delivery but not associated with the length of latency period between them. Contrary to our expectation, we observed that lower BMI was associated with earlier diagnosis and delivery.

	Total N 391	Gestational Age at Diagnosis			Gestational Age at Delivery			Latency Period		
Obesity Class	N	Median	IQR	*p value*	Median	IQR	*p value*	Median	IQR	*p value*
Underweight, normal weight	16	35.5	26.5-38.5	0.0017	36	29.5-38.5	0.0038	0	0-0	0.46
Overweight	76	37	33.5-39		37	34-39		0	0-0	
Class I	91	37	36-38		37	36-39		0	0-0	
Class II	79	36	32-38		37	35-38		0	0-1	
Class III	129	37	34-38		37	35-38		0	0-0	

438 Complicated deliveries increase neonatal failure rates of the first Otoacoustic Emissions Hearing Test

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OBJECTIVE: Otoacoustic emission test (OAE) is a screening test for congenital hearing loss and it is performed usually 2 days after delivery. Newborn hearing screening may fail due to perinatal and neonatal factors. Our departmental OAE failure rate is 6.2%. We aimed to assess failure rate and associated factors among complicated pregnancies.

STUDY DESIGN: This retrospective study included all women who were admitted to our high risk unit during their pregnancy and delivered between January 2021 and June 2023. Delivery characteristics were compared between newborns with failed OAE test and those who passed the test (control group). All OAE tests were performed within 48 hours after delivery.

RESULTS: A total of 872 newborns were included, among them 136 (15.6%) were in the failed OAE group and 735 in the control group. There was no difference in maternal age, gravidity, parity or gestational age between groups. There was no difference in SGA or macrosomia rate between groups. Higher rates of vacuum extraction (8.84% vs. 1.47% p=0.001) and gestational diabetes (16.9% vs. 10.61%, p=0.02) in the study group compared to the control group. No difference in vaginal delivery and cesarean section rates.

In the multivariate analysis after adjustment for confounders, vacuum extraction (OR-6.1 ,95%CI 1.4-25.6, p= 0.012) and gestational diabetes (OR-1.7, 95% CI 1.0-2.9, p=0.03) were independently associated with failed first OAE.

CONCLUSION: Based on our cohort, infants delivered by vacuum extraction are more likely to fail in the first Otoacoustic Emissions Hearing Test. These data may be considered in setting the timing for that screening test. Infants born after complicated high risk pregnancies had significantly higher failure rates on first OAE. These higher rates were independently associated with vacuum extraction and gestational diabetes. We speculate that the timing of first OAE after high risk pregnancies with gestational diabetes and vacuum deliveries should preferably be postponed beyond the first days of infants life to improve OAE success rates and minimize parental anxiety and costs.

439 Early treatment with IV iron is associated with improved maternal hemorrhage-related outcomes

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OBJECTIVE: Anemia in pregnancy is associated with hemorrhage-related morbidity and mortality. Iron deficiency anemia (IDA) is a modifiable risk factor when identified and treated antenatally. The purpose of this study is to evaluate how timing of IV iron therapy in relation to delivery impacts hemorrhage-related maternal morbidity and fetal outcomes.

STUDY DESIGN: This retrospective cohort study from a single center included patients who received antenatal IV iron therapy for a diagnosis of anemia in pregnancy from January 2017 through January 2023. Anemia was defined as admission hemoglobin < 11 g/dL. Timing of IV iron administration in relation to delivery date was analyzed. An unadjusted analysis was performed using Fisher's exact test and Student's paired t-test. Multivariate logistic regression was used to calculate odds ratios (95% confidence intervals) to compare pregnancy outcomes for IV iron therapy more than and less than 10 days prior to delivery.

RESULTS: Of 83 included pregnancies with IDA, 45 received IV iron therapy more than 10 days prior to delivery, while 38 received IV iron therapy fewer than 10 days before delivery. Pregnant patients who received their final transfusion of IV iron >10 days before delivery had significantly higher hemoglobin at delivery admission (p< 0.001). Those who received IV iron < 10 days before delivery were 6.8 times more likely to receive a blood transfusion (p=0.01, aOR=6.8, 95%CI 1.6-22) and 5.3 times more likely to have preterm birth (p=0.001, aOR =5.3). Patients who received IV iron > 10 days were significantly less likely to have ICU admission (p=0.04) or a

birth resulting in NICU admission (p=0.02). There was no significant difference in the mode of delivery, postpartum hemorrhage, or pre-existing pregnancy comorbidities between groups.

CONCLUSION: Patients who received IV iron more than 10 days prior to delivery had improved maternal and fetal outcomes, including fewer maternal blood transfusions, maternal ICU admissions, preterm births, and NICU admissions. Earlier treatment of IDA with IV iron in pregnancy may mitigate hemorrhage-related morbidity.

Table 1. Outcomes for patients treated with intravenous iron and timing of intravenous therapy with relationship to delivery

	Total (n = 83)	IV Iron > 10 days (n = 45)	IV Iron < 10 days (n = 38)	p-value
Maternal Outcomes				
Gestational Age at treatment start	34 (31-36)	33 (29-34)	35.5 (32-37)	0.006
Hemoglobin at diagnosis	9.1 (8.6-9.8)	9.4 (8.7-9.9)	8.9 (8.3-9.7)	0.2
Hemoglobin at delivery admission	10 (8.8-10.9)	10.9 (9.8-11.6)	9.3 (8-9.9)	<0.001
Recovered with Treatment[1]	22 (27)	19 (42)	3 (8)	<0.001
Quantitative Blood Loss	461 (207-824)	480 (239-800)	400 (206-824)	0.8
Postpartum hemorrhage	20 (24)	11 (24)	9 (23)	0.9
Blood Transfusion	18 (23)	5 (12)	13 (36)	0.01
Intensive Care Unit Admission	4 (5)	0 (0)	4 (11)	0.04
Preeclampsia	11 (13)	4 (9)	7 (18)	0.2
Gestational Diabetes Mellitus	4 (5)	1 (2)	3 (8)	0.2
Cesarean delivery	29 (35)	14 (31)	15 (39)	0.4
Fetal Outcomes				
Neonatal Intensive Care Unit Admission	22 (28)	7 (16)	15 (40)	0.02
Preterm Birth	19 (23)	4 (9)	15 (40)	0.001

[1] Percentage of patients with hemoglobin above 11g/dL after IV iron treatment.
Note: Data reported as median (interquartile range) or N (%).

440 Association between cesarean delivery and childhood respiratory outcomes

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OBJECTIVE: To investigate whether there is an association between cesarean delivery (CD) and childhood respiratory outcomes.

STUDY DESIGN: Secondary analysis of a prospective, follow-up study of children delivered in the NICHD Antenatal Late Preterm Steroids study. Children were included if their mothers were enrolled in the follow-up study and had data available for the primary outcome at age 6 or greater. The primary exposure was CD. The primary outcome was a composite of adverse childhood respiratory outcomes: abnormal pulmonary function testing, diagnosis of asthma or of other chronic respiratory illnesses, or inpatient admission for respiratory illness. It was planned *a priori* to assess whether results differed according to whether CD occurred after labor or rupture of membranes (ROM). Log-binomial regression was used to calculate unadjusted and adjusted relative risk (RR), with vaginal delivery as the referent group.

RESULTS: Of 1,218 children enrolled in the follow-up study, 833 (68.4%) delivered vaginally and 385 (31.6%) by cesarean. Children born by CD had lower birth weight, were more likely to be small for gestational age, have had respiratory distress syndrome and to have been admitted to the neonatal intensive care unit, and were less likely to have been breastfed. Mothers of children born by CD were older and more likely to have private insurance. The average age at follow up was 7 years in both groups. There was no difference in the primary outcome between children born vaginally and those born by CD (48.6% vs. 41.5%; aRR 1.14; 95% CI: 0.99, 1.31), although those born by CD were more likely to have had pneumonia (11.2% vs. 7.6%; aRR 1.48; 95% CI: 1.01-2.15) or wheezing or whistling in the chest (49.4% vs. 40.2%; aRR 1.17; 95% CI: 1.02-1.34). There was no evidence that the elevated risk was specific to CD after labor or ROM (Table 1).

CONCLUSION: Delivery via CD in children who were at risk for late preterm delivery was not associated with the primary outcome, although some individual adverse respiratory outcomes were more likely among those with CD.

Table 1. Association between Mode of Delivery and Primary and Secondary Outcomes

Outcome	Primary analysis	Secondary analysis	
	aRR* cesarean (N=385)	aRR* cesarean without labor or ROM (N=204)	aRR* cesarean with labor or ROM (N=181)
Primary composite outcome	1.14 (0.99,1.31)	1.14 (0.96,1.37)	1.10 (0.92,1.32)
Abnormal spirometry	1.09 (0.92,1.30)	1.09 (0.87,1.38)	1.09 (0.87,1.36)
Ever diagnosed with asthma	1.24 (0.86,1.78)	1.24 (0.78,1.97)	1.25 (0.79,1.98)
Diagnosed with other chronic respiratory illnesses	1.01 (0.56,1.81)	0.65 (0.27,1.55)	1.41 (0.72,2.78)
Ever stayed overnight in the hospital for respiratory illness	1.43 (0.98,2.08)	1.57 (1.00,2.47)	1.31 (0.79,2.20)
Ever had unscheduled doctor, ER, or urgent care visit for coughing, wheezing, or trouble breathing	1.06 (0.92,1.22)	1.05 (0.88,1.25)	1.08 (0.91,1.28)
Pneumonia	**1.48 (1.01,2.15)**	**1.83 (1.17,2.86)**	1.14 (0.67,1.94)
Ever had wheezing or whistling in the chest	**1.17 (1.02,1.34)**	1.07 (0.89,1.28)	**1.25 (1.07,1.47)**

All analyses are compared with vaginal deliveries (N=833).
Spirometry missing in 25.
Data are relative risk (95% CI).
*Adjusted by pre-specified characteristics including gestational age at delivery, maternal age, smoking during pregnancy, maternal asthma requiring medication, child age, gender, maternal education, second-hand smoke exposure, breastfeeding, small for gestational age, treatment assignment, center (and number of previous pregnancies in secondary analysis).

441 Association of nocturnal heart rate and development of gestational diabetes and hypertensive disorders of pregnancy

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OBJECTIVE: Prior data suggest nocturnal heart rate (NHR) may represent a marker of cardiometabolic disease risk in non-pregnant adults, but data on NHR and pregnancy outcomes are limited. We sought to assess the association of NHR with gestational diabetes (GDM) and hypertensive disorders of pregnancy (HDP).

STUDY DESIGN: This is a secondary analysis of nulliparas enrolled in a prospective observational cohort at 8 clinical sites who completed a home sleep study using the Embletta-Gold device with bipolar electrocardiogram at baseline (6^0-13^6 weeks) and follow-up visits (22^0-29^6 weeks). We excluded those with chronic hypertension or pregestational diabetes. The primary exposure was the mean NHR at baseline and follow-up (analyzed separately). Secondary exposures were the minimum and maximum NHR at each visit. The outcomes were GDM and HDP. Independent samples t-tests compared each exposure among gravidas with and without the outcomes of interest.

Multivariable logistic regression models estimated the odds of each outcome per 5-beat increase in NHR at baseline and follow-up.

RESULTS: Among 2,952 eligible nulliparas, 4.1% (118/2911) developed GDM and 13.6% (392/2890) developed HDP. The mean (standard deviation) for the mean, minimum, and maximum NHR was 71 (8), 46 (11), and 102 (14) at baseline, and 78 (9), 51 (13), and 108 (15) at follow-up. Gravidas who developed GDM had higher mean, minimum, and maximum NHR at baseline and follow-up than unaffected gravidas ($p \leq 0.01$, Table), with each exposure associated with higher adjusted odds of GDM. Gravidas who developed HDP also had higher mean NHR (baseline and follow-up), higher minimum NHR (baseline), and higher maximum NHR (follow-up) ($p < 0.01$) than those without HDP. For each 5-beat increase in mean NHR at the baseline visit, the adjusted odds of GDM and HDP were higher by 39% and 10%, respectively, with similar increased odds at follow-up.

CONCLUSION: Higher mean, minimum, and maximum NHR in pregnancy appear to be associated with higher odds of GDM and HDP. This may reflect increased sympathetic and/or decreased parasympathetic activity in affected gravidas.

Table. Nocturnal heart rate metrics and odds of gestational diabetes and hypertensive disorders of pregnancy for each 5-beat increase in heart rate

Nocturnal Heart Rate	Average *mean (SD)*	Minimum *mean (SD)*	Maximum *mean (SD)*
Gestational Diabetes			
Baseline (6^0-13^6 weeks)			
Yes	74.9 (7.9)	49.0 (10.0)	106.0 (13.3)
No	70.9 (8.4)	45.9 (10.9)	101.7 (14.0)
aOR (95% CI)[1,2]	1.39 (1.26, 1.53)	1.17 (1.04, 1.32)	1.08 (1.04, 1.11)
Follow-up (22^0-29^6 weeks)			
Yes	81.8 (9.5)	54.0 (13.2)	113.7 (14.1)
No	77.4 (9.3)	50.5 (12.5)	108.0 (15.4)
aOR (95% CI)	1.31 (1.20, 1.42)	1.12 (1.07, 1.17)	1.09 (1.05, 1.13)
Hypertensive Disorders of Pregnancy			
Baseline (6^0-13^6 weeks)			
Yes	72.6 (8.4)	47.6 (10.7)	102.7 (14.4)
No	70.9 (8.3)	45.7 (10.9)	101.7 (14.0)
aOR (95% CI)	1.10 (1.04, 1.17)	1.07 (1.03, 1.12)	1.01 (0.97, 1.06)
Follow-up (22^0-29^6 weeks)			
Yes	79.5 (9.2)	51.8 (12.0)	110.4 (14.4)
No	77.3 (9.3)	50.5 (12.6)	107.8 (15.5)
aOR (95% CI)	1.11 (1.04, 1.18)	1.02 (0.96, 1.08)	1.04 (1.01, 1.08)

aOR—adjusted odds ratio, CI—confidence intervals, SD—standard deviation,

1. Adjusted models include maternal age, race/ethnicity (as a proxy for racism), insurance type, smoking status, average sleep hours, sleep apnea risk (high vs. low risk based on the Berlin Questionnaire), and restless leg syndrome.
2. 95% confidence intervals are based on robust standard errors clustered around clinical site.

442 Association of fatty acid intake with preterm birth in nulliparas with obesity

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OBJECTIVE: Prior data suggest the association between polyunsaturated fatty acid (PUFA) intake and preterm birth (PTB) differs by maternal body mass index (BMI), but it is unclear if the severity of obesity influences this association. We sought to assess the association between periconceptional dietary PUFA intake and PTB in gravidas with obesity.

STUDY DESIGN: This is a secondary analysis of nulliparas enrolled in a prospective observational cohort who completed a 1st-trimester food frequency questionnaire assessing PUFA intake within 3 months of conception. Primary and secondary exposures were self-reported daily intake of docosahexaenoic and eicosapentaenoic acid (DHA+EPA, in milligrams) and Alternative Healthy Eating Index-2010 PUFA scores (AHEI PUFA %, as a % of total energy intake), respectively. The primary outcome was any PTB < 37 weeks, with spontaneous and indicated PTB (iPTB) as secondary outcomes. Multivariable logistic regression was used to estimate the odds of PTB associated with each PUFA exposure categorized in quartiles (Q1, lowest; Q4, highest) in nulliparas with early-pregnancy BMI $\geq$30 kg/m^2. A test of interaction estimated effect modification of BMI $\geq$40 and, if significant, a stratified analysis was performed.

RESULTS: Among 1,874 eligible nulliparas, PTB occurred in 11% and 12% of gravidas with BMI 30-39.9 and $\geq$40, respectively. Significant interactions between BMI and EPA+DHA intake (p=0.02) and AHEI PUFA % (p=0.03) indicated that PTB rates differed by obesity strata. Specifically, in nulliparas with BMI $\geq$40, those with DHA+EPA intake in Q2 and Q3 had a 57% and 60% reduced adjusted odds of PTB, compared with those in the highest intake quartile (Q4), but no association with PTB was found for those with BMI 30-39.9 (Table). For AHEI PUFA %, Q2 intake in nulliparas with BMI $\geq$40 was associated with a 58% and 66% reduction in adjusted odds of any PTB and iPTB, respectively, but not for those with BMI 30-39.9.

CONCLUSION: Severity of obesity mediates the association between periconceptional PUFA intake and PTB, with lower PUFA intake associated with reduced PTB in nulliparas with BMI $\geq$40.

Table. Odds of preterm birth prior to 37 weeks' gestation and fatty acid intake in nulliparas with obesity

	n/N (%)	aOR (95% CI)[1]
BMI 30-39.9 kg/m²		
DHA+EPA intake (mg/day)		
Q1	41/323 (12.7)	1.43 (0.88, 2.32)
Q2	40/372 (10.8)	1.17 (0.72, 1.90)
Q3	43/381 (11.3)	1.24 (0.77, 2.01)
Q4	33/354 (9.3)	ref
AHEI PUFA %[2]		
Q1	42/388 (10.8)	0.81 (0.51, 1.27)
Q2	35/339 (10.3)	0.76 (0.47, 1.21)
Q3	35/365 (9.6)	0.70 (0.44, 1.12)
Q4	45/338 (13.3)	ref
BMI ≥ 40 kg/m²		
DHA+EPA intake (mg/day)[3]		
Q1	14/127 (11.0)	0.49 (0.24, 1.02)
Q2	13/135 (9.6)	**0.43 (0.21, 0.89)**
Q3	12/131 (9.2)	**0.40 (0.19, 0.84)**
Q4	26/132 (19.7)	ref
AHEI PUFA %[4]		
Q1	13/124 (10.5)	0.54 (0.26, 1.12)
Q2	11/131 (8.4)	**0.42 (0.19, 0.90)**
Q3	16/133 (12.0)	0.64 (0.32, 1.27)
Q4	25/137 (18.3)	ref

aOR—adjusted odds ratio , AHEI—Alternative Healthy Eating Index-2010, BMI—body mass index, CI—confidence interval, DHA—docosahexanoic acid, EPA—eicosapentaenoic acid, PUFA—polyunsaturated fatty acid, PTB—preterm birth, Q1—quartile 1, lowest (DHA+EPA: 3.97-32.3mg; AHEI PUFA %: 0.0-5.14), Q2—quartile 2 (DHA+EPA: 32.4-71.5mg; AHEI PUFA %: 5.15-6.34), Q3—quartile 3 (DHA+EPA: 71.6-148mg; AHEI PUFA %: 6.35-7.73), Q4—quartile 4, highest (DHA+EPA: 149-789mg; AHEI PUFA %: 7.74-10.0),

1. Multivariable models were adjusted for race (as a proxy for racism) and tobacco use
2. AHEI PUFA %: the highest score (10) is given to individuals with ≥10% of total energy intake from PUFAs, while the lowest score (0) is given to individuals with ≤2% of total energy intake from PUFAs, excluding EPA and DHA intake.
3. Adjusted odds of indicated and spontaneous PTB, stratified by obesity status, did not differ by DHA+EPA intake quartile, although this analysis was limited by small sample size.
4. In analysis by type of PTB, the aOR in AHEI PUFA % Q2 was significant for indicated PTB (0.34, 95% CI 0.11-0.98), but not spontaneous PTB.

443 Machine Learning for the Prediction of Neonatal Neuroskeletal Injury Following Shoulder Dystocia

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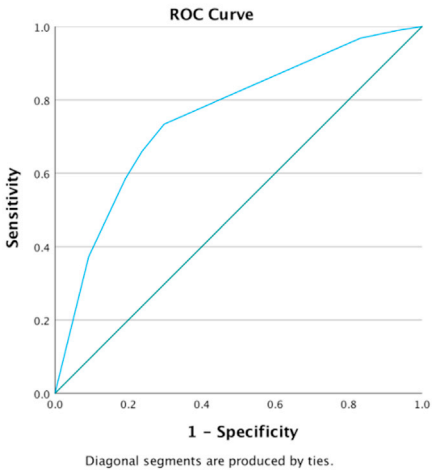
OBJECTIVE: To use machine learning (ML)-based decision tree modeling for the prediction of neuroskeletal injury in neonates following shoulder dystocia (SD).

STUDY DESIGN: A multi-center retrospective cohort study including all cases of SD across three tertiary care perinatal centers and members of the New York City Maternal Fetal Medicine research consortium, from 2015-2020. A total of 59 variables were collected including sociodemographic and obstetrical variables and outcomes. Tenfold cross-validated decision tree model (DTM) was then constructed for the prediction of neuroskeletal injury among the cases of SD. Neuroskeletal injury was defined as any of the following: Erb's palsy, Klumpke's palsy, facial nerve palsy, humeral or clavicular fractures.

RESULTS: Among the 1,155 cases of SD identified, there were 94 (8.2%) cases of neuromuscular injury. There were 56 cases of Erb's palsy (59.6%), two facial nerve palsy (2.1%), 20 humeral fractures (21.3%) and 28 clavicular fractures (29.8%) (Twelve of the cases had overlapping injuries). There were no cases of Klumpke's palsy in our cohort. ML-based, DTM encompassing five variables including head-to-body time, maternal BMI, neonatal birthweight, oxytocin use and type of delivery were able to predict neuroskeletal injury with a with 73.4% sensitivity, 70.3% specificity, 0.76 AUC (95% CI 0.70, 0.81, Figure 1) and 0.28 F1 score. Decisions were observed with head-to-body time >1.67 minutes, maternal BMI >29, type of delivery being spontaneous vaginal delivery and forceps assisted vaginal delivery, use of Oxytocin and neonatal birth weight of >3575g.

CONCLUSION: It is possible to identify a combination of factors that are associated with SD cases that maybe complicated by neonatal neuroskeletal injury with a moderate level of sensitivity and specificity by using DTM models.

Figure 1: ROC curve



444 National and International Validation of a Prenatal Machine Learning Algorithm to Forecast Cesarean Section Risk

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OBJECTIVE: Clinical risk assessment for cesarean delivery (CD) remains subjective with poor inter-provider reliability. Our goal was to develop an objective, individualized risk prediction model for CD using machine learning (ML) models trained on routine prenatal data. Accurately identifying risk could allow more nuanced counseling on delivery mode, inform conversations around scheduling repeat cesarean, and optimize resource planning for higher risk patients.

STUDY DESIGN: We conducted a retrospective cohort study including all patients from 2018-2020 in the Center for Disease Control's Vital

Statistics System utilizing sociodemographic and clinical data prior to delivery. Deliveries with missing data for route of delivery were excluded. The primary outcome was route of delivery through cesarean section.

An extreme gradient boosting model was trained on included patients from 2018-2020, as well as CD patients from years 2014, 2016, and 2017. Weight scaling algorithms were utilized to improve model performance. The model was retrospectively tested on patients from the year 2021 of the Vital Statistics System and prospectively tested on a cohort of women enrolled across 8 hospitals in Cameroon and Nigeria.

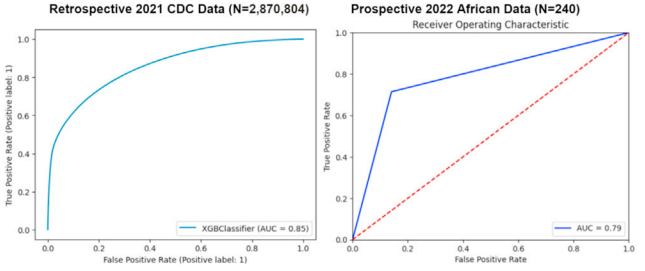
RESULTS: The model was trained on 10,541,899 patients, of which 470,2731 (44.6%) had a CD.

When retrospectively tested on 2,870,804 patients, where 1,022,481 (35.6%) had a CD, the model achieved 0.85 AUC, 78.1% accuracy, 0.72 sensitivity, and 0.78 F1 score.

When prospectively tested on 240 African patients, where 84 (35%) had a CD, the model achieved 0.79 AUC, 80.8% accuracy. 0.71 sensitivity, and 0.80 F1 score when tuned to a 0.77 threshold.

The highest weighted factors for the model were maternal body mass index/pregestational weight and maternal age.

CONCLUSION: We demonstrate that prenatal ML models can predict CD likelihood with strong discrimination ability, which can aid patient education, delivery planning, and resource optimization through data-driven clinical decision support. Our findings have the potential to reduce unplanned CD and lower correlated costs for providers and health systems.



445 Physical activity in pregnant persons with a prior preterm birth: impact of cervical insufficiency (CI)

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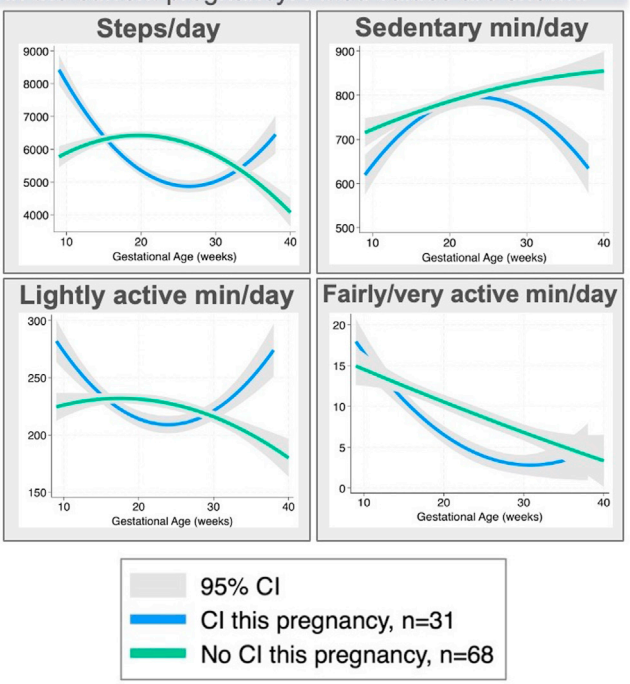
OBJECTIVE: We sought to determine the association between objectively quantified physical activity and GA at delivery among patients with a prior SPTB who did and did not develop CI in the current pregnancy.

STUDY DESIGN: Primary analysis of a prospective observational cohort designed to identify factors associated with recurrent SPTB. Patients with singleton, non-anomalous gestations and ≥1 prior SPTB < 35 wks were recruited, 9-14 wks, 2017-2022. Participants were provided FitBit activity trackers for the remainder of pregnancy and instructed to maintain their usual activity. Those with ≥7 valid monitoring days (FitBit recorded heart rate for ≥80% of the day) were included. Patients with a mid-trimester CL < 25mm & US- or exam-indicated cerclage in the current pregnancy were considered to have CI. Daily steps and intensity were compared by those with and without CI. The primary outcome was GA at delivery. Fixed-effects linear regression was used to examine whether activity parameters were associated with GA at delivery and to account for varying numbers of obs/subject.

RESULTS: 99 patients met inclusion criteria; 31 (31%) had CI. Those with CI delivered at 35.4 ± 4.1 wks vs. 36.8 ± 3.1 wks (no CI), p=0.058. The cohort was racially (40% Black) and ethnically (16% Hispanic) diverse. There were 6847 Fitbit wear days (median 60 days/person). For those with CI, daily steps, light activity min/day, and fairly/very active min/day were higher in early pregnancy and decreased mid-pregnancy; these activity patterns differed significantly from those without CI (Figure). In separate regression models including all patients and controlling for the diagnosis of CI and *a priori* for other known PTB risk factors, median steps/day (β=0.10, 95% CI 0.09, 0.12), light activity min/day (β=0.002, 95% CI 0.001, 0.002), and fairly/very active min/day (β=0.006, 95% CI 0.003, 0.009) were associated with GA at delivery (all p< 0.001).

CONCLUSION: Patients with a prior SPTB < 35 wks and CI have different physical activity patterns compared to those without CI. Physical activity amount and intensity are associated with GA at delivery.

Figure. Physical activity across gestation, measured by FitBit activity tracker. All patients had ≥1 prior SPTB <35 weeks. Data shown are findings compared based on presence of cervical insufficiency diagnosis in the current pregnancy. Fitted values are shown.



446 Exploring YouTube Sentiments on Water Births through MonkeyLearn Artificial Intelligence

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OBJECTIVE: YouTube is a platform for sharing accessible information about pregnancy experiences, including water births. It is imperative

healthcare professionals are aware of perceptions of water births, including those on public forums like YouTube. We employ MonkeyLearn, an Artificial Intelligence text classification tool to determine and understand sentiments expressed by pregnant individuals and their loved ones.

STUDY DESIGN: A YouTube search query on "water birth" was conducted on 3/9/2023 with a new profile and private browser. English transcripts from the top 100 "most viewed" videos were extracted and analyzed using MonkeyLearn, which categorized sentiments as positive, negative, or neutral. Video views ranged from 457,296 to 78,035,874. Chi-square goodness-of-fit and independence tests were performed to assess significance of differences between groups.

RESULTS: 63 YouTube videos were identified. 82% were uploaded from North America (NA), 5% from Australia, 1% from Africa, 5% from Asia, 6% from Europe, and 1% from South America. 36.5% (n=23) of videos had positive sentiment, 47.6% (n=30) negative, and 15.9% (n =10) neutral ($p = 0.0006$). 33% of NA videos had a positive sentiment vs 27.2% from other continents ($p = 0.1765$). 37% of NA videos had a negative sentiment vs 27.2% from other continents ($p = 0.0243$). 19.6% of NA videos had a neutral sentiment vs 45% from other continents ($p < 0.0001$).

CONCLUSION: Popular YouTube water birth videos were more likely to have a negative sentiment. North American videos were more likely to be polarizing with negative or neutral sentiments. This may reflect the negative and/or apathetic views that NA region views water birth. Future research should target education and awareness surrounding water births and subsequent impact on patient sentiments.

447 Factors associated with persistent severe hypertension in patients with preeclampsia

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OBJECTIVE: Hypertensive disorders of pregnancy are a leading cause of maternal morbidity and adverse pregnancy outcomes. We sought to examine factors that were associated with persistent severe hypertension.

STUDY DESIGN: This was a retrospective study of patients with preeclampsia who delivered at 23 weeks' gestation or greater from January 1, 2010, to December 31, 2020 at a single academic institution. Analyses were limited to patients with preeclampsia who developed acute severe hypertension (systolic pressure 160 mmHg or diastolic pressure 110 mmHg) and received anti-hypertensive medications during the hospital stay. Our primary outcome was persistent severe hypertension, defined as persistent severe hypertension even after the first dose of anti-hypertensive medication. Variables with p-value < 0.1 were included in multivariable logistic regression to calculate adjusted odds ratios (aORs) and 95% confidence intervals (95%CI).

RESULTS: Of 822 patients with preeclampsia, 376 (45.7%) had persistent severe hypertension after the first dose of anti-hypertensive medication and 446 (54.3%) had resolution of severe hypertension. AORs of variables with P-values less than 0.1 are presented in Table 2. Patients with chronic hypertension compared to those without had increased odds of persistent severe hypertension (aOR 1.43; 95%CI 1.07-1.92). For every 10 mmHg increase in the systolic pressure, there were increased odds of persistent severe hypertension (aOR 1.35; 95%CI 1.20-1.51). BMI 40 or greater compared with BMI< 40 was associated with increased odds of persistent severe hypertension (aOR 1.61; 95%CI 1.19-2.19). Gestational age < 34 weeks compared with gestational age 34 weeks or greater was associated with increased odds of persistent severe hypertension (aOR 1.40; 95%CI 1.04-1.88). Smoking was not associated with increased odds of persistent severe hypertension.

CONCLUSION: We found that chronic hypertension, BMI of at least 40, the degree of severe hypertension, and gestational age < 34 weeks were associated with difficult acute blood pressure control.

Table 1. Adjusted odds ratios.

Variables	Adjusted Odds Ratio (95% CI)
Chronic Hypertension	1.43 (1.07-1.92)
Systolic Pressure (Each 10 mmHg)	1.35 (1.20-1.51)
Smoking	1.64 (0.91-2.86)
BMI 40 or Greater	1.61 (1.19-2.19)
Gestational age <34 weeks	1.40 (1.04-1.88)

All variables were adjusted for each other.

448 Comparing Generalized Anxiety Disorder-7 to Edinburgh Postnatal Depression anxiety- 3 scale in antepartum anxiety screening

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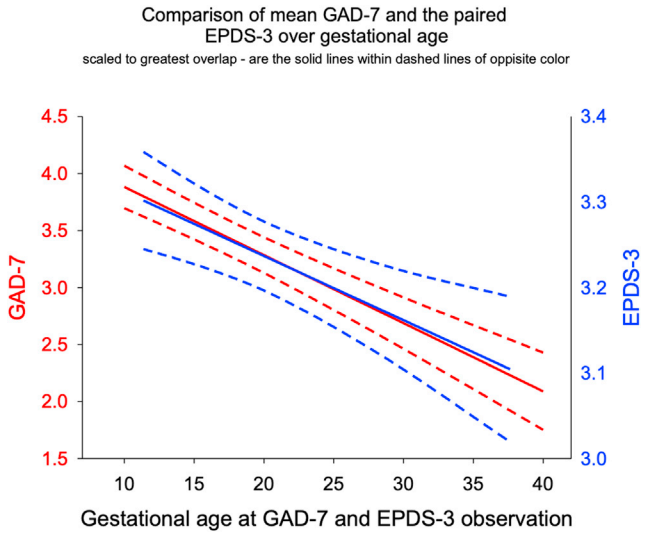
OBJECTIVE: Presently, there is no singular universally recommended screening tool for peripartum anxiety disorders. Our aim was to compare the Generalized Anxiety Disorder − 7 questionnaire (GAD-7) and the Edinburgh Postnatal Depression Scale (EPDS-3) in antepartum anxiety screening among underserved patients living in an urban region. We hypothesized these standardized instruments would be equivalent.

STUDY DESIGN: This was a secondary analysis of a prospective observational study that screened for anxiety symptomatology at a prenatal care clinic in a large, inner-city healthcare system. Enrolled patients completed the GAD-7 and EPDS-3 questionnaires at the first prenatal visit. Those with a positive GAD-7 score (≥ 10) were then referred to a behavioral health counselor for further evaluation and treatment. Patients with multiple gestations, congenital anomalies, or those who established care after 34 weeks were excluded from this analysis. Study outcomes of GAD-7 and EPDS-3 scores were compared using the Pearson correlation.

RESULTS: Between Sept 2020 and December 2022, a total of 1794 patients completed the GAD-7 and the EPDS-3 surveys. Of these, 267 (15%) patients had a positive GAD-7 score (≥ 10) and 315 (17%) had a positive EPDS-3 score (≥ 5). The Pearson correlation of 4337 paired observations was 0.338 (CI 0.311, 0.364). The mean score of the GAD-7 overlaps with the confidence interval for EPDS-3 and vice versa; therefore, the two screens are equivalent in their likelihood of positivity (Figure).

CONCLUSION: This study validates the use of the EPDS-3 screen as an equivalent screening tool to GAD-7 in detecting anxiety symptomatology in pregnancy. Given the simple nature of limited screening questions, this information may facilitate deployment of universal screening among resource limited settings.

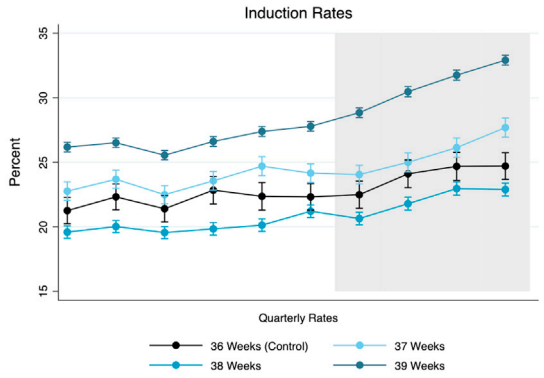


Figure

a)

Control Group	Control Group (36 Weeks) Pre	Control Group (36 Weeks) Post	Comparison Group Pre	Comparison Group Post	Unadjusted DID Estimate (95% CI)	Unadjusted p	Adjusted DID Estimate (95% CI)	Adjusted p
37 Weeks	22.0	24.0	23.4	25.7	0.3 [-0.5, 1.1]	0.42	0.2 [-0.6, 1.0]	0.61
38 Weeks	22.0	24.0	20.0	22.0	0.0 [-0.8, 0.7]	0.92	-0.2 [-0.9, 0.1]	0.64
39 Weeks	22.0	24.0	26.6	31.0	2.4 [1.7, 3.1]	<0.001	2.2 [1.5, 2.9]	<0.001

b)



449 Early term induction of labor after the ARRIVE trial dissemination

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OBJECTIVE: The ARRIVE trial showed that induction of labor at 39 weeks among low-risk nulliparous patients led to decreased cesarean delivery rates. We sought to determine if the trial's dissemination was associated with an increase in induction of labor among infants delivered at early term (37-38 completed weeks of gestation).

STUDY DESIGN: This repeated cross-sectional analysis used US natality data of 1,071,351 patients without hypertension or diabetes who gave birth to cephalic, non-SGA infants from January 2017-August 2019. A patient-level difference-in-differences (DID) analysis was performed using linear regression to determine if the ARRIVE trial was associated with changes in induction of labor among patients with early term deliveries compared to patients delivering at 36 weeks' gestation, a cohort not expected to be influenced by the ARRIVE trial. A control group was used as inductions among "low-risk" patients before 39 weeks may be for medical indications that are not tracked on natality data. As a positive control, patients delivering at 39 weeks of gestation were also compared against the 36-week cohort.

RESULTS: Induction rates were increasing in each gestational age cohort before and after the trial's publication (Figure). However, the trial did not increase inductions among infants born at 37 weeks of gestation (pre-period induction rate: 23.4%, post-period induction rate: 25.7%, adjusted DID estimate 0.2 percentage points (95% CI -0.6 to 1.0 pp, p=0.62) or 38 weeks of gestation (pre-period rate: 20.0%, post-period rate: 22.0%, adjusted DID estimate -0.2 pp (95% CI -0.9 to 0.6 pp, p=0.62) relative to the 36-week control group (pre-period rate: 22.0%, post-period rate 24.0%). As expected, the induction rate in the 39-week group did increase (pre-period rate: 26.6%, post-period rate: 31.0%, adjusted DID estimate 2.2 pp, 95% CI 1.4 to 2.9 pp, p< 0.001) compared to the control group (Table).

CONCLUSION: Appropriately, publication of the ARRIVE trial and associated guidance did not result in an increase in early term induction of labor among patients without hypertension, diabetes, or SGA infants.

450 Changes in low-dose aspirin use after updated USPSTF and ACOG guidance on race

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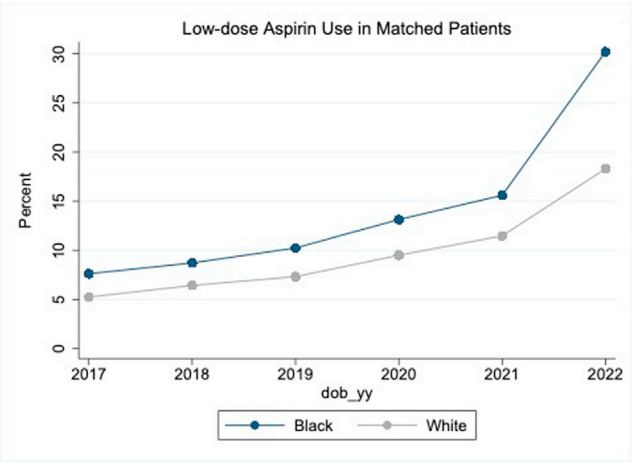
[1]Massachusetts General Hospital, Boston, MA, [2]University of South Florida Morsani College of Medicine, Tampa, FL

OBJECTIVE: In 2021, updated USPSTF guidelines emphasized that Black race is associated with higher incidence of and morbidity from preeclampsia; ACOG also updated guidelines noting that Black race as a risk factor is a proxy for racism. It is unclear whether the change in framing of these recommendations was associated with changes in LDA use in this population.

STUDY DESIGN: Repeated cross-sectional analysis of nulliparous patients delivering at ≥24 weeks gestation from 2017-2022 in one healthcare system with an indication for LDA regardless of race (any high-risk factor or 2+ moderate-risk factors excluding Black race). USPSTF risk factors and aspirin use were obtained from the medical record. The primary outcome was LDA documented on the medication list. The primary exposure was Black race (vs white race). Exact matching was performed on risk factors, year of delivery, and site, stratified by race. A patient-level difference-in-difference (DID) analysis using linear regression was performed among matched patients. The pre-period included patients delivering before 2022; the post-period during 2022.

RESULTS: The cohort included 13,221 patients, of whom 9,822 self-identified as white or Black race. After exact matching, 2,614 patients remained (26.6%). The overall rate of LDA use was 12.2%; 27.3% among patients for whom LDA was recommended and 5.0% among those for whom it should be considered. LDA use increased over time in both cohorts (Figure). In the pre-period, LDA use was 3.1 percentage points higher among Black patients (p=0.02). The rate of LDA use among white patients increased from 8.0 to 18.3 percent; among Black patients from 11.1 to 30.2 percent. This represents a difference-in-difference of 8.8 percentage points (95% CI 7.6-16.9 pp, p=0.03). All Black patients delivering in 2022 had a USPSTF recommendation for LDA; the LDA rate in this group was 30.2%.

CONCLUSION: New wording from the USPSTF and ACOG in 2021 that emphasized the racial inequities of preeclampsia was associated with an increase in the rate of LDA use in Black patients. However, overall rates of LDA use remain well below recommended.



451 Urinary calcium to creatinine ratio for the prediction of preeclampsia: a systematic review and meta-analysis

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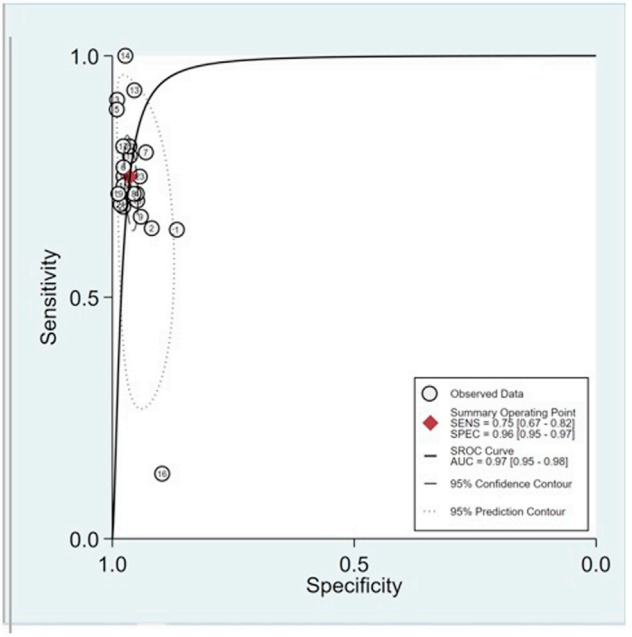
OBJECTIVE: To assess the diagnostic accuracy of the urinary calcium-to-creatinine ratio as an early predictor of preeclampsia in pregnant patients without pre-existing hypertensive disorders.

STUDY DESIGN: We conducted a systematic search of several electronic databases from inception to March 31, 2023, to identify pertinent studies assessing the diagnostic accuracy of the urinary calcium-to-creatinine ratio. These studies involved pregnant patients who were at risk for preeclampsia but were not diagnosed with the condition at the time of their participation in the study. We compiled combined measures of diagnostic accuracy, including diagnostic odds ratios, sensitivity, specificity, likelihood ratios, and hierarchical summary receiver-operating characteristic plots, to compare the performance of the calcium-to-creatinine ratio.

RESULTS: The meta-analysis included 33 studies, totaling 6,454 patients. The urinary calcium-to-creatinine ratio demonstrated a combined sensitivity of 69% (95% CI: 0.60-0.76) and a specificity of 94% (95% CI: 0.92-0.96) for the prediction of preeclampsia. The positive likelihood ratio was 12.3, and the negative likelihood ratio was 0.33, resulting in a diagnostic odds ratio of 37. Subgroup analysis of 23 studies using a common cut-off value of < 0.04 showed enhanced sensitivity (75%, 95% CI: 0.67-0.82) and specificity (96%, 95% CI: 0.95-0.97). The hierarchical summary receiver-operating characteristic curve indicated superior overall test accuracy, with an area under the curve of 0.91 (95% CI: 0.88-0.93) for all studies and 0.97 (95% CI: 0.95-0.98) for studies that employed a urinary calcium-to-creatinine cut-off value of < 0.04.

CONCLUSION: The urinary calcium-to-creatinine ratio is a useful screening tool for the early prediction of preeclampsia in pregnant patients without any underlying hypertensive disorders. It displays high sensitivity and specificity, offering the potential to improve clinical decision-making and fast-track the management of preeclampsia, leading to enhanced maternal and neonatal outcomes.



452 Evaluating updated guidelines for delivery management of severe fetal growth restriction

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[1]Massachusetts General Hospital, Boston, MA, [2]University of South Florida Morsani College of Medicine, Tampa, FL

OBJECTIVE: In 2020, SMFM recommended 37-week delivery for severe fetal growth restriction (FGR). We sought to determine if this recommendation resulted in national practice changes.

STUDY DESIGN: This repeated cross-sectional analysis used US natality data of singletons at $\geq$37 weeks completed gestation in the US between May 2019 and Oct 2021. Exclusion criteria included hypertension, diabetes, or fetal anomalies. The FGR cohort included birthweight $<$ 3rd percentile by gestational age (a proxy for severe FGR); a control cohort included birthweight $>$10th percentile. A population-level linear regression difference-in-differences (DID) analysis was performed. The primary outcome was 37-week delivery rate. Other secondary outcomes included 37-week induction, cesarean delivery, NICU admission, respiratory support, and perinatal death. The time between online and in print publication (May-Oct 2020) was excluded. The pre-period was from May 2019-Apr 2020; the post-period from Nov 2020-Oct 2021.

RESULTS: The study included 5,975,195 patients; 2,464,143 in the pre-period and 2,308,719 in the post-period. After the guidelines were disseminated, the rate of 37-week delivery increased in the FGR group relative to the non-FGR group (DID estimate: 1.59 percentage points, 95% CI 1.06-2.13, p$<$ 0.001), an increase from 11.3% (expected delivery rate in the FGR cohort) to 12.8% (observed). Induction of labor at 37 weeks also increased (DID estimate: 1.10 pp, 95% CI 0.73-1.47, p$<$ 0.001). There was a slight increase in the need for respiratory support (DID estimate: 0.25 pp, 95% CI 0.005-0.49, p=0.046), but no change in cesarean delivery, neonatal respiratory support, or perinatal death (Table).

CONCLUSION: SMFM recommendations for severe FGR led to increased 37-week delivery, although absolute rates remained low,

suggesting many fetuses may not be diagnosed antenatally. There was a slight increase in need for respiratory support but no change in the rate of cesarean delivery or NICU admission. It is hard to assess changes in perinatal death given limited sample size and inability to know which fetuses were diagnosed antenatally.

	Control Group (BW >10%ile)		Comparison Group (BW <3%ile)			
	Pre	Post	Pre	Post	DID Estimate (95% CI)	p
37 Week Delivery	9.07	9.26	11.1	12.8	1.59 [1.06, 2.13]	<0.001
38-39 Week Delivery	54.1	54.8	52.4	51.8	-1.35 [-2.18, -0.52]	0.002
37 Week Induction	1.86	2.08	4.23	5.54	1.10 [0.73, 1.47]	<0.001
Cesarean Delivery	27.9	28.1	32.4	33.0	0.45 [-0.04, 0.96]	0.07
NICU Admission	3.79	3.89	16.2	16.6	0.25 [-0.11, 0.63]	0.17
Respiratory Support	2.72	3.06	5.54	6.13	0.25 [0.005, 0.49]	0.046
Perinatal Death*	0.11	0.11	1.00	1.09	0.09 [-0.03, 0.21]	0.14

*Includes stillbirth and in-hospital neonatal demise.

453 Association of Insomnia in Pregnancy with Maternal and Neonatal Outcomes

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OBJECTIVE: In the non-pregnant population, insomnia is the most prevalent sleep disorder and is associated with an increased risk of cardiovascular and metabolic disease. Despite the frequency of insomnia during pregnancy, little is known about its association with adverse perinatal outcomes.

STUDY DESIGN: In this secondary analysis of data from a large, diverse observational cohort of nulliparous individuals conducted at eight US medical centers, those with self-reported sleep data were included. Insomnia symptoms were evaluated via a sleep questionnaire adapted from the 'Women's Health Initiative Insomnia Rating Scale' in early (6-13 weeks') and mid pregnancy (22-29 weeks'). Having clinically significant insomnia symptoms was defined as a score of 9 or greater. The outcomes of interest included hypertensive disorders of pregnancy (HDP), gestational diabetes (GDM), preterm birth (PTB), and small-for-gestational-age birth < 10%ile (SGA). For each time point, separate multivariable logistic regression analysis was performed adjusting for maternal age, race/ethnicity as a social construct, insurance, high risk for sleep-disordered breathing, body mass index, and smoking.

RESULTS: Of 7,676 and 8,310 participants who completed sleep questionnaires in early and mid pregnancy, the prevalence of insomnia symptoms was 42.1% and 46.5% respectively. Individuals with insomnia symptoms in early pregnancy were more likely to be non-Hispanic White, publicly insured, older, a current smoker, living with obesity, and at high risk for sleep-disordered breathing. Insomnia symptoms in early pregnancy were associated with HDP (aOR 1.10, 95% CI 1.01-1.21), and insomnia symptoms in early and mid pregnancy were associated with PTB (aOR 1.17, 95% CI 1.01-1.36; aOR 1.28, 95% CI 1.10-1.49, respectively). Insomnia symptoms were not associated with GDM or SGA.

CONCLUSION: Insomnia symptoms are common in pregnancy. Even after controlling for sleep-disordered breathing, insomnia symptoms in early pregnancy are associated with an increased risk of HDP and symptoms in early and mid pregnancy are associated with an increased risk of PTB.

Table. Association of insomnia symptoms during pregnancy with adverse perinatal outcomes

	Total	No Insomnia	Insomnia[1]	p-value	aOR (95% CI)[2]
		Early pregnancy (6-13 weeks')			
	N=7,676	N=4,445	N=3,231		
HDP	14.1%	13.1%	15.6%	0.003	**1.10 (1.01,1.21)**
GDM	4.1%	3.7%	4.7%	0.05	1.04 (0.87, 1.26)
PTB	8.7%	7.9%	9.7%	0.009	**1.17 (1.01, 1.36)**
SGA	10.7%	11.0%	10.3%	0.32	0.97 (0.88, 1.07)
		Mid pregnancy (22-29 weeks')			
	N=8,310	N=4,448	N=3,862		
HDP	13.7%	12.8%	14.9%	0.006	1.11 (1.00, 1.24)
GDM	4.2%	3.6%	4.8%	0.004	1.18 (1.00, 1.40)
PTB	7.5%	6.7%	8.5%	0.003	**1.28 (1.10, 1.49)**
SGA	10.4%	10.6%	10.2%	0.59	1.05 (0.90, 1.22)

Data presented as % and adjusted odds ratio (95% confidence interval)

HDP- Hypertensive disorders of pregnancy, GDM- Gestational diabetes, PTB- preterm birth (<37w), SGA- Small for gestational age status (<10%ile), aOR- adjusted odds ratio, CI- confidence interval

1. Insomnia symptoms were defined as a score of 9 or greater (scale 0-20) on the 'Women's Health Initiative Insomnia Rating Scale.'
2. Multivariable models were adjusted for early pregnancy maternal age, race/ethnicity as a social construct, insurance, high risk for sleep-disordered breathing as measured from questions adapted from the Berlin Questionnaire for Sleep Apnea, body mass index, and current smoking within the prior 3 months.

454 Association of Restless Legs Syndrome with Adverse Perinatal Outcomes

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OBJECTIVE: Restless legs syndrome (RLS) is categorized as an urge to move the legs, usually accompanied by an uncomfortable and unpleasant sensation. Pregnant individuals are two to three times more likely to experience RLS than non-pregnant individuals, but its association with perinatal outcomes is not well known. We aimed to assess the association of RLS with maternal and neonatal outcomes in a large, diverse cohort of nulliparous individuals.

STUDY DESIGN: In this secondary analysis of data from an observational cohort of nulliparous individuals conducted at eight US medical centers from 2010-2013, those with self-reported sleep data were included. RLS symptoms were evaluated in early (6-13 weeks') and

mid pregnancy (22-29 weeks') via a questionnaire adapted from the International Restless Legs Syndrome Study Group. The outcomes of interest included hypertensive disorders of pregnancy (HDP), gestational diabetes (GDM), preterm birth (PTB), and small-for-gestational-age birth < 10%ile (SGA). For each time point, multivariable logistic regression analysis was performed adjusting for maternal age, race/ethnicity as a social construct, insurance status, high risk for sleep disordered breathing, body mass index, and smoking.

RESULTS: Of 7,294 and 8,061 participants who completed sleep questionnaires in early and mid pregnancy, 15.7% and 25.9% had RLS symptoms respectively. Individuals with early pregnancy RLS were more likely to be non-Hispanic White, a current smoker, and at high risk for sleep-disordered breathing. RLS in early pregnancy was associated with HDP after adjustment for key confounders (aOR 1.17, 95% CI 1.01-1.36), but was not associated with GDM, PTB, or SGA (Table). RLS in mid pregnancy was not associated with any outcomes of interest.

CONCLUSION: In this cohort of nulliparous individuals, RLS symptoms in early pregnancy were associated with a modestly increased risk for HDP, indicating a potential area for future research regarding the prediction and prevention of HDP.

Table. Association of restless legs syndrome (RLS) during pregnancy with adverse perinatal outcomes

	Total	No RLS	RLS [1]	p-value	aOR (95% CI)[2]
		Early pregnancy (6-13 weeks')			
	N=7,294	N=6,149	N=1,145		
HDP	14.2%	13.7%	16.4%	0.02	**1.17 (1.01,1.36)**
GDM	4.0%	3.8%	5.1%	0.05	1.26 (0.86, 1.86)
PTB	8.7%	8.3%	10.4%	0.03	1.26 (0.98, 1.60)
SGA	10.8%	10.7%	11.2%	0.63	1.14 (0.92, 1.40)
		Mid pregnancy (22-29 weeks')			
	N=8,061	N=5,972	N=2,089		
HDP	13.8%	13.6%	14.4%	0.34	1.04 (0.90, 1.20)
GDM	4.2%	3.9%	4.9%	0.07	1.22 (0.95, 1.57)
PTB	7.6%	7.7%	7.2%	0.53	0.92 (0.85, 1.00)
SGA	10.5%	11.0%	9.3%	0.04	0.93 (0.86, 1.00)

Data presented as % and adjusted odds ratio (95% confidence interval)

HDP- Hypertensive disorders of pregnancy, GDM- Gestational diabetes, PTB- preterm birth (<37w), SGA- Small for gestational age status (<10%ile), aOR- adjusted odds ratio, CI- confidence interval

1. Restless legs syndrome was defined as a score of 3 out of 3 on the 'International Resltess Legs Syndrome Study Group' diagnostic criteria questionnaire.
2. Multivariable models were adjusted for early pregnacy maternal age, race/ethnicity as a social construct, insurance, high risk for sleep-disordered breathing as measured from questions adapted from the Berlin Questionnaire for Sleep Apnea, body mass index, and current smoking within the prior 3 months.

455 Association of Insomnia in Pregnancy with Cardiovascular Health 2-7 years after first birth

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OBJECTIVE: In the non-pregnant population, insomnia is associated with increased risk of cardiovascular disease. This study examined the association of insomnia during pregnancy and cardiovascular health (CVH) scores 2-7 years after first birth.

STUDY DESIGN: In this secondary analysis of longitudinal data from a large, diverse cohort of nulliparas conducted at 8 US medical centers, individuals were followed 2-7 years after their first birth. Insomnia symptoms were evaluated via a sleep questionnaire adapted from the 'Women's Health Initiative Insomnia Rating Scale' in early (6-13 weeks') and mid (22-29 weeks') pregnancy. A score ≥ 9 indicated clinically significant insomnia. The primary outcome was CVH quantified by the American Heart Association's Life's Essential 8 (LE8) score, a validated surrogate of cardiovascular disease risk with lower scores associated with worse CVH. The LE8 score includes diet, physical activity, nicotine exposure, sleep, body mass index, blood pressure, blood glucose, and lipids, and ranges from 0 (worst) to 100 (best). For early and mid pregnancy, a multivariable linear regression analysis was performed adjusting for baseline maternal age, race and ethnicity as a social construct, insurance status, and being at high risk for sleep disordered breathing.

RESULTS: Of 3,453 and 4,123 individuals in early pregnancy and mid pregnancy, insomnia was reported in nearly half of participants (42.3% and 46.6%, respectively). Early and mid pregnancy insomnia symptoms were associated with lower mean LE8 score 2-7 years after first birth. These associations remained significant after covariate adjustment linear regression (Early: 82.8 [SD 11.6] vs. 79.7 [SD 12.9], $p < 0.001$; β [95% CI] -1.22 [-2.34, -0.10]); Mid: 82.2 [SD 11.9] vs. 79.9 [SD 13.0], $p < 0.001$; β [95% CI] -1.24 [-2.41, -0.07]).

CONCLUSION: Insomnia symptoms, which are common in pregnancy, were associated with worse LE8 scores 2-7 years after first birth, indicating a need for future research understanding how sleep disorders in pregnancy can affect future CVH.

Table. Association of insomnia symptoms during pregnancy with cardiovascular health 2-7 years after birth

CVH[1]	Total	No Insomnia	Insomnia[2]	p-value	β (95% CI)[3]
		Early Pregnancy (6-13 weeks')			
	N=3,453	N=1,994	N=1,459		
LE-8*	81.5 (12.3)	82.8 (11.6)	79.7 (12.9)	<0.001	**-1.22 (-2.34, -0.10)**
		Mid pregnancy (22-29 weeks')			
	N=4,123	N=2,192	N=1,931		
LE-8*	81.2 (12.5)	82.2 (11.9)	79.9 (13.0)	<0.001	**-1.24 (-2.41, -0.07)**

Data presented as mean and standard deviation, adjusted regression coefficient (95% confidence interval)

β – linear regression beta coefficient, CI - confidence interval, * American Heart Association Life's Essential 8 score

1. Mean and standard deviation American Heart Association Life's Essential 8 score for cardiovascular health, which includes diet, physical activity, nicotine exposure, sleep, body mass index, blood pressure, blood glucose, and lipids.
2. Insomnia symptoms were defined as a score ≥ 9 (range 0-20) on the 'Women's Health Initiative Insomnia Rating Scale.'
3. Multivariable linear regression models were adjusted for baseline maternal age, race and ethnicity as a social construct, insurance status, and high risk of sleep-disordered breathing as measured from questions adapted from the Berlin Questionnaire for Sleep Apnea.

456 Association of Restless Legs Syndrome in Pregnancy with Cardiovascular Health 2-7 years after first birth

Rachel Friedlander[1], Xiaoning Huang[1], Minjee Kim[1], Sadiya S. Khan[2], Phyllis Zee[1], Philip Greenland[3], Natalie Bello[4], Janet M. Catov[5], Bethany Gibbs[6], William A. Grobman[7], David M. Haas[8], Lisa D. Levine[9], Rebecca B. McNeil[10], Brian M. Mercer[11], Noel Bairey Merz[4], Eliza C. Miller[12], Uma M. Reddy[13], George R. Saade[14], Robert M. Silver[15], Lynn M. Yee[16]

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OBJECTIVE: Restless Legs Syndrome (RLS) is associated with cardiovascular disease in the non-pregnant population. Prevalence of RLS is high during pregnancy, but data are limited regarding associations with cardiovascular health (CVH) after delivery. This study assessed the association of RLS in pregnancy with CVH 2-7 years after first birth.

STUDY DESIGN: In this secondary analysis of longitudinal data from a large, diverse cohort of nulliparas conducted at 8 US medical centers, individuals were followed 2-7 years after first birth. RLS was evaluated in early (6-20 weeks') and mid pregnancy (22-29 weeks') via the International Restless Legs Syndrome Question Set. The primary outcome was CVH, quantified by the American Heart Association's Life's Essential 8 (LE8) score, a validated surrogate of cardiovascular disease risk with lower scores associated with worse CVH. The LE8 score includes diet, physical activity, nicotine exposure, sleep, body mass index, blood pressure, blood glucose, and lipids, and ranges from 0 (worst) to 100 (best). For early and mid pregnancy, a multivariable linear regression analysis was performed adjusting for baseline maternal age, race and ethnicity as a social construct, insurance status, and being at high risk for sleep disordered breathing.

RESULTS: Of 3,289 individuals with data in early pregnancy and 4,009 with data in mid pregnancy who were eligible for inclusion in this analysis, 16.2% and 28.7% reported RLS symptoms respectively. RLS in early pregnancy was associated with lower mean LE8 score 2-7 years after birth; this association remained significant after adjusting for covariates in multivariable models (82.0 [SD 11.9] without RLS vs. 79.4 [SD 13.4] with RLS, p=0.008; β [95% CI] -1.62 [95% CI -2.48, -0.77]). However, RLS in mid-pregnancy was not associated with LE8 scores 2-7 years after birth (Table).

CONCLUSION: RLS in early pregnancy was associated with worse LE8 scores 2-7 years after birth. These findings indicate a need for future research to understand how antenatal sleep disorders may relate to CVH.

Table. Association of restless legs syndrome (RLS) during pregnancy with cardiovascular health 2-7 years after birth

CVH[1]	Total	No RLS	RLS[2]	p-value	β (95% CI)[3]
		Early pregnancy (6-13 weeks')			
	N=3,289	N=2,757	N=532		
LE-8*	81.6 (12.2)	82.0 (11.9)	79.4 (13.4)	0.008	**-1.62 (-2.48, -0.77)**
		Mid pregnancy (22-29 weeks')			
	N=4,009	N=2,904	N=1,105		
LE-8*	81.2 (12.5)	81.2 (12.5)	81.1 (12.6)	0.92	-0.27 (-1.63, 1.09)

Data presented as mean and standard deviation, adjusted regression coefficient (95% confidence interval)

β – linear regression beta coefficient, C I- confidence interval, * American Heart Association Life's Essential 8 score

1. Mean and standard deviation American Heart Association Total Life's Essential 8 score for cardiovascular health, which includes diet, physical activity, nicotine exposure, sleep, body mass index, blood pressure, blood glucose, and lipids.
2. Restless legs syndrome was defined as a score of 3 out of 3 on the 'International Resltess Legs Syndrome Study Group' diagnostic criteria questionnaire.
3. Multivariable linear regression models were adjusted for maternal age, race and ethnicity as a social construct, insurance status, and high risk of sleep-disordered breathing as measured from questions adapted from the Berlin Questionnaire for Sleep Apnea.

457 Etiology of abnormal labor progress among patients with obesity: is it contraction strength?

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OBJECTIVE: Over 35% of reproductive-age women in the US are obese and at risk for obstetric complications due to abnormal labor and cesarean delivery. However, there is a limited understanding of why and how obesity leads to abnormal labor. The objective of this prospective study was to compare uterine contractility characteristics, collected via universal intrauterine pressure catheters (IUPC), between patients with and without obesity.

STUDY DESIGN: This was a prospective cohort study of women with a singleton gestation admitted for labor at ≥37 weeks gestation. Upon amniotomy, all participants had an IUPC placed. The primary outcomes were four parameters of uterine contractility: frequency, peak pressure, duration, and force (Montevideo units, MVU). Secondary outcomes were intrauterine resting tone and presence of tachysystole. Outcomes were compared between patients with and without obesity (BMI ≥ 30 kg/m^2) at four time points: upon amniotomy and IUPC placement, at active labor (defined as first cervical exam ≥6 cm), at maximum oxytocin dose, and in the 1 hour prior to full cervical dilation. Sub-group analyses were performed among women with vaginal delivery and women receiving oxytocin.

RESULTS: Of the 224 participants in this study, 118 (52.7%) had obesity. Women with obesity were more likely to be induced (97.5 vs 81.1%, p< 0.01). Majority of the cohort, 88.0%, had a vaginal delivery and this did not statistically differ between patients with or without obesity. There were no differences in contraction peak pressure, frequency, duration or force between patients with and without obesity at any of the four time points evaluated. Patients with obesity had higher average resting tone (22.3 vs 19.6 mmHg,

P< 0.01). There were no differences in occurrence of tachysystole between the groups.

CONCLUSION: Women with obesity were able to achieve similar contraction characteristics associated with frequency and strength as patients without obesity. Differences in uterine contraction pressure and frequency may not explain the disparate rates of labor dystocia and cesarean rates among women with obesity.

Contraction Variable	Time point: 1 hour after active labor			Time point: 1 hour prior to complete cervical dilation (10cm)		
	Obese (n=104)	Non-obese (n=94)	p	Obese (n=103)	Non-obese (n=97)	p
Peak pressure *mean±STD*	39.7 ± 12.4	41.7 ± 10.8	0.23	39.8 ± 12.4	39.7 ± 12.4	0.93
Contraction Frequency *median (IQR) per hour*	23 (17,26)	23 (20,26)	0.87	24 (19,27)	23 (20,26)	0.97
Contraction duration *mean± STD*	84.8 ± 16.0	81.8 ± 9.0	0.10	84.8 ± 13.6	82.2 ±9.0	0.10
Median MVU *(5th, 95th percentile)*	157 (63, 253)	164 (90, 250)	0.28	163 (63, 255)	160 (63, 263)	0.98
Average resting tone *mean±STD*	22.5 ± 9.5	19.7 ± 9.0	0.04	22.7 ± 8.6	20.0 ± 9.4	0.04

458 Exploring the Association Between Provider-Patient Communication and Maternal Antenatal Anxiety

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OBJECTIVE: Maternal anxiety is associated with adverse outcomes such as gestational hypertension and may be compounded by perceived higher risk of birth complications. Provider communication may impact patient's anxiety, either directly by providing information and support, or indirectly by connecting them with mental health providers. This study aims to explore whether quality provider-patient communication is associated with reduced antenatal anxiety.

STUDY DESIGN: A cross-sectional study was conducted using patient-reported data from "The Pandemic Impacts and Supports: COVID-19 Experience Study (PISCES)", a cohort of obstetric patients at a large academic center. Provider-patient communication was assessed using the Kim Alliance Scale Communication Subscale (KAS-CM). Patients were considered to have received recent mental health support if they reported seeing a mental health provider in the past month. Anxiety was assessed using the 7-item Pregnancy-Related Anxiety Scale (PRAS). Both scales were standardized. Associations were calculated using linear or negative binomial regression, as appropriate.

RESULTS: A total of 775 survey responses were collected. Respondents were on average 33 weeks gestational age (Standard Deviation (SD): 10.6), majority White (35%) and 31% had an advanced degree (Table 1). Pregnant women who had better communication with their prenatal provider exhibited lower levels of anxiety (coefficient = -0.22, p=0.001). While patients with higher anxiety were slightly more likely to have received recent mental health support (risk ratio (RR): 1.1, p=0.067), there was no association between provider communication style and receipt of therapy (p=0.984).

CONCLUSION: The association between quality provider communication and reduced antenatal anxiety emphasizes the importance of clear, non-judgmental interactions. Effective communication directly impacts anxiety, bypassing the need for improved therapy access as an intermediary. Future research should assess the association among more diverse populations.

Table 1. Patient Characteristics.

	Mean (SD)
Age	33.4 (4.1)
Gestational Age	33.0 (10.6)
	N (%)
Ethnicity	
White	272 (35.1)
Black/African American	28 (3.6)
Asian	39 (5.0)
Hispanic/Latina	37 (4.7)
Other	28 (3.6)
Don't want to answer	4 (0.5)
Education	
High School or Less	11 (1.4)
College	162 (20.9)
Advanced degree*	244 (31.5)
Employment Status	
Employed	713 (92.0)
Unemployed	27 (3.4)
Student	40 (5.2)
Prefer not to answer	6 (0.8)
Mental Health Support**	258 (33.3)
High Antenatal Anxiety	103 (13.5)
	Median (IQR)
KAS-CM Score	42 (40-44)

SD, Standard Deviation; **IQR**: Interquartile Range.

* Master's or Doctoral degree.
**Therapist, Psychologist, Psychiatrist, or Social Worker for both individual and/or group care in the past 30 days.

459 Common vaginal microbes modify Group B Streptococcus growth at epithelial barriers: potential mechanisms governing colonization

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OBJECTIVE: Group B Streptococcus (GBS) disease, the leading cause of early-onset neonatal sepsis, is predicated upon vaginal colonization. Given limitations of existing screening and prophylaxis strategies, primary prevention of GBS disease necessitates interventions targeting vaginal colonization. Features of vaginal ecosystems may modify GBS colonization though mechanisms are incompletely understood. We sought to investigate how common vaginal microbes modify GBS growth at epithelial barriers.

STUDY DESIGN: Ectocervical, endocervical, and vaginal (VK2) epithelial cells were treated with *Gardnerella vaginalis* (*G. vaginalis*) or *Lactobacillus crispatus* (*L. crispatus*) for 24h. Cell culture (conditioned) media was sterile filtered. Clinical isolates of GBS serotypes Ia, III, and IV were grown in varying concentrations (50%, 75%, 100%) of conditioned media. Optical density was measured across time points to create GBS growth curves. Growth at 8h was

compared across groups by one-way ANOVA with Dunnett's tests for multiple comparisons. Fold change comparing GBS growth in *G. vaginalis*-conditioned epithelial cell media to *L. crispatus*-conditioned epithelial cell media was calculated to generate heat maps.

RESULTS: GBS growth was higher in media from *G. vaginalis*-conditioned epithelia compared to *L. crispatus*-conditioned epithelia for all GBS serotypes (Fig. 1, $p < 0.05$ for all). Effects of conditioned media from ectocervical, endocervical, and vaginal epithelial cells on GBS growth were similar. GBS serotypes responded similarly to conditioned media.

CONCLUSION: Exposure of the cervicovaginal epithelium to *G. vaginalis*, an anaerobe implicated in adverse reproductive outcomes, promotes growth of clinical GBS isolates involved in invasive disease. *L. crispatus* exerts a relative protective effect. Microbial-conditioning of the cervicovaginal epithelium likely plays a mechanistic role in the complex microbial ecology governing GBS colonization — interventions aimed at optimizing host responses to components of vaginal ecosystems may offer novel approaches to GBS eradication in pregnancy.

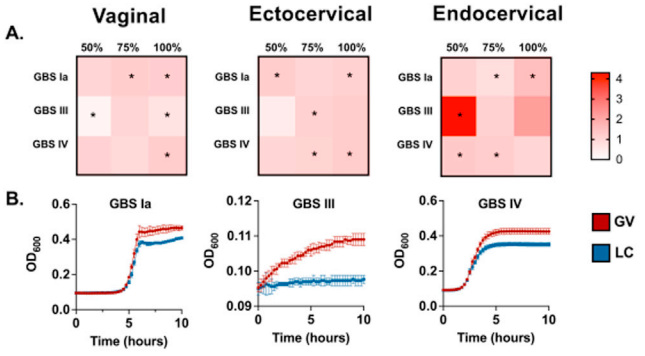

Figure 1. GBS growth in microbe-conditioned cervicovaginal epithelial cell media. **A.** Heat map depicting fold change in GBS growth in *G. vaginalis*-conditioned epithelial cell media (GV) compared to *L. crispatus*-conditioned epithelial cell media (LC) at 8h. **B.** Representative growth curves for different GBS serotypes grown in 75% microbe-conditioned cervicovaginal epithelial cell media. Graphs corresponds to the cell line listed above heat map. *p<0.05

460 Enhancing neonatal acidosis prediction: A Machine Learning approach using CTG features and clinical characteristics

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OBJECTIVE: Neonatal acidosis can lead to severe consequences such as hypoxic-ischemic encephalopathy, and mortality. Timely prediction during labor is essential for effective interventions and improved outcomes. We aimed to investigate the performance of machine learning techniques to predict neonatal acidemia at birth based on cardiotocography (CTG) features and maternal, pregnancy and labor characteristics.

STUDY DESIGN: A predictive modeling study was conducted on term singleton vaginal deliveries at a tertiary maternity hospital between January 2018 and July 2021. Patients with missing information or >30% signal loss were excluded. Neonates with cord pH< 7.10 were matched randomly with those with pH >7.10 to create a balanced dataset. After preprocessing of CTG tracings, features were extracted from each 10-minute interval of the 2h before delivery (baseline, short- and long-term variability, number of accelerations, decelerations, and contractions, deceleration area and reperfusion time). Maternal, pregnancy and labor characteristics were also extracted. A logistic regression model and a random forest model including all characteristics associated with neonatal acidosis with an area under the curve (AUC) >0.6 in the univariate analysis were developed. The dataset was split into training and test subsets, and a 10-fold cross-validation was performed to obtain the final AUC and accuracy of the models.

RESULTS: Among the 10561 included women, 395(3.7%) had a cord pH< 7.10 (mean pH 7.05±0.05) and were matched randomly with 395 women with a cord pH >7.10 (mean pH 7.26±0.07). Parity, oxytocin during labor and all CTG features but short time variation were associated with acidosis in univariate analysis. The logistic regression model on the test set achieved an AUC of 0.90 and an accuracy of 0.84. For the random forest model, the AUC and accuracy were 0.90 and 0.82, respectively.

CONCLUSION: The findings from this study hold the potential to facilitate timely clinical interventions, enabling healthcare providers to make informed decisions and improve perinatal outcomes.

461 Does the number of abnormal values in the oral glucose tolerance test impact pregnancy outcomes?

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OBJECTIVE: The objective of this study was to assess the association between the number of abnormal values (AVs) in oral glucose tolerance test (OGTT) and adverse maternal and neonatal outcomes, among women diagnosed with gestational diabetes mellitus (GDM), considering its impact on the course of pregnancy, delivery, maternal health, and neonatal outcomes.

STUDY DESIGN: This retrospective cohort study included all pregnant women who underwent OGTT between the years 2015 and 2022, and diagnosed with GDM, at our department. The study cohort was divided into four groups based on the number of AVs in the OGTT: one AV, two AVs, three AVs and four AVs group. Maternal characteristics and pregnancy outcomes were compared between these groups.

RESULTS: A total of 1893 women diagnosed with GDM, through OGTT were included in the study. Among them 781 had one AV, 787 had two AVs, 267 had three AVs and 58 had four AVs. The rate of GDMA2 was higher among women with higher AVs in OGTT: 28.4% vs. 25.5% vs. 38.6%, vs. 65.5% among the one AV, two AVs, three AVs and four AVs groups, respectively (p< 0.001). The higher AVs groups were associated with increased maternal BMI (p=0.004), gravidity (p=0.002), and parity (p=0.001). Additionally, there was an increased rate of labor induction (p=0.002), episiotomy (p< 0.001), neonatal Apgar score < 7 (p=0.006), and NICU admission (p=0.008) in the higher AVs groups. There were no between groups differences in mode of labor, rate of macrosomia, shoulder dystocia, and composite adverse neonatal outcomes.

CONCLUSION: The study findings suggest that a higher the number of AVs in OGTT, indicates difficulty in regulating blood sugar with diet alone, which may require medical treatment and intervention. The OGTT not only aids in diagnosing GDM but also allows clinicians to be more aware about potential adverse maternal and neonatal outcomes by closely examining the number of abnormal values.

Table: ANOVA of OGTT pathological values number, comparing maternal characteristics, obstetric data and birth outcomes (maternal and neonatal).

Characteristics	Number of OGTT Pathological values				P value
	1 (n=781)	2 (n=787)	3 (n=267)	4 (n=58)	
Maternal age, years	32.4±5.1	32.8±5.3	32.2±5.7	34.0±5.2	0.059
BMI*, Kg/m²	26.8±5.4	26.9±5.8	27.5±5.2	30.3±5.5	**0.004**
Gravidity (G)	2.9±1.7	2.6±1.7	2.6±1.8	3.0±2.3	**0.002**
Parity (P)	1.3±1.2	1.1±1.3	1.0±1.2	1.4±1.5	**0.001**
Multiple Gestation	20 (2.6%)	29 (3.7%)	5 (1.9%)	1 (1.7%)	0.341
GDM#					**<0.001**
GDMA1	559 (71.6%)	586 (74.5%)	164 (61.4%)	20 (34.5%)	
GDMA2	222 (28.4%)	201 (25.5%)	103 (38.6%)	38 (65.5%)	
Weight gain during pregnancy, Kg	10.9±7.3	9.6±5.8	9.6±6.3	7.4±5.2	**0.002**
Male fetus	385 (50.6%)	438 (55.7%)	140 (52.4%)	30 (51.7%)	0.243
GA& at delivery, weeks	39.1±1.3	39.1±1.4	38.7±1.8	38.7±1.4	**<0.001**
Induction of Labor	368 (47.1%)	318 (40.4%)	137 (51.3%)	31 (53.4%)	**0.002**
Delivery Type					0.124
Vaginal Delivery	577 (73.9%)	559 (71.0%)	177 (66.3%)	33 (56.9%)	
Operative Vaginal Delivery	55 (7.0%)	77 (9.8%)	26 (9.7%)	8 (13.8%)	
Emergency CS@	88 (11.3%)	89 (11.3%)	36 (13.5%)	10 (17.2%)	
Elective CS@	61 (7.8%)	62 (7.9%)	28 (10.5%)	7 (12.1%)	
Neonate's birth weight, gr.	3,370.1±455.0	3,310.2±478.3	3,290.0±522.1	3,370.1±635.2	**0.022**
Macrosomia (>4 Kg)	60 (7.7%)	49 (6.2%)	23 (8.6%)	7 (12.1%)	0.235
Episiotomy	96 (12.3%)	144 (18.3%)	58 (21.7%)	11 (19.0%)	**<0.001**
OASIS~	6 (0.8%)	6 (0.8%)	1 (0.4%)	0 (0.0%)	0.911
Shoulder Dystocia	13 (1.7%)	8 (1.0%)	4 (1.5%)	2 (3.4%)	0.358
Apgar <7	19 (2.4%)	16 (2.0%)	17 (6.4%)	2 (3.4%)	**0.006**
Neonatal Hypoglycemia	25 (3.2%)	24 (3.0%)	13 (4.9%)	4 (6.9%)	0.206
Neonatal Jaundice	213 (27.3%)	215 (27.3%)	85 (31.8%)	20 (34.5%)	0.161
NICU admission**	18 (2.3%)	26 (3.3%)	18 (6.7%)	3 (5.2%)	**0.008**
Neonatal Composite outcome+	55 (7.0%)	67 (8.5%)	15 (5.6%)	5 (8.6%)	0.403

For categorical variables results are presented as value (%) and for continuous variables as value ± standard deviation (SD). Significant p values (<0.05) are in bold.

* BMI – Body Mass Index
# GDM – Gestational Diabetes Mellitus
^ GCT – Glucose Challenge Test
$ OGTT – Oral Glucose Tolerance Test
& GA – Gestation Age
@ CS – Cesarian Section
~ OASIS – Obstetric Anal Sphincter Injury
** NICU - Neonatal Intensive Care Unite
+ Neonatal Composite Outcome – defined as one of the following: Shoulder Dystocia, Apgar < 7, Neonatal Hypoglycemia, Neonatal Jaundice, Neonatal hospitalization > 2 days in Vaginal delivery, Neonatal hospitalization > 3 days in CS@ delivery, NICU admission

462 Biophysical Profile in very premature fetuses

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OBJECTIVE: The applicability and interpretation of biophysical profile (BPP) in very premature fetuses have not been studied extensively. However, monitoring fetuses at < 24 wk is important because of the delivery option provided to patients at this very early gestational age. Hence, we sought to investigate if BPP score and interpretation differ according to gestational age in pregnancies between 20.0 and < 32.0 wk.

STUDY DESIGN: Prospective evaluation of BPP in uncomplicated pregnancies undergoing ultrasound for anatomic survey or fetal growth at < 32 wk was performed in 165 appropriate for gestational age fetuses that underwent 366 BPPs. Pregnancies were grouped according to gestational age: I (20.0-23.6 wk), II (24.0-27.6 wk) and III (28.0-31.6 wk). BPP was performed until a score of 8/8 was obtained. Pregnancies with obstetric/medical indication for fetal testing and/or with fetal anomalies were excluded. Duration of the study was compared to a control group (32.0-35.6 wk) undergoing indicated BPP. If patients had > 1 BPP performed during pregnancy, each BPP was analyzed individually. ANOVA and post hoc Tukey tests were used for comparisons.

RESULTS: At 30 minutes, 72% of the BPPs performed in group I and 97% in group II had a score of 8/8, whereas in group III and controls 100% of the fetuses had a BPP 8/8 within 30 minutes (P< 0.001). The mean ± SD time (minutes) for a BPP 8/8 was 23 ± 10 for group I, 17 ± 8 for group II, 13 ± 7 for group III, and 9 ± 6 for controls (P< 0.001). If extending the study to 2SD (43 minutes) in group I, 97% would have achieved a score of 8/8. None of the pregnancies in groups I-III developed adverse outcomes during the study period.

CONCLUSION: A score of BPP 8/8 can be obtained in a shorter time with advancing gestation, probably as consequence of fetal neurologic development and maturation. Our data indicate that a BPP can be performed reliably as early as 20.0 wk; however, in normal pregnancies, BPP of 8/8 is obtained within 43 minutes at a gestational age < 24 wk. This is important to consider when monitoring pregnancies and interpreting BPPs at these gestational ages.

GROUP	Total BPP readings (N)	Gestational age (weeks)	N (%) with BPP 8/8 at 30 minutes*	Mean ± SD time (minutes) to obtain a BPP 8/8*	N (%) with BPP 8/8 if study extended to 2SD mean (minutes)
I	79	20-0 to 23-6	57 (72%)	23 ± 10	77 (97%)
II	75	24-0 to 27-6	73 (97%)	17 ± 8	74 (98%)
III	72	28-0 to 31-6	72 (100%)	13 ± 7	NA
Controls	140	32-0 to 35-6	140 (100%)	9 ± 6	NA

*P < 0.001

463 Fetal fraction of cfDNA from noninvasive prenatal testing as a predictor for Placenta Accreta Spectrum

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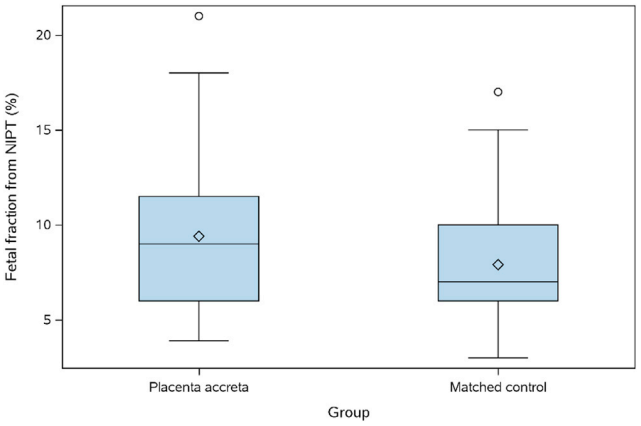
OBJECTIVE: Unanticipated placenta accreta spectrum (PAS) disorders pose significant risks to maternal health, and current sensitivity of prenatal ultrasound for PAS ranges from 50% to 80-90% depending on clinical expertise. We aim to examine the clinical significance of fetal fraction (FF) from noninvasive prenatal screening in PAS disorder.

STUDY DESIGN: We conducted a matched case-control study comparing FF from cfDNA testing in patients who had histologically confirmed PAS to normal controls. Cases were identified based on ICD codes and chart review for histologically confirmed PAS and cfDNA testing with reported FF. Controls were matched to cases 2:1 by gestational age at cfDNA testing, maternal BMI, maternal age, and self-reported race. Multiple gestations and pregnancies with chromosomal abnormalities were excluded.

RESULTS: There were 102 patients with PAS from our institution from 2013-2023. Of these, 44 patients had undergone cfDNA testing but no fetal fraction reported for 12 of them. 32 singleton pregnancies who had undergone cfDNA testing with reported FF were included in the analysis. The FF of cfDNA in PAS was significantly higher than patients with normal placentation, 9.4% vs 7.9%, p=0.038. However, in a subgroup analysis of PAS with previa (n=13) and PAS without previa (n=19), there was no significant difference in FF compared to controls. Of all patients who underwent hysterectomy at time of CD, 36% were unplanned due to uncertainty regarding PAS diagnosis from prenatal imaging.

CONCLUSION: FF was higher in patients with PAS compared to matched controls. The lack of significance in the subgroup analysis may be explained by small group numbers due to the frequency of PAS and limited reporting of fetal fraction until more recent years. More research is needed to assess the potential role for FF in cases of suspected PAS.



464 Fetal fraction from cfDNA among placenta accreta spectrum, placenta previa, and normal placentation

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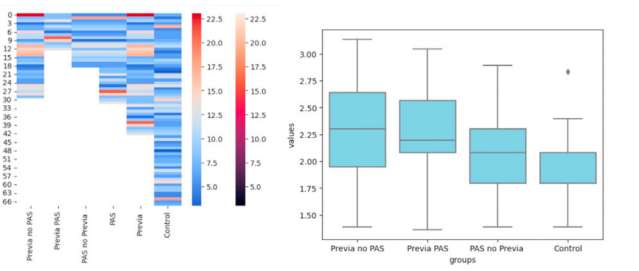
OBJECTIVE: Disorders of placental morphogenesis have been associated with differences in the amount of trophoblastic DNA shed into the maternal circulation, thereby impacting the reported fetal fraction percentages from cfDNA testing. We aimed to determine the difference in FF from cfDNA in PAS, previa, and normal placentation.

STUDY DESIGN: We conducted a retrospective matched cohort study comparing FF from cfDNA testing in patients who had histologically confirmed PAS with and without PP, PP without PAS, and normal controls. Patients were identified based on diagnosis codes, ultrasound confirmation of PP, histology confirming presence of absence of PAS and cfDNA testing with reported FF. Controls were matched to cases 2:1 by gestational age at cfDNA testing and maternal BMI. Multiple gestations and pregnancies with chromosomal abnormalities were excluded.

RESULTS: There were no significant differences in mean FF from cfDNA between PAS without PP (n=19) and controls, and PAS with PP (n=13) and controls. There was a significant difference in FF between Previa without PAS and controls (10.1% vs 7.9%, p=0.014) and all cases with Previa including PAS+PP and controls (10.1% vs 7.9%, p=0.013). There was no difference in FF between PAS with PP and Previa without PAS. There was also no significant difference between PAS with PP and PAS without PP.

CONCLUSION: While all cases with placenta previa including those with PAS showed higher mean FF than controls, this is suspected to be driven by the previa component and not the presence of PAS given the significantly higher mean FF demonstrated in previa without PAS. Given the relatively recent use of routine cfDNA for prenatal genetic screening, a larger study of patients with PAS and cfDNA testing is needed to make conclusions about the clinical significance of fetal fraction in differentiating placenta previa with PAS from isolated placenta previa.



465 Fetal growth restriction: What is worse too small (EFW) or too skinny (AC)?

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OBJECTIVE: SMFM defines fetal growth restriction(FGR) by estimated fetal weight(EFW) or abdominal circumference(AC) < 10%. There is limited data on neonatal outcomes based on FGR diagnosed by EFW vs isolated AC. The SMFM algorithm for the diagnosis and management of FGR does not address managing patients with FGR based on AC. Our objective was to assess whether FGR based on EFW had worse outcomes and perinatal morbidity than those diagnosed solely on AC.

STUDY DESIGN: This was a retrospective cohort study performed on singleton gestations from 03/2018-12/2022. All patients included, were admitted for induction of labor at term and had a pregnancy with a fetus defined as FGR at the last ultrasound prior to delivery. Group EFW was defined as FGR with overall EFW< 10%; Group AC was defined as FGR with an isolated AC< 10th% and overall EFW≥10%. The primary outcome was a neonatal composite outcome which was defined as: NICU Admission, APGAR < 5 at 5 minutes, neonatal hypoglycemia, and small for gestational age (SGA).

RESULTS: Of the 529 patients eligible, 237(45%) were in the EFW Group and 292(55%) were in the AC Group. The demographic data was similar between the groups. There was a significant difference between the two groups in respect to: gestational age at delivery, neonatal birth percentile, weight & 5 minutes APGARS. The proportion of individuals who had abnormal Dopplers, chronic hypertension, SGA at birth, and NICU admission was significantly higher in EFW vs AC Group (p< 0.0001, See Table 1). Composite neonatal outcomes were significantly worse in the EFW group compared to AC Group (p< 0.0001). The odds of having an adverse outcome among individuals diagnosed as FGR via EFW is 3.88 times higher among neonates diagnosed as FGR via AC (95% CI:2.6−5.8).

CONCLUSION: Our data suggests that neonates who were diagnosed with FGR based on EFW had worse neonatal outcomes when compared to FGR diagnosed by AC alone. These findings could be used to consult and reassure the patient that while an isolated AC< 10% gives a fetus the diagnosis of FGR, the outcomes appear to be better for these infants.

Table 1. Patient Demographics, Clinical Characteristics, and Perinatal Outcomes

Variable		ALL (n=529)	AC <10th%, EFW≥10th % (n=292)	EFW <10th % (n=237)	P value[§]
GA at time of admission for induction (weeks) – median (interquartile range)		38.4 (37.1, 39.1)	39.0 (38.1, 39.4)	37.6 (37.0, 38.6)	**<.0001**
Neonatal %ile at birth		8.0 (0.0, 59.0)	11.0 (0.0, 59.0)	5.0 (0.0, 34.0)	**<.0001**
Neonate weight (g) – mean (standard deviation)		2426.0 (550.8)	2613.4 (479.8)	2195.1 (545.8)	**<.0001**
APGAR 1 minute – median (range)		8.0 (1.0, 9.0)	8.0 (2.0, 9.0)	8.0 (1.0, 9.0)	0.12
APGAR 5 minute – median (range)		9.0 (1.0, 10.0)	9.0 (5.0, 9.0)	9.0 (1.0, 10.0)	**0.02**
Oligohydramnios—no. (%)		50 (9.5)	24 (8.3)	26 (11.0)	0.29
Abnormal dopplers at time of admission —no. (%)		71 (13.5)	18 (6.2)	53 (22.5)	**<.0001**
Smoker—no. (%)		1 (0.2)	1 (0.3)	0 (0)	>0.99
cHTN—no. (%)		36 (6.8)	14 (4.8)	22 (9.3)	**0.04**
Pre-gestational diabetes—no. (%)		7 (1.3)	4 (1.4)	3 (1.3)	>0.99
Gestational diabetes—no. (%)		64 (12.1)	37 (12.7)	27 (11.4)	0.65
Delivery mode—no. (%)					**0.01**
	NSVD	311 (58.9)	183 (62.7)	128 (54.2)	
	Operative delivery	24 (4.5)	17 (5.8)	7 (3.0)	
	Cesarean delivery	193 (36.6)	92 (31.5)	101 (42.8)	
SGA at birth—no. (%)					**<.0001**
	AGA	212 (40.9)	154 (53.8)	58 (25.0)	
	SGA	306 (59.1)	132 (46.2)	174 (75.0)	
NICU admission –no. (%)		124 (23.8)	47 (16.4)	77 (32.8)	**<.0001**
Hypoglycemia—no. (%)		40 (32.0)	9 (19.1)	31 (39.7)	**0.02**

Composite Primary Outcome

Variable	ALL (n=529)	Group AC (n=292)	Group EFW (n=237)	Odds Ratio (95% CI)	p-value
Composite Fetal/Neonatal Outcome –no. (%)	354 (66.9)	159 (54.5)	195 (82.3)	0.26 (0.17, 0.39)	<.0001

[§] The Chi-square or Fisher's exact test and the T-test or Wilcoxon Rank Sum test were used as appropriate

466 EKG/ECHO findings among Black patients with positive cardiovascular risk assessment during pregnancy and postpartum

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OBJECTIVE: Racial disparities exist in obstetrical care with an increased cardiovascular disease (CVD) related morbidity and mortality in non-Hispanic Black patients. Pregnancy related physiological changes in hemodynamics may cause symptoms that mimic CVD. We used a CVD risk assessment tool to identify obstetrical patients at-risk for CVD. We sought to determine if there are differences in abnormal echocardiogram (ECHO)/electrocardiogram (EKG) findings among Black and non-Black patients who screened positive.

STUDY DESIGN: This was a prospective cohort of obstetrical patients who screened positive for CVD risk during pregnancy or postpartum from 6/15/2022 to 7/1/2023 at an inner-city academic hospital. Patients who screened positive were referred for ECHO, EKG, and Cardio-Obstetric consultation. Our primary outcome was the rate of CVD diagnosis based on ECHO/EKG diagnostic criteria. Secondary outcomes included rates of symptomatology, valvular abnormality on ECHO, and abnormal EKG.

RESULTS: Of the 131 patients that screened positive for CVD risk, 71 (53.4%) self-identified as Black. Non-Black patients were more likely to report symptoms of shortness of breath (70.5% vs 48.6%, p= 0.013), orthopnea (44.3% vs 25.7%, p= 0.028), and rapid heart rate (57.4% vs 34.3%, p= 0.008) during pregnancy compared to Black patients. There were no significant differences in our primary outcome, 25 (50%) patients who completed the CVD workup were identified to have CVD in the Black group, CVD was identified in 20 (40.8%) of patients in the non-Black group. No significant differences in other diagnostic results were seen.

CONCLUSION: We found a significantly lower number of Black patients reporting symptoms that mimic CVD, yet race did not alter the rate of true CVD diagnosis in pregnancy. Increased prevalence of comorbidities in the Black race leading to CVD risk is a potential explanation, a multivariate analysis could further evaluate this finding. Cultural influences may be related to the discrepancies in symptomology among races, however more studies are warranted to further understand the drivers.

467 Effects of Economic Insecurity, a Social Determinants of Health Domain, on Adverse Maternal/Neonatal Outcomes

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OBJECTIVE: Adverse social determinants of health (SDoH) can impact maternal and mental health during pregnancy. Economic insecurity (EI) is one of the domains used in various frameworks of SDoH. We sought to determine the relationship between SDoH relating to EI and perinatal outcomes in a racially and ethnically diverse inner-city cohort.

STUDY DESIGN: This is a prospective cross-sectional cohort of obstetrical patients delivering at an academic institution from 05/2022 to 07/2023. Structured surveys regarding various SDoH were administered in English or Spanish. The primary study exposure was defined as exposure to any adverse SDoH relating to EI including housing, income, or food insecurity during pregnancy. Sociodemographic and obstetrical characteristics were abstracted from electronic medical records.

RESULTS: 119 patients were consented, and 85.7% (102) completed all questionnaires. Of those that completed the questionnaires, 87.2% reported EI during pregnancy. Maternal age, race/ethnicity, GA at delivery and comorbidities were similar in participants who reported EI when compared to those who did not report EI. Exposure to EI was associated with increased maternal BMI at delivery (p =0.037). Job insecurity was more common in participants with younger maternal age (p=0.024). Not surprisingly, participants who reported EI were more likely to report food insecurity (p=0.002). Infants of participants who reported EI were more likely to require NICU admission (23.2% vs 16.7%, p=0.04), information for neonatal admission was not found for seven patients. Participants who reported EI did not report more anxiety; however, those who reported anxiety were less likely to be discharged with a contraception plan (38.5% vs 43.7%, p=0.032).

CONCLUSION: A large proportion of our study participants reported EI during pregnancy. Our findings suggest the need for identifying and responding to the support needs of this patient population. Further studies are needed to evaluate the role of mental health conditions on postpartum contraception, especially given the escalating risks to reproductive justice across the US.

468 Disparities in sociodemographic factors associated with hepatitis C in pregnancy

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OBJECTIVE: To assess the impact of maternal sociodemographic parameters on the prevalence of hepatitis C virus (HCV) infection in pregnancy in a recent United States (US) cohort.

STUDY DESIGN: Retrospective analysis of the US Centers for Disease Control and Prevention Natality Live Birth database (2016-2021). All births were eligible for inclusion. Deliveries with missing data on HCV were excluded. We compared multiple maternal sociodemographic factors between pregnancies complicated by maternal infection with HCV and those without infection. Multivariable logistic regression was performed to evaluate the association of these factors with HCV in pregnancy. Data were presented as adjusted odds ratios (aOR) with 95% confidence intervals (95% CI) and statistical significance set at $P < 0.05$.

RESULTS: Of the 22,604,938 included, 107,761 (0.48%) were from patients who had HCV infection in pregnancy. Maternal factors associated with an increase in prevalence of HCV are presented in the Table. Concurrent infection with HBV was associated with the highest risk of HCV in pregnancy, followed by maternal factors such as older maternal age, Medicaid insurance, tobacco use, and concurrent infection with gonorrhea, chlamydia, and syphilis. Higher educational attainment, non-Hispanic black, Hispanic, and Asian race and ethnicity were associated with a decreased risk of HCV in pregnancy.

CONCLUSION: Several sociodemographic factors are associated with an increased prevalence of HCV infection in contemporary US. Specifically, concurrent infection with HBV or sexually transmitted infections, low educational attainment, non-Hispanic white race and ethnicity, Medicaid insurance, and tobacco use were associated with an increased risk of HCV in pregnancy. These data are an important step in the attempt to identify at-risk groups and better care for them.

Table. Multivariable analysis evaluating maternal factors associated with HCV in pregnancy.

	Adjusted Odds Ratio	95% Confidence Interval
Maternal age (years)		
< 20	1	Reference
20-24	3.29	3.10-3.49
25-29	6.99	6.61-7.41
30-34	8.58	8.10-9.10
35-39	8.59	8.10-9.12
≥ 40	7.52	7.00-8.09
Education		
Less than high school	1	Reference
High school graduate	0.84	0.83-0.86
Some college credit	0.63	0.62-0.65
College graduate	0.19	0.18-0.19
Master's or higher	0.12	0.12-0.13
Insurance type		
Medicaid	3.30	3.22-3.37
Private	1	Reference
Self-pay/other	2.27	2.20-2.34
Race or ethnic group		
Non-Hispanic white	1	Reference
Non-Hispanic black	0.18	0.17-0.18
Other/multiracial	0.84	0.81-0.86
Asian	0.20	0.19-0.21
Hispanic	0.24	0.23-0.25
Concurrent gonorrhea	2.53	2.40-2.68
Concurrent chlamydia	1.57	1.52-1.63
Concurrent syphilis	5.88	5.49-6.28
Concurrent hepatitis B	12.39	11.69-13.13
Tobacco use during pregnancy	8.22	8.09-8.35

469 Custody outcomes of women with opioid use disorder

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OBJECTIVE: The primary outcome was to assess the differences in custody outcomes between patients compliant with medication-assisted therapy and those with illicit substance use at delivery at an urban safety net hospital.

STUDY DESIGN: This was a retrospective cohort study at a single center of all patients admitted for delivery between 1/1/2016 to 6/1/2021. De-identified data was collected from the medical record of these patients and linked to the delivered infants. All patients admitted for delivery had urine toxicology collected with voluntary opt-out. Patients were grouped based on confirmatory opioid toxicology with sub-groups of patients on medication-assisted therapy versus illicit use. Categorical data were compared using chi-squared or Fisher's exact tests and numerical data compared using Wilcoxon rank-sum or Student's t-tests. A logistic regression analysis was conducted based on the pre-defined outcome of custody.

RESULTS: Although urine toxicology testing is voluntary, no patients were identified without results. Of the 16,827 births, 790 had positive urine toxicology screens for opioids (4.7%). A total of 202 patients had a prescription for buprenorphine and 159 for methadone. Of these, 149 were positive for buprenorphine only and 78 for methadone only, 14 were negative for all opioids. The logistic regression showed that non-Hispanic white patients had significantly

higher odds than individuals of all other races to receive full custody (OR= 3.5 [2.20-5.88]). Unemployed individuals had significantly lower odds of receiving full custody (OR=0.28 [0.16-0.50]). There was no statistical difference between the odds of receiving custody based on age, use of medication-assisted therapy, or being in the delivery hospital's perinatal addiction clinic.

CONCLUSION: This study showcases ongoing ethnic/racial disparities regarding custody outcomes and the possible negative effects of universal toxicology testing. The data suggests a lack of improved custody outcomes despite compliance with treatment. This indicates the need for further awareness and interventions to help decrease these inequities.

Logistic Regression Covariates and their Impact on Custody

Characteristic	*OR (95% CI)*	*P-value*
On Medication-Assisted Therapy	1.15 (0.80-1.66)	NS
Unemployed	0.28 (0.16-0.50)	<0.0001
Non-Hispanic White	3.52 (2.20-5.58)	<0.0001
Age	0.98 (0.95-1.01)	NS
Prenatal care at delivery hospital clinic	2.08 (1.48-2.94)	<0.001
Treated at delivery hospital perinatal addiction clinic	0.74 (0.47-1.16)	NS

A logistic regression analysis was performed regressing custody against covariates as depicted above.
OR, odds ratio; CI, confidence interval

470 Double-balloon cervical ripening in women with scarred uterus presenting with PROM: A randomized controlled trial

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OBJECTIVE: Women with a scarred uterus who present with pre-labor rupture of membranes (PROM) pose a clinical challenge for labor induction. Using Oxytocin in this setting is associated with an increased risk for uterine rupture. Nevertheless, the insertion of a foreign body following PROM may potentially lead to intra-uterine infection. In this randomized controlled trial, we examine the safety of cervical ripening using a double-balloon catheter in women with a single previous cesarean delivery (CD) who present with PROM and an unfavorable cervix and who opt for trial of labor.

STUDY DESIGN: In this, NIH registered, prospective randomized controlled trial, women with a previous CD, who presented with PROM and an unfavorable cervix were randomly allocated following maternal consent to either cervical ripening with a double-balloon catheter or to expectant management. The double-balloon catheter was placed for 12 hours or until spontaneously expelled. After balloon expulsion or removal, an identical expectant management protocol was followed in both groups. The primary outcome was maternal or neonatal infection rates. Secondary outcomes included successful vaginal birth after cesarean (VBAC) rates and time-to-delivery interval. Multivariable analyses were used to control for confounders.

RESULTS: A total of 60 women were included in the study, 32 were allocated to the intervention group and 28 to expectant management. Rates of maternal infections and VBAC were comparable between the groups (Table). No cases of uterine rupture or neonatal infections were noted in either group. Time-to-delivery was significantly shorter in the intervention group (Table). A multivariable linear regression model, controlled for parity, proved cervical ripening with a double-balloon catheter to significantly reduce PROM-to-delivery interval (Table).

CONCLUSION: Cervical ripening with a double-balloon catheter appears to be safe in the setting of ruptured membranes. For women with a scarred uterus, PROM, and an unfavorable cervix, such intervention reduces time-to-delivery interval with no apparent increase in adverse outcomes.

Selected delivery outcomes in the double-balloon catheter group vs. expectant management: Univariable and multivariable analyses

	Double-balloon catheter (n=32)	Expectant management (n=28)	Odds ratio (95%CI)	P value
Maternal age (years, ±SD)	30.7 ± 4.8	31.8 ± 5.0		0.392
Gestational age (weeks, ±SD)	38.6 ± 1.3	38.3 ± 1.3		0.521
Maternal infection	1 (3.1%)	1 (3.6%)	0.87 (0.05 - 14.60)	0.923
VBAC	23 (71.9%)	23 (82.1%)	0.55 (0.16 - 1.92)	0.348
Time to delivery (hours, ±SD)	31.2 ± 14.3	44.3 ± 31.3		0.038
Birthweight (grams, ±SD)	3141 ± 475	3109 ± 380		0.779
Multivariable analyses: Double-balloon catheter vs. expected				
	Adjusted OR*	**B****	**95% CI**	**P value**
VBAC	0.58		0.16 to 2.03	0.301
Time to delivery		-13.3	-26.1 to -0.6	0.040

* Multivariable logistic regression model adjusted for parity

** Multivariable linear model adjusted for parity

471 Association of neighborhood socioeconomic disadvantage and stillbirth

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OBJECTIVE: Individual measures of adverse social determinants of health (SDOH) are associated with an increased risk of stillbirth, but whether community-level measures are associated with this risk is uncertain. We examined whether neighborhood socioeconomic disadvantage, as measured by the Area Deprivation Index (ADI), is associated with risk of stillbirth.

STUDY DESIGN: In this secondary analysis from the prospective cohort Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-To-Be study, participant home addresses at enrollment were geocoded at the census tract level and linked to the 2015 ADI. The ADI score incorporates the domains of income, education, employment, and housing quality into a composite national US ranking of neighborhood socioeconomic disadvantage, and was analyzed in tertiles from the lowest (tertile 1 [T1], least disadvantaged, reference) to the highest (T3, most disadvantaged) score. The outcome was stillbirth,

defined as intrauterine fetal demise ≥20 weeks. Poisson regression with robust error variance was used to estimate an adjusted relative risk (aRR) and incorporated individual-level covariates including age at delivery, pre-pregnancy body mass index, chronic hypertension, and diabetes.

RESULTS: Of 9,588 enrolled pregnant individuals with available ADI data, 47 had stillbirths (38 antepartum; 9 intrapartum). The frequency of stillbirth increased with neighborhood deprivation, from 4 per 1,000 individuals in T1 (i.e., least disadvantaged) to 9 per 1,000 individuals in T3 (i.e., most disadvantaged) (p< 0.01). Pregnant individuals living in the most disadvantaged neighborhoods (T3) were more likely to experience a stillbirth compared to those living in the least disadvantaged neighborhoods (T1) (aRR: 2.15; 95% CI: 1.03 to 4.48). Those in an intermediate tertile (T2) of neighborhood disadvantage were not more likely to experience a stillbirth.

CONCLUSION: Nulliparous pregnant individuals who lived in the most disadvantaged U.S. neighborhoods were at increased risk of stillbirth.

Table. Association between Area Deprivation Index (ADI) and stillbirth

	Frequency n (%)	Unadjusted and adjusted analysis	
		Risk ratio (RR); 95% CI[1]	Adjusted risk ratio (ARR); 95% CI[1,2]
Area Deprivation Index			
Tertile 1 (least deprivation)	16/4,283 (0.4)	1.00	1.00
Tertile 2	8/2,626 (0.3)	0.82 (0.35 to 1.90)	0.72 (0.29 to 1.83)
Tertile 3 (most deprivation)	23/2,679 (0.9)	2.30 (1.22 to 4.34)	2.15 (1.03 to 4.48)

[1]Poisson regression with robust error variance was used to estimate an adjusted relative risk (aRR).
[2]Adjusted model included individual-level covariates: age, pre-pregnancy body mass index, chronic hypertension, and diabetes in pregnancy.

472 Association between adverse pregnancy outcomes and insulin resistance 2-7 years later

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OBJECTIVE: To evaluate associations between non-GDM adverse pregnancy outcomes (APOs) and insulin resistance in the years following delivery.

STUDY DESIGN: Secondary analysis of a prospective cohort of nulliparous participants enrolled during the first trimester and followed 2-7 years postpartum. We included all participants who completed a study visit at 2-7 years postpartum and excluded those with diabetes (pre-gestational or GDM) in the index pregnancy, a subsequent pregnancy during the study period, or who were not fasting at the study visit. The exposure was APO (hypertensive disorder of pregnancy, SGA, PTB, stillbirth) in the index pregnancy. The primary outcome was insulin resistance (continuous variable) measured via fasting homeostasis model assessment of insulin resistance (HOMA-IR) at follow-up. HOMA-IR is a pre-clinical measure of insulin resistance calculated from fasting insulin and glucose. Secondary categorical outcomes were highest tertile of HOMA-IR, prediabetes, and incident diabetes. Multivariable logistic regression estimated associations between APOs and outcomes of interest, adjusting for confounders.

RESULTS: Among 4,484 study participants, 3,047 were eligible for this analysis; 763 (25%) experienced APOs in index pregnancy. History of APO was associated with higher HOMA-IR at mean 2.7±0.9 years follow-up [adjusted Geometric Mean (95% CI): 1.4 (1.3, 1.5) vs 1.3 (1.3, 1.4), p = 0.01]. History of APO was also associated with HOMA-IR in the highest tertile and prediabetes (**Table**). The association between APOs and incident diabetes was not significant. Results were robust to adjustment.

CONCLUSION: In primiparas without GDM, APO history was associated with higher insulin resistance 2-7 years after first pregnancy.

Table. Associations between exposure to non-GDM adverse pregnancy outcomes and insulin resistance outcomes 2-7 years later.

Outcome 2-7 years postpartum	Adverse Pregnancy Outcome in index pregnancy[1]			Odds Ratio, 95% CI	
	yes	no	*p*	Unadjusted	Adjusted[2]
High HOMA-IR tertile	277 (36.3%)	636 (27.8%)	<0.001	1.48 (1.24, 1.76)	1.24 (1.00, 1.54)[3]
Prediabetes	148 (19.4%)	303 (13.3%)	<0.001	1.57 (1.27, 1.95)	1.32 (1.05, 1.66)
Incident diabetes	16 (2.1%)	37 (1.6%)	0.383	1.30 (0.72, 2.35)	0.96 (0.51, 1.83)

[1]Values reported as N and (%), with p-value from chi-square test
[2]Adjusted for time from index pregnancy, age, smoking, pre-pregnancy BMI, gestational weight gain, and postpartum weight retention.
[3]Corresponding p-value provided due to confidence interval value of 1.00: *p*=0.049

473 Deliver First or Transfer Mom? Neonatal Outcomes after Antenatal versus Postnatal Transfer ≥ 34 Weeks

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OBJECTIVE: Compared to neonatal transfers, maternal transfers to a Level IV Perinatal Care Center (PCC) have been associated with lower neonatal morbidity. Little is known regarding transfer outcomes for neonates born in the late preterm and term periods. We sought to compare neonatal outcomes between maternal and neonatal transfers to a Level IV PCC that delivered at ≥ 34 weeks.

STUDY DESIGN: This is a retrospective cohort study of maternal and neonatal transfers to a Level IV PCC from January – December 2021 who delivered at ≥ 34 weeks' gestation. Maternal transfers delivered during the admission and neonatal transfers within 24 hours of delivery were included. Neonates were excluded if resuscitation was declined. The primary outcome was composite neonatal morbidity which included: respiratory distress syndrome (RDS), mechanical ventilation, sepsis, grade 3-4 intraventricular hemorrhage (IVH), chronic lung disease, necrotizing enterocolitis, patent ductus arteriosus, and stage 3-4 retinopathy of prematurity. Secondary outcomes included mode of delivery, APGARs < 7 at 5 minutes, length of neonatal stay, and each component of the composite score. Chi square, fisher exact, Mann Whitney U tests, and multivariate logistic regression were used as appropriate.

RESULTS: 182 neonatal and 97 maternal transfers were included. Maternal transfers delivered at earlier gestational ages, were less likely to have congenital anomalies, and were more likely to receive antenatal steroids or be diagnosed with hypertensive disorders of pregnancy. Maternal transfers were significantly associated with

lower odds of composite neonatal morbidity (aOR 0.71 [0.61-0.82]), specifically RDS (aOR 0.69 [0.60-0.79]) and mechanical ventilation (aOR 0.84 [0.75-0.95]). Length of neonatal stay did not differ.

CONCLUSION: Compared to neonatal transports, maternal transports to a Level IV PCC have significantly lower odds of neonatal morbidity for deliveries $\geq$ 34 weeks. Our results underscore the importance of and continued need for robust maternal transport programs, even in the late preterm and term periods.

	Neonatal transfer N=182	Maternal Transfer N=97	OR (95% CI)	aOR* (95% CI)
Cesarean Delivery	87 (47.8)	44 (45.4)	0.91 (0.54-1.53)	0.87 (0.75-1.00)
APGARs <7 at 5 minutes	**24 (13.2)**	**2 (2.1)**	**0.14 (0.01-0.58)**	**0.91 (0.84-0.99)**
Neonatal Composite**	**95 (52.2)**	**30 (30.9)**	**0.41 (0.23-0.71)**	**0.71 (0.61-0.82)**
Respiratory distress syndrome	**75 (41.2)**	**25 (25.8)**	**0.50 (0.02-0.58)**	**0.69 (0.60-0.79)**
Mechanical Ventilation	**50 (27.5)**	**10 (10.3)**	**0.30 (0.13-0.65)**	**0.84 (0.75-0.95)**
Sepsis	3 (1.6)	2 (2.1)	1.26 (0.10-11.14)	1.02 (0.98-1.06)
Neonatal death	4 (2.2)	1 (1.0)	0.46 (0.01-4.78)	0.99 (0.95-1.03)
Grade 3 or more IVH	2 (1.1)	0 (0.0)	--	--
Chronic lung disease	2 (1.1)	0 (0.0)	--	--
Necrotizing enterocolitis	2 (1.1)	0 (0.0)	--	--
Patent ductus arteriosus	4 (2.2)	4 (4.1)	--	--
>Stage 3 retinopathy	0	0	--	--
Length of neonatal stay, median days (IQR)	11.5 (16.8)	15 (22.0)	p=0.667	

*Adjusted for transferring facility, gestational age at delivery, fetal anomalies, antenatal steroids, hypertensive disorders of pregnancy
**Composite score of any diagnosis of RDS, mechanical ventilation, sepsis, death, Grade 3 IVH, chronic lung disease, NEC, PDA, or >stage 3 retinopathy

474 Association of diabetic ketoacidosis with adverse maternal outcomes for pregnant patients with pre-existing diabetes

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OBJECTIVE: Patients with pre-existing diabetes have high-risk pregnancies; however, the impact of diabetic ketoacidosis (DKA) during pregnancy on maternal outcomes is not well elucidated. We sought to assess maternal outcomes among patients with type 1 diabetes (T1D) or type 2 diabetes (T2D) who had DKA during pregnancy compared to those who did not.

STUDY DESIGN: We conducted a retrospective cohort study of singleton, non-anomalous live births in California between 2008-2019. We included patients with T1D and T2D who delivered between 23-42 weeks' gestation and compared maternal outcomes among pregnancies complicated by DKA during pregnancy to those who did not have DKA. Chi squared and multivariable logistic regression were used for statistical comparisons with a p-value of 0.05.

RESULTS: Of the 5,305,447 births in California assessed, there were 7,401 and 38,062 patients with T1D and T2D that met our inclusion criteria, of which 786 (10.6% T1D) and 703 (1.9% T2D) had DKA during pregnancy, respectively. Among patients with T1D, DKA during pregnancy was associated with hypertensive disorders of pregnancy (HDP) (adjusted odds ratio (aOR) 1.21; 95% confidence interval (CI) 1.01-1.45), ICU admission (aOR 4.03; 95% CI 1.94-8.36), severe maternal morbidity (SMM) (aOR 2.01; 95% CI 1.44-2.79), and non-transfusion SMM (aOR 3.04; 95% CI 1.99-4.66). Among patients with T2D, having DKA during pregnancy was associated with HDP (aOR 1.32; 95% CI 1.10-1.58), ICU admission (aOR 4.07; 95% CI 2.02-8.21), SMM (aOR 1.67; 95% CI 1.16-2.40), non-transfusion SMM (aOR 2.45; 95% CI 1.56-3.86), and cesarean delivery (CD) among nulliparous (aOR 1.61; 95% CI 1.21-2.13) and multiparous patients without a history of CD (aOR 1.80; 95% CI 1.31-2.46).

CONCLUSION: In this relatively large cohort of patients with DKA, we found that DKA during pregnancy was associated with significantly worse maternal outcomes.

Table 1. Maternal and neonatal outcomes among patients with type 1 diabetes and type 2 diabetes by DKA status during pregnancy

	DKA in pregnancy	No DKA in pregnancy	aOR (95% CI)
Type 1 diabetes			
Hypertensive disorder of pregnancy	30.4%	24.9%	1.21 (1.01-1.45)
Postpartum hemorrhage	5.0%	4.6%	1.23 (0.85-1.77)
Operative vaginal delivery	4.5%	5.1%	0.87 (0.60-1.27)
Cesarean delivery (CD)			
Nulliparous	65.7%	65.3%	1.04 (0.81-1.32)
Multiparous with history of CD	93.1%	96.2%	0.74 (0.33-1.67)
Multiparous no history of CD	36.2%	28.5%	1.34 (0.93-1.92)
ICU admission	2.0%	0.4%	4.03 (1.94-8.36)
Severe maternal morbidity (SMM) **	7.8%	3.1%	2.01 (1.44-2.79)
Non-transfusion SMM ***	5.3%	1.4%	3.04 (1.99-4.66)
Type 2 diabetes			
Hypertensive disorder of pregnancy	27.9%	21.0%	1.32 (1.10-1.58)
Postpartum hemorrhage	3.4%	4.3%	0.90 (0.59-1.38)
Operative vaginal delivery	4.1%	3.5%	1.10 (0.74-1.63)
CD			
Nulliparous	65.9%	60.6%	1.61 (1.21-2.13)
Multiparous with history of CD	96.9%	95.2%	1.55 (0.62-3.86)
Multiparous no history of CD	40.7%	28.6%	1.80 (1.31-2.46)
ICU admission	1.6%	0.3%	4.07 (2.02-8.21)
SMM **	5.6%	2.5%	1.67 (1.16-2.40)
Non-transfusion SMM ***	3.6%	1.1%	2.45 (1.56-3.86)

* OR adjusted for race/ethnicity, age, BMI, college attendance, insurance type, tobacco use, parity, gestational age at delivery
** Severe maternal morbidity (SMM) consists of 21 diagnosis- and procedure-based ICD-9 and ICD-10 codes provided by Centers for Disease Control & Prevention (CDC)
*** SMM excluding blood transfusion

475 Delivery hospitalization costs associated with diabetic ketoacidosis among pregnant patients with pre-existing diabetes

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OBJECTIVE: Prior data have demonstrated that patients with diabetes in pregnancy accrue higher health care costs, particularly those with antepartum admissions for diabetes-related complications, such as diabetic ketoacidosis (DKA). We sought to assess hospitalization costs for delivery among patients with pre-existing diabetes who had DKA during pregnancy compared to those who did not.

STUDY DESIGN: We conducted a retrospective cohort study of singleton, non-anomalous live births in California between 2008-2019. We included patients with type 1 and type 2 diabetes who delivered between 23-42 weeks' gestation and stratified by DKA status. We assessed median and mean hospitalization costs for delivery for the patient and infant separately, and also assessed length of stay. Kruskal-Wallis equality of populations rank test was used for statistical comparisons with a p-value of 0.05. We also performed generalized linear models to assess the adjusted mean difference between costs.

RESULTS: There were 481,749 pregnant persons with diabetes included in this analysis, of which 1,503 (0.3%) had DKA during pregnancy. Delivery hospitalization costs were significantly higher among pregnant persons who had DKA during pregnancy ($27,764 versus $22,070, $P< 0.001$) and their hospital stays were longer (4 versus 3 days, $P< 0.001$). This was also true for infants of patients with DKA during pregnancy, who had significantly higher delivery hospitalization costs ($6,435 versus $4,571, $P< 0.001$) and longer hospital length of stay (3 versus 2 days, $P< 0.001$).

CONCLUSION: In this study, we found that delivery hospitalization costs and length of stay were increased among pregnant persons with pre-existing diabetes who had DKA during pregnancy. These results allow greater understanding of health care costs associated with DKA during pregnancy and suggest that there is increased resource utilization during the hospitalization for delivery for patients with DKA in pregnancy.

Table 1. Delivery hospitalization costs and length of stay among patients with pre-existing diabetes stratified by DKA status in pregnancy.

	DKA in pregnancy	No DKA in pregnancy	*P*
Maternal costs			
Median (IQR)	$27,764 ($18,498-$43,503)	$22,070 ($14,468-$32,932)	<0.001
Mean (SD)	$41,210 ($57,573)	$28,040 ($30,334)	
Adjusted MD (95% CI)*	$12,999 ($9,601-$16,396)	-	<0.001
Maternal length of stay (days)			
Median (IQR)	4 (3-5)	3 (2-4)	<0.001
Mean (SD)	5.3 (6.5)	3.7 (3.7)	
Infant costs			
Median (IQR)	$6,435 ($3,172-$32,699)	$4,571 ($2,808-$9,170)	<0.001
Mean (SD)	$42,096 ($107,519)	$19,855 ($64,516)	
Adjusted MD (95% CI)*	$19,908 ($14,615-$25,202)	-	<0.001
Infant length of stay (days)			
Median (IQR)	3 (2-5)	2 (2-4)	<0.001
Mean (SD)	6.4 (10.8)	3.9 (6.4)	

DKA, diabetic ketoacidosis; IQR, interquartile range; SD standard deviation; MD, mean difference; CI, confidence interval

* Adjusted for race/ethnicity, age, body mass index, college attendance, insurance type, tobacco use, parity

476 Expression and distribution of Src kinase LYN in placenta of patients with preeclampsia (PE)

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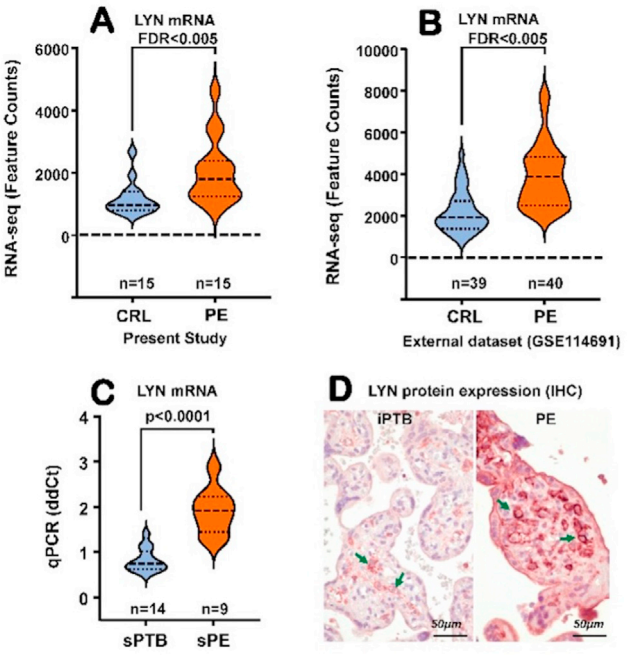
OBJECTIVE: The Src family of tyrosine kinases (SFK) plays key roles in cell migration, growth, and division. Among the 8 SFK members, some are ubiquitous (SRC, YES, FYN), while others are considered tissue specific (BLK, FGR, HCK, LCK, LYN). Cancer biology and immunology have been the primary focus of SFK research thus far. As SFK-regulated processes are also important for pregnancy, we set out to determine the relative expression of SFK members in placenta to explore their potential role in PE.

STUDY DESIGN: RNAseq was performed on placental villous samples in two groups: PE (n=15, GA 30±1w) and normotensive controls (n=15, GA 33±1w). An external RNAseq dataset (GSE114691) (n=79), and RNA from villous placenta tissues from preterm PE with severe features (n=9, GA 29±1w) or spontaneous preterm birth (sPTB, n=14, GA 29±1w) were used for database and qPCR validation, respectively. Placental immunohistochemistry (IHC) was performed using an anti-LYN monoclonal antibody. Protein-Protein Interaction networks (PPI) curated using STRING and PINOT databases provided insight into processes correlated with placental LYN expression. Non-parametric statistics and linear regression were used.

RESULTS: LYN was the only SFK elevated in PE placenta compared to controls, both in our RNAseq data (1.8-fold, FDR< 0.005, **Fig. A**) and the external dataset (FDR< 0.005, **Fig. B**). LYN mRNA correlated positively with maternal systolic blood pressure (r=0.63, p< 0.001). LYN upregulation in PE placenta was confirmed by qPCR (p< 0.0001, **Fig. C**) independent of GA, birthweight, fetal sex or delivery mode. Placental LYN expression was more conspicuous in PE, localizing primarily to syncytiotrophoblast outer basal membrane and Hofbauer cells (**Fig. D**, arrows). PPI data mining identified the hypoxia-regulated endoplasmic reticulum oxido-reductase ERO-1A as the top LYN correlated transcript (r=0.85, p< 10^{-7}).

CONCLUSION: We demonstrate for the first time that LYN mRNA and protein expression are upregulated in PE. Correlation to LYN mRNA and maternal blood pressure further support a role for this Src kinase in the pathophysiology in PE.



477 Comorbidity Burden and Social Vulnerability Among Non-Pregnant Reproductive-Age Patients: Opportunities for Preconception Counseling

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OBJECTIVE: To determine the proportion of non-pregnant reproductive age patients with high comorbidity burden and less effective contraception that may benefit from preconception counseling.

STUDY DESIGN: Retrospective cohort of patients 15-49 years of age presenting for annual gynecological examinations throughout a large health system in New York between January 2019 and December 2022. Clinical and sociodemographic data was obtained from the electronic medical record. Patients were classified into 3 groups based on risk to conceive: 1) no risk—menopause or prior hysterectomy, 2) low risk—intrauterine device, implant, female sterilization, 3) high risk—pill, patch, ring, shot, or no contraception documented. Obstetrical comorbidity index (OB-CMI) score was calculated (pregnancy-specific components excluded) based on ICD-10 codes and clinical documentation. High comorbidity burden was defined as OBCMI >=4. Social vulnerability index (SVI) score was determined based on the census tract of each patient's home address, and patients were grouped by SVI quartile.

RESULTS: Of the 30,722 patients, most (79%; n=24,228) had less effective or no contraception documented. The rates of highly reliable contraception did not vary when stratified by SVI quartile or OBCMI score. Non-Hispanic Black patients were more likely to have highly reliable contraception compared to non-Hispanic White patients (20.4% vs. 17.2%; OR 1.23, 95% CI 1.12-1.36). High comorbidity burden was seen in 15% of patients with less effective contraception (n=3,443/24,228). Among patients with less effective

contraception, non-Hispanic Black patients were more likely to have a high comorbidity burden compared to non-Hispanic White patients (20.9% vs. 14.3%; OR 1.58, 95% CI 1.42-1.75).

CONCLUSION: Racial and ethnic differences in contraceptive method and comorbidity burden were seen in this cohort of reproductive age patients. By identifying non-pregnant patients with high comorbidity burden and less effective contraception, we have an opportunity to direct targeted interventions such as referral for high-risk preconception counseling or family planning.

Table 1: Baseline demographics by risk to conceive.

Characteristic	High Risk	Low Risk	No Risk
Maternal age	31.5 ± 8.9	31.2 ± 8.9	44.9 ± 4.0
BMI	27.8 ± 6.8	28.4 ± 6.7	28.0 ± 5.9
Race and ethnicity			
Non-Hispanic White	11376 (37)	2365 (7.7)	470 (1.5)
Non- Hispanic Black	2742 (8.9)	1392(4.5)	199 (0.65)
Hispanic	5154 (16.8)	27 (15.6)	35 (19.9)
Asian or Pacific Islander	952 (3.1)	297 (1)	34 (.1)
Other/Multiracial	1551 (5.0)	444 (1.45)	52 (0.2)
Declined/Unknown	2453 (8.0)	427 (1.4)	48 (0.2)
Nulliparous	300 (38.1)	65 (37.6)	73 (42.0)
Public insurance	8003 (26.1)	2077 (6.8)	205 (0.7)
English language	21478 (70.5)	4957 (16.3)	743 (2.4)
OBCMI >=4	3443 (11.2)	709 (2.3)	452 (1.5)

Data presented as n (%) and mean ± standard deviation

478 Bictegravir Use During Pregnancy: A Multi-Center Retrospective Analysis Evaluating HIV Viral Suppression and Perinatal Outcomes

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OBJECTIVE: Integrase strand-transfer inhibitors (INSTI) are recommended as part of antiretroviral therapy for most people with HIV. Bictegravir (BIC) is a first line INSTI in non pregnant adults living with HIV, however there is a paucity of data on its use in pregnancy. The objective of this study was to describe maternal viral suppression and perinatal outcomes among people with HIV who used BIC during pregnancy.

STUDY DESIGN: We performed a multi center retrospective cohort study of pregnant people with HIV who used a BIC containing antiretroviral regimen between January 2019- June 2023 at 4 different centers in the United States. Demographics, HIV, perinatal, and infant outcomes were abstracted from the medical record and summarized by timing of BIC use in pregnancy. Viral suppression was defined as HIV-1 RNA (viral load) < 50 copies/mL.

RESULTS: 147 pregnancies with BIC use were included in the analysis (Site 1 [n=41], Site 2 [n=18], Site 3 [n=75], Site 4 [n=13]). The median age was 29 (range 16-43) years, and the median gestational age of delivery was 39 (range 26-41) weeks. Of these pregnancies, 83 (56.4%) received BIC preconception and continued in pregnancy, 59 (40.1%), started BIC during pregnancy and 5 (3.4%) received BIC preconception and discontinued during pregnancy. Viral suppression closest to delivery was highest in those receiving BIC preconception and continued in pregnancy (96.2%), and no cesarean deliveries for elevated HIV viral load occurred in this group. For those who started BIC prior to conception and continued on it through pregnancy, a birth defect was noted in 2.4%. One perinatal HIV transmission occurred after a third trimester HIV diagnosis with BIC started at 31 weeks' gestation.

CONCLUSION: In this analysis, the use of BIC in pregnancy was associated with high levels of viral suppression and similar perinatal outcomes to published literature in this patient population. These findings highlight the potential efficacy and safety of BIC in pregnancy and support its consideration in the management of HIV during pregnancy.

Table 1: Perinatal outcomes and HIV viral suppression with use of bictegravir (BIC) in pregnancy

	BIC use preconception and continued in pregnancy (n=83)	BIC started in pregnancy (n=59)	BIC use preconception then stopped in pregnancy (n=5)	Any BIC use in pregnancy (n=147)
Background				
Mean age in years (range)	29.2 (19-43)	28.3 (16-42)	23.4 (19-28)	28.6 (16-43)
Non-Hispanic Black	62/83 (74.7%)	46/59 (80.0%)	2/5 (40%)	110/147 (74.8%)
Perinatal HIV infection	6/82 (7.3%)	5/58 (8.6%)	1/5 (20.0%)	12/145 (8.3%)
CD4 <200 cells/mm^3 at prenatal care entry	4/82 (4.9%)	13/58 (22.4%)	0/4 (0%)	17/144 (11.8%)
HIV Outcomes				
Viral suppression on entry to prenatal care*	65/82 (79.2%)	13/56 (23.2%)	4/5 (80%)	82/143 (57.3%)
HIV-1 RNA viral load <200 copies/mL on entry to prenatal care	70/82 (85.3%)	16/56 (28.6%)	5/5 (100%)	91/143 (63.6%)
Viral suppression closest to delivery*	78/81 (96.2%)	50/59 (84.7%)	3/5 (60%)	131/145 (90.3%)
HIV-1 RNA viral load <200 copies/mL on entry to prenatal care	79/81 (97.5%)	54/59 (91.5%)	4/5 (80%)	137/145 (94.5%)
Perinatal Outcomes				
Mean gestational age at delivery in weeks (range)	38.1 (26-40.5)	37.9 (30-41)	39.0 (38.2-40.3)	38.1 (26-41)
Preterm birth (<37 weeks)	16/83 (19.2%)	10/59 (16.9%)	0/5 (0%)	26/ 147 (17.7%)
Cesarean delivery for HIV	0	5	1	6
Infant Outcomes				
Fetal anomaly- Includes Anatomic/syndromic/genetic abnormalities	2/83 (2.4%)	4/59 (6.7%)	0/5 (0%)	6/147 (4.1%)
Perinatal HIV transmission	0 (0%)	1 (1.7%)	0/5 (0%)	1 (0.7%)

* Viral suppression defined as HIV-1 RNA (viral load) <50 copies/mL

479 Differences in time of birth between spontaneous and operative vaginal births: a nationwide population-based analysis

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OBJECTIVE: Previous studies have identified a correlation between obstetric interventions and the time of day. However, they do not account for the granular variation in temporality of such interventions, which may be influenced by healthcare provider and resource availability. Our objective was to assess differences in time of birth among spontaneous versus operative (forceps- and vacuum-assisted) vaginal births using a population-based dataset.

STUDY DESIGN: We performed a retrospective population-based study using birth certificate data from the National Vital Statistics System from 2016 to 2021, which includes the time of birth and method of delivery for all recorded births in the United States. The number of spontaneous and operative vaginal births at each minute was determined over a 24-hour time frame. To facilitate balanced comparisons between groups, birth numbers were normalized relative to

the total births within each group. Trend lines were established based on 60-minute moving averages and the distributions were compared using the Kolmogorov-Smirnov test.

RESULTS: A total of 15,413,957 vaginal births were analyzed, among which 690,912 (4.5%) were operative births. The normalized proportion of spontaneous and operative births over a 24-hour period is presented in Figure 1. There was a statistically significant difference in the time of birth between spontaneous and operative births ($p<$ 0.01). Compared to births at other time intervals, those between 4:30-7:30 p.m. were more likely to be operative births (OR 1.11, 95% CI 1.11-1.12). Conversely, births between 3:00-6:00 a.m. were less likely to be operative births (OR 0.89, 95% CI 0.88-0.89).

CONCLUSION: In this population-based study, we identified temporal differences between spontaneous and operative vaginal births with increased use of instrumentation during late afternoon and reduced use in the early morning. These results prompt further investigation into the indications for operative vaginal birth and the root causes of these temporal variations, which are likely multifactorial and involve provider and resource availability.

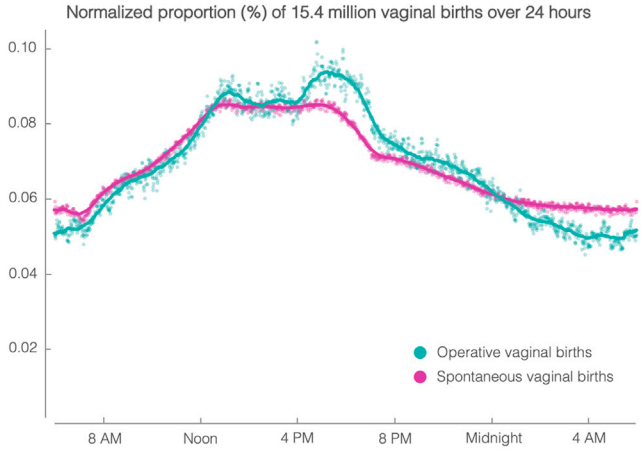

Figure 1. Normalized proportion of spontaneous and operative vaginal births over a 24 hours. Each dot represents the normalized proportion of births that occurred within 5-minute intervals. Trendlines are generated using 60-minute moving averages.

480 Cost-effectiveness of 2022 American Academy of Allergy, Asthma & Immunology Practice Parameter for cesarean prophylaxis

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OBJECTIVE: The updated 2022 American Academy of Allergy, Asthma and Immunology (AAAAI) Practice Parameter suggests de-emphasis of skin allergy testing compared to drug challenge for majority of patients with penicillin allergy. We sought to evaluate cost-effectiveness of incorporating 2022 AAAAI practice parameter for cefazolin (Ancef) cesarean prophylaxis (AP) versus referral for penicillin allergy testing (PAT).

STUDY DESIGN: A decision analytic model was constructed to compare the costs and outcomes of 2 strategies for cesarean prophylaxis with penicillin allergy:

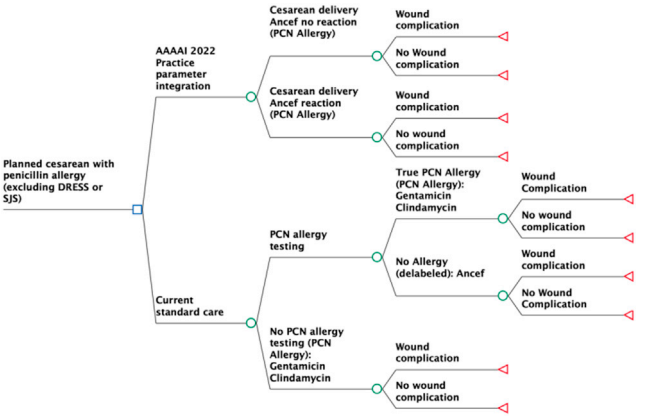
AAAAI 2022 guidelines for AP (excluding history of severe cutaneous reaction).

Current practice of referral for PAT prior to surgery.

Data was sourced from published literature, drug pricing databases, and expert opinion. Costs included allergy testing, antibiotics, and complications. Effects included testing compliance, Ancef reactions and de-labeling penicillin allergy. Comparing the costs and effects of each strategy determined the incremental cost-effectiveness ratio of cost per wound infection averted. Sensitivity analysis tested the robustness of the results to variability in the data and model structure.

RESULTS: In the base-case, incorporation of the AAAAI practice parameter was the choice strategy, with the mean cost of $283 compared to $588. Referral for penicillin allergy testing costs $43,916 per case of wound infection avoided. However, when incorporating the estimated lifelong cost of penicillin allergy into the decision model, referral for penicillin allergy testing becomes the dominant, cost saving strategy, with mean cost of $1,367 compared to $4,755. When considering the lifelong cost of penicillin allergy, incorporation of AAAAI practice parameter costs $487,934 per wound infection avoided.

CONCLUSION: Incorporation of AAAAI practice parameter for cesarean prophylaxis is cost saving compared to referral for penicillin allergy testing. However, when considering the lifelong cost of penicillin allergy and potential to de-label penicillin allergies during pregnancy, referral for allergy testing becomes the cost-saving strategy.



481 Engaging community doulas with a remote postpartum hypertension program for Black persons: A qualitative study

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OBJECTIVE: Perform a qualitative assessment of the postpartum (PP) person's experiences with addition of a community-based doula in an existing remote patient monitoring (RPM) program for PP hypertension (HTN).

STUDY DESIGN: Qualitative study to explore Black PP person's experience with addition of a community-based doula in an existing PP RPM program for patients with Hypertensive Disorders of Pregnancy (HDP) to improve program participation with BP submission as well as an improvement in overall postpartum care. We prespecified the plan to conduct up to 20 semi-structured interviews to achieve thematic saturation in understanding participant experiences and any barriers or facilitators regarding the intervention. The interviews were coded and thematically analyzed using a modified grounded theory approach using NVivo 12.

RESULTS: Interviews were conducted with 19/49 individuals who participated in the study. Then mean (SD) maternal age was 27.3 (6.04), 74.5% were single, 96.1% had a prior pregnancy, and 33.3% delivered pre-term. Five themes emerged; three regarding facilitators/benefits 1) communicative, responsive and supportive care, 2) ability for participants to better care for their health and wellbeing, and 3) emotional support provided by doulas. The two themes regarding barriers were 4) challenges with technology and 5) difficulty remembering to submit vitals. Participants shared overwhelming positive support for the program. Any challenges or criticisms of the program were with technological difficulties.

CONCLUSION: Overall participants reported positive experiences with the addition of community-based doulas in our RPM program for patients with HDP. Specifically, they felt their physical and emotional health were better supported. Barriers were rare and limited to technology difficulties. This study highlights the ability to improve participation with clinical care measures by utilizing alternative strategies such as involving community stakeholders to assist in supporting non-clinical needs.

Table 1: Thematic analysis themes and examples

Theme	Patient example
1) Supportive communication	"It wasn't like somebody was just watching over me. It was just actually just, it felt like support, genuine support. Like we care, and we just want to make sure that you are taken care of in the best way possible and that you know what is going on and what's available for you to help you." "And then, yeah, it [their blood pressure] did, went up just once. And I was contacted by one of the nurses. And she prescribed me another blood pressure medication. But overall, like my blood pressure just got back to normal, then they got me off of it. It's just the back-and-forth communication. So that's what made the experience go really well for me."
2) Ability for participants to better care for their health and well being	"I was able to just manage it and be at home and be comfortable. Like I don't know how it really works because, like I said, this is my first being diagnosed with preeclampsia. So I didn't have to go to the clinic out there for myself. Or, you know, I didn't have to stay in the hospital longer. I was able to come home and manage my health situation." "So I felt like this program honestly saved my life because I really wouldn't have been getting my blood pressures checked or anything after having the baby until my six-week checkup. So the six weeks I was at home, you know, going through the postpartum healing from the C-section, I felt like this program really was very good for my health and my wellbeing because I wouldn't have been knowing which medicines to switch or add on or take off."
3) Emotional support by doulas	"I needed, she helped me get to my doctor's appointments for the baby. She, I needed breast pads and bras and stuff, nursing bras that would help me better to nurse. She connected me to my social worker, to the hospital, to get me bras and stuff. So she's been a huge help in just reassuring that I'm doing it right." "Well, really, she was a great listener. I'll say that. We went to the mall and stuff, you know. She helped out with the children. Or if I told her I needed something, of course she would have brought it. I didn't really need too much besides a little bit of support and a listening ear. And, you know, she was there." "Yeah, so like breastfeeding for one. I was struggling with breastfeeding. And then I was also re-hospitalized. And she was able to come and stay with me and the baby, so the baby didn't have to be separated from me. And then she also helped me with the baby weight gain, so like finding something to help with the baby gaining weight because she wasn't gaining weight at a point."
4 & 5) Challenges	"At first it was a little hard to remember to take it every day. That's the only struggle that I had, was, yeah, just like trying to basically maintain a newborn and just basically maintain taking a blood pressure on a daily basis, not forgetting, stuff like that." Several participants noted the ease of working with technology but a few saw it as a challenge, "Only the tablet had a malfunction, and I had to just manually give them to, give them my blood pressure on the phone."

482 Associations between antepartum anemia and uterine fibroids in pregnancy by race and ethnicity

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OBJECTIVE: Uterine fibroids cause anemia and create a significant burden of disease among Black women. Yet the degree to which fibroids contribute to racial disparities in antepartum anemia, a cause of severe maternal morbidity, is unclear. Our objectives were 1) to estimate the associations of uterine fibroids with antepartum anemia and 2) to evaluate associations across seven racial/ethnic groups.

STUDY DESIGN: We conducted a retrospective cohort study of pregnant people in California from 2007 to 2018 who delivered at 20-42 weeks. Data were abstracted from a statewide database of vital records linked to delivery hospitalization discharge data. The primary exposure, uterine fibroids, and outcome, antepartum anemia, were identified using ICD codes. We used multivariable logistic regression modeling, stratified by self-reported race and ethnicity, to estimate odds ratios of antepartum anemia and to adjust for maternal characteristics (age, insurance, BMI, parity, timing of prenatal care) and clinical factors (vaginal bleeding and placental abruption).

RESULTS: Among 5,196,914 deliveries, the frequency of fibroids was 1.6%. Patients with fibroids were more likely to be older than 30 years (85.1% vs 46.3%), pregnant by assisted reproductive technology (0.8% vs. 0.1%), and have a cesarean birth (69.9% vs 31.9%). Black pregnant patients, with and without fibroids, had the highest frequency of anemia; of Black pregnant patients, with fibroids, 26% had anemia, and 16.1% of those without fibroids had anemia, respectively (Table 1). In the total study population, fibroids were associated with increased odds of antepartum anemia (aOR 1.78, 95% confidence interval 1.74-1.82). Fibroids increased the odds of antepartum anemia by at least 70% in every racial/ethnic group except American Indian/Alaska native.

CONCLUSION: Independent of confounders, fibroids were significantly associated with 78% increased odds of antepartum anemia across nearly all racial/ethnic groups. Screening for anemia in patients with uterine fibroids may identify individuals at risk for severe maternal morbidity.

Table 1. Associations between uterine fibroids and antepartum anemia by race and ethnicity

	Anemia without fibroids n (%)	Anemia with fibroids n (%)	Crude odds ratio (95% confidence interval)	Adjusted odds ratio (95% confidence interval)*
Total Population	406,609 (8.0)	11,476 (14.2)	1.92 (1.88-1.96)	1.78 (1.74-1.82)
Stratified by racial/ethnic group†				
American Indian/ Alaska Native	1,862 (8.3)	18 (11.1)	1.39 (0.85-2.27)	1.36 (0.82-2.24)
Asian	55,011 (7.7)	2,343 (12.5)	1.72 (1.65-1.80)	1.70 (1.63-1.78)
Non-Hispanic Black	44,537 (16.0)	2,869 (26.1)	1.86 (1.78-1.94)	1.76 (1.69-1.85)
Hispanic	210,598 (8.1)	3,946 (13.8)	1.83 (1.77-1.89)	1.82 (1.75-1.88)
Pacific Islander	2,562 (10.0)	44 (16.9)	1.83 (1.32 -2.54)	1.91 (1.37-2.67)
Non-Hispanic White	91,623 (6.3)	2,230 (10.2)	1.69 (1.62-1.77)	1.71 (1.63 -1.78)
Another race specified#	416 (10.6)	26 (20.6)	2.18 (1.40-3.40)	2.31 (1.45-3.66)

*Covariates: age, insurance, education, prenatal care timing, pre-pregnancy BMI, parity, race and ethnicity, placental abruption, and vaginal bleeding during pregnancy.
†Covariates: all covariates listed above except for race and ethnicity.
#Another race as specified by the individual

483 Black and Hispanic patient-centered voices of antepartum anemia: a community engaged approach

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OBJECTIVE: Black pregnant people have the highest rates of anemia, contributing to disparities in severe maternal morbidity in the United States. Our objective was to conduct community-centered

research to identify barriers to and opportunities to care for antepartum anemia among historically underserved communities.

STUDY DESIGN: We applied Howell's conceptual framework on reduction of peripartum racial and ethnic disparities (Obstet Gynecol 2018) and the Public Health Critical Race Praxis to identify community stakeholders and distill research objectives. In collaboration with our community partners, we created a semi-structured interview guide. People with a history of antepartum anemia were eligible and participated in focus groups and interviews aimed at providing insight into patient perceptions of diagnosis, management, and treatment of anemia offered and received during pregnancy. Cultural congruency between the interview facilitators and interviewees was maintained by race and ethnicity when possible. We analyzed the interviews using the grounded-based theory approach.

RESULTS: We conducted one-one interviews and virtual focus group sessions with 15 people with a history of antepartum anemia, facilitated by our community partner and academic research team. 11 focus group participants were Black, 3 were Hispanic/Latinx, and 1 was Multiracial, and all resided in California. Our analysis identified five major themes around barriers to care: 1) lack of information/education from the provider regarding anemia; 2) dismissal of patient's reported experiences with anemia symptoms; 3) treatment challenges with nutrition, oral, and intravenous iron; 4) perception of race and culture as a contributing factor to maternal care; and 5) role of patient support system.

CONCLUSION: Our qualitative community-engaged approach identified specific challenges and opportunities for patient-informed solutions to improve antepartum anemia care among Black and Hispanic pregnant patients. Community-informed interventions are needed to achieve equitable, evidence-based treatment and care of anemia in pregnancy.

Table 1. Thematic based quotes from Pregnant Patients Experiences with Antepartum Anemia

Themes		
Lack of information on anemia	"They didn't explain any of that. They just told me to take the pills." ID 4	"She gave me a sheet with a diet that I should follow, and that was pretty much it. She's just like, 'Here's the paper.'" ID 11
Dismissal of patient's reported experiences with anemia symptoms	"I was always feeling very tired, but every time I would tell the doctor, it was always being diagnosed as, 'You're pregnant.'" ID 10	"When I told her I was really tired, really dizzy, it was kind of just kind of ignored just because it's kind of like, "Oh, well, it's normal.'" ID 11
Treatment challenges	"And so from there, it was about trying to advocate and find the right words to kind of say, 'Look, I can't take this iron supplement anymore. I do need to be on infusions now.'" ID 9	"I was just like, 'Hey, these pills are making me sicker than what it was.' ...but I was so severe...I was like a 6 or 5, and they would give me infusions." ID 15
Influence of race and culture	"I do feel like what you end up doing has repercussions on your care, and so sometimes it feels like I don't want to say stuff because I don't want it to have repercussions on my care." ID 9	"And the first barrier I had going to the doctor was being as a woman of color, already being assessed without any medical test being run." ID 10
Role of Support person	"My family was a really strong support for me, especially my cousin... And she educated me a lot on it." ID 6	"I was telling them...[family] on the way that they could help out in order for me to now solve this issue I got." ID7 and ID 8

484 Donor gamete status and hypertensive disorders of pregnancy in pregnancies conceived with assisted reproductive technologies

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OBJECTIVE: It is hypothesized that abnormal maternal immune tolerance may lead to a higher risk of HDP in pregnancies conceived with ART, which accounts for an increasing percentage of live births in the United States.We sought to determine if pregnancies resulting from in vitro fertilization (IVF) of double donor gametes have a higher risk of HDP compared to other ART procedures in a cohort of deliveries in a healthcare center between 1998-2016.

STUDY DESIGN: Pregnancies conceived via ART at the healthcare center's infertility clinic were linked to delivery records. The overall cohort consisted of 48,749 deliveries; 1,949 of those deliveries were conceived with ART at the fertility clinic (13% used intrauterine insemination [IUI], 87% used IVF). HDP were ascertained using an electronic health record-based definition that incorporated quantitative blood pressure and laboratory data, as well as complications in labor and delivery. Gamete donation status was classified into four categories: no donor gamete, donor sperm, donor oocyte, double gamete donation. Adjusted generalized estimating equations accounting for multiple pregnancies per patient were used to determine differences in the risk of HDP by gamete donation categories.

RESULTS: The overall rate of HDP in the non-ART population was 7.2%; in the ART population, the rate of HDP was 12.9%. After adjustment, the risk of HDP in donor oocyte and double gamete donation categories was significantly higher than the no donor gamete category (Table 1). There was no difference in the risk of HDP between donor sperm and no donor gametes. Results did not change after adjustment for IUI versus IVF and the use of intracytoplasmic injection of sperm (ICSI) in the IVF cohort.

CONCLUSION: Donor oocyte was associated with an increased risk of HDP compared to pregnancies conceived with autologous oocytes and partner sperm in this ART cohort. While a known risk factor in spontaneously conceived pregnancies is new partner sperm, donor sperm had a similar rate of HDP compared to no donor gametes.

Table 1. Gamete donation status and HDP rate of N=1,949 ART-conceived pregnancies

Gamete Donation Status	*N (%) of ART pregnancies (N=1,949)*	*Rate of HDP*	*aOR* (95% CI); p-value for HDP*
No donor gametes	1,768 (90%)	12.2%	*Reference*
Donor sperm	63 (3.2%)	7.9%	0.61 (0.21, 1.72); 0.35
Donor oocyte	110 (5.6%)	26.4%	3.34 (1.93, 5.78); <0.001
Double gamete donation	8 (0.41%)	37.5%	8.73 (1.45, 52.6); 0.02

*Generalized estimating equations adjusted for maternal age, first trimester maternal BMI, gestational diabetes (defined using Carpenter-Coustan criteria), multiple gestation, and year of delivery

485 Association between perinatal phthalate metabolite concentrations and postpartum glucose levels: a prospective observational study

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OBJECTIVE: To study the associations of pregnancy and postpartum exposure to phthalates, a class of endocrine disrupting chemicals, with postpartum glucose tolerance.

STUDY DESIGN: Pregnant participants in the Environmental Reproductive and Glucose Outcomes Study with data on urinary phthalate metabolite concentrations at $\leq$ 4 study visits (median 11 [Visit 1, V1], 19 [Visit 2, V2], and 26 [Visit 3, V3] weeks' gestation and median 7 weeks postpartum [PP]) and available PP fasting and 2-hour glucose levels after a 75-gram oral glucose tolerance test were included. Phthalate metabolite concentrations (e.g. MCOCH, MHiNCH, MBP, etc.) were specific-gravity adjusted and modeled

individually and as mixtures at each timepoint. Analyses were adjusted for age, pre-pregnancy BMI, education, and parity.

RESULTS: 201 participants were included [mean(SD) age: 33 (5) years; fasting glucose: 82 (8) mg/dL; 2-hour glucose: 88 (22) mg/dL] with phthalate data measures available for 90%, 81%, 86% and 92% at V1, V2, V3 and PP, respectively. V1 MCOCH and MHiNCH; V2 MBP; and PP MEHHP, MEHP, MHBP were associated with higher fasting glucose levels, while V2 MCNP was associated with higher 2-hour postprandial glucose levels. MEHHTP at V2 and MCOP at V3 were associated with lower fasting glucose levels. V1 MECPTP and MEHHTP; V2 MBP, MBzP, MEHHP, MEOHP; V3 MEHHP and MHiNCH; and PP MCPP and MHiBP were associated with lower 2-hour postprandial glucose levels. Weighted quantile sum regression identified pregnancy MCOCH (positive direction) and MEP (negative direction) in the phthalate mixture as important contributors to the mixture's associations with PP fasting and 2-hour glucose levels.

CONCLUSION: In our cohort, pregnancy and postpartum urinary phthalate metabolite concentrations were associated with altered glucose metabolism in the postpartum period, although findings varied by timing of phthalate measurement. Given the ubiquitous nature of phthalates in consumer products, it is important to further explore the influence of phthalate metabolites concentrations on PP glucose metabolism.

486 Compliance with national guidelines for aspirin prophylaxis for preeclampsia prevention

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OBJECTIVE: Since 2014, the American College of Obstetricians and Gynecologists (ACOG) has recommended aspirin prophylaxis, beginning at 12 weeks gestational age, to prevent preterm preeclampsia in high-risk patients. Despite the known benefits of aspirin prophylaxis, the frequency of provider adherence to this recommendation is poorly understood. Hence, we assessed the frequency of guideline adherence over time and the risk factors for non-adherence.

STUDY DESIGN: From 2012-2023, 29,595 patients received prenatal care at our tertiary care center. Patients that met the criteria for aspirin prophylaxis were identified, and longitudinal adherence to guidelines was assessed. We then evaluated patient factors contributing to guideline non-adherence.

RESULTS: A total of 10,171 (34%) patients met the criteria for aspirin prophylaxis. Of those eligible, 1,463 (14%) were prescribed aspirin prophylaxis overall. Guideline adherence improved with time, increasing from 2.7% of eligible patients in 2014 to 26% in 2022 (Figure 1). Since the inclusion of moderate risk factors in the guidelines, eligible patients most often overlooked were a combination of Black race and low income, comprising 47% of eligible patients that did not receive a prescription.

CONCLUSION: Despite the ACOG recommendation for aspirin prophylaxis for the prevention of preterm preeclampsia, only 26% of eligible present-day patients received a prescription. Low-income Black patients were most frequently overlooked, suggesting that populations already at increased risk are being left out. Alternate methods to encourage guideline adherence, such as a provider alert, are needed to facilitate the benefit of evidence-based recommendations.

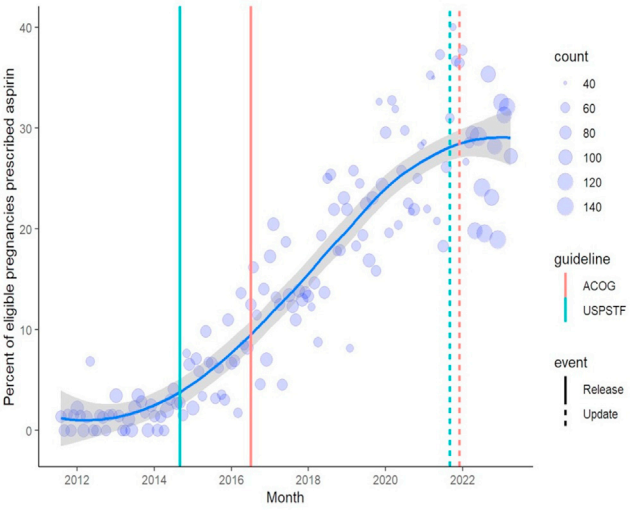

Figure 1: Longitudinal adherence to recommended aspirin prophylaxis guidelines for preeclampsia prevention. Timing of guideline implementation and updates are noted by vertical lines. The shaded area represents the 95% confidence interval.
ACOG, American College of Obstetricians and Gynecologists; USPSTF, United States Preventative Services Task Force

488 Development of umbilical vessels as vascular grafts

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OBJECTIVE: Small-diameter arterial cardiovascular disease often requires the replacement of damaged or disease blood vessels with autologous graft such as saphenous vein or thoracic artery or synthetic graft. However, the supply of suitable vessels is often limited, and there are potential limitations such as thrombogenic risk and lack of integration associated with natural grafts. To overcome these challenges, researchers have explored decellularized tissue engineering as a promising alternative. This study aimed to create a decellularized umbilical vessel and evaluate its potential as a small-diameter vascular graft.

STUDY DESIGN: We created decellularized blood vessels using umbilical cords obtained from full-term deliveries. After separating them into artery and vein, the vessels underwent freezing, thawing, and chemical treatments to remove cellular components. Confirmation of successful decellularization was achieved through H&E staining. Subsequently, we performed interposition of these decellularized vessels into the abdominal aorta of rabbits with a similar diameter.

RESULTS: After one week following the transposition into the rabbit's abdominal aorta, we observed that the decellularized vessels maintained their structural integrity and demonstrated appropriate patency. Upon conducting a postmortem examination of the rabbit, even then, we confirmed the absence of thrombus formation, indicating that blood clots did not occur.

CONCLUSION: This study confirmed the potential of umbilical cord blood vessels as a novel artificial blood vessel. However, further research is required for practical implementation.

489 Do fetal biometry parameters> 90th percentile increase the risk of Primary Cesarean Delivery?

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OBJECTIVE: To determine whether sonographic fetal biometry parameters > 90% increase the risk of primary cesarean delivery (PCD) in Appropriate for Gestational Age (AGA) neonates across different parity groups.

STUDY DESIGN: A retrospective analysis was conducted to assess the rate of PCD for AGA neonates with Fetal Biometry above 90% in various parity groups. Singleton pregnancies at term underwent sonographic estimation using the Hadlock scale within one week of delivery between 2020 and 2023. Pregnancies with known anomalies were excluded.

RESULTS: The study included 10,515 women, divided into primiparous (n=2,183), multiparous (parity 1-4) (n=5,587), and grand multiparous (parity ≥5) (n=2,745) groups. The overall rate of PCD was higher among primiparous women, 13.4%, compared to 3.6% in multiparas and 4.8% in grand multiparas (p< 0.01). For AC >90%, the rate was 24.6% in primiparas, 6.7% in multiparas, and 8.1% in grand multiparas (p< 0.01). For HC >90%, the rates were 25.2% in primiparas, 6.4% in multiparas, and 4.8% in grand multiparas (p< 0.01). For FL >90%, the rates were 14.2% in primiparas, 2.9% in multiparas, and 5.2% in grand multiparas (p< 0.01).

When comparing the rate of CD between biometric parameters >90% and Large for Gestational Age (LGA) neonates, a higher rate of CD was observed in women with AC or HC >90% compared to LGA in primiparas (24.6% and 25.2% vs 17.2%, p< 0.01) and multiparas (6.7% and 6.4% vs 6.03, p< 0.01). However, this difference was not significant in grand multiparas (8.1% and 4.8% vs 8.6%, p=0.1).

CONCLUSION: AC and HC >90th centile confer an increased risk of PCD in primiparous and Multiparous patients but not in Grandmultiparous patients. These findings underscore the importance of considering fetal biometry, especially AC and HC, as key factors in decision-making regarding the mode of delivery, which may lead to better management and improved outcomes for pregnant women and their neonates.

	Primary CS n(%)	AC>90 AGA Total n(%)	AC>90 AGA-primary CS n(%)	HC>90 AGA Total n(%)	HC>90 AGA primary CS n(%)	FL>90 AGA Total n(%)	FL>90 AGA primary CS n(%)	LGA total n(%)	LGA Primary CS n(%)	P value
Primiparas n=2183	293 (13.4)	61 (2.8)	15 (24.6)	111 (5.1)	28 (25.2)	267 (12.2)	38 (14.2)	163 (7.5)	28 (17.2)	0.03
Multiparas N=5587	204 (3.6)	224 (4.0)	15 (6.7)	311 (5.6)	20 (6.4)	718 (12.8)	21 (2.9)	696 (12.4)	42 (6.03)	0.01
Grandmultiparas N=2745	132 (4.8)	161 (5.9)	13 (8.1)	209 (7.6)	10 (4.8)	402 (14.6)	21 (5.2)	476 (17.3)	41 (8.6)	0.1
P value	<0.01		<0.01		<0.01		<0.01		<0.01	

490 Changes in postpartum uterine artery Doppler velocimetry in subjects undergoing conservative management of placenta accreta

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OBJECTIVE: In patients undergoing an uncomplicated birth, blood flow to the uterus decreases in the ensuing weeks with an increase in resistance to flow in the uterine arteries (UtA). In patients who undergo conservative management of placenta accreta spectrum (PAS), the placenta remains *in situ*, providing a plausible physiologic basis for alterations in the expected blood flow pattern to the uterus postpartum. In this study, we describe UtA Doppler findings in individuals who underwent conservative management of PAS.

STUDY DESIGN: We studied a prospective cohort of subjects with PAS. Subjects who choose conservative management undergo serial postpartum ultrasound evaluations. UtA Doppler recordings were reviewed and peak systolic velocity (PSV), end-diastolic velocity (EDV), and pulsatility index (PI) registered, and mean values calculated. Postpartum outcomes and operative reports were reviewed. UtA Doppler measurements were plotted and linear regression analyses were performed to quantify changes over time.

RESULTS: 18 subjects were identified; 7/18 had 3 or more postpartum Doppler evaluations. The remaining 11 subjects had fewer than 3 postpartum ultrasounds with UtA Doppler values. When the 7 subjects with 3 or more evaluations were analyzed, 5/7 (71.4%) had an increase in mean UtA PI over time, 4/7 (57.1%) had a decrease in UtA PSV, while 5/7 (71.4%) had a decrease in UtA EDV over time. Of these seven subjects, two (28.6%) were readmitted for heavy bleeding, one (14.3%) developed a coagulopathy, two (28.6%) underwent dilation and curettage, and four (57.1%) underwent interval hysterectomy.

When data were pooled for all 18 subjects, there was a statistically significant decrease in UtA EDV (p = 0.005) and increase in PI (p = 0.0004), with a non-significant trend towards decrease in PSV.

CONCLUSION: In subjects undergoing conservative management of PAS with the placenta remaining *in situ* after delivery, blood flow to the uterus decreases over time with a concomitant increase in resistance to flow in the UtA. When aberrations in this trend are observed, patients may be at higher risk for complications.

Table 1: Changes in mean uterine artery (UtA) PSV, EDV, and PI over time for the 7 subjects with at least 3 postpartum ultrasounds with UtA Doppler measurements. Outcomes for each corresponding individual are also demonstrated.

	Mean UtA PSV over time	Mean UtA EDV over time	Mean UtA PI over time	Readmitted for bleeding	Coagulopathy	Infection	Dilation and curettage	Interval hysterectomy (EBL in cc)
Patient 1	decrease	decrease	Increase					
Patient 2	decrease	decrease	increase			X		X (100)
Patient 3	decrease	decrease	increase	X				X (100)
Patient 4	Increase	decrease	increase	X			X	X (100)
Patient 5	increase	increase	decrease		X			X (3000)
Patient 6	decrease	decrease	increase				X	
Patient 7	increase	increase	not recorded					

491 Can pre-cesarean angle of progression predict maternal complications in second-stage labor arrest?

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OBJECTIVE: An emergency cesarean delivery (CD) performed during the second stage of labor can be associated with increased maternal complications, as a low fetal head in the maternal pelvis can be associated with a challenging fetal extraction. The angle of progression (AOP) is an objective sonographic tool to monitor fetal head descent, and an AOP of 116° was described as equivalent to fetal head at station "0". This study aimed to assess the association between the AOP at rest

as measured before the decision of an emergency CD due to arrest of descent during the second stage of labor and the rates of intraoperative and postoperative maternal complications.

STUDY DESIGN: This retrospective study included all primiparous women who underwent an emergency CD due to arrest of descent during the second stage of labor and had an AOP recorded in the electronic medical charts between January 2017 and May 2023. The cohort was divided into two groups based on the AOP measurement at rest before the decision on a CD: 1. AOP≤116° and 2. AOP >116°. The maternal intraoperative and postoperative complication rates were compared between the two groups.

RESULTS: The demographic characteristics were comparable between women with an AOP≤116° (n=41) and those with an AOP >116° (n=127) (Table 1). Women with an AOP >116° had a significantly higher composite intraoperative complications rate than those with an AOP≤116° (47% vs. 29%, p=0.04), mostly attributed to increased rates of uterine extensions and difficult extractions. No significant differences were noted in the total maternal postoperative complications rate (29% vs. 29%, p=0.93) and short-term neonatal outcomes (Table 1).

CONCLUSION: Among primiparous women who underwent an emergency cesarean delivery due to arrest of descent during the second stage of labor, those with an AOP greater than 116° as assessed by trans-perineal ultrasound had a higher rate of a composite of intraoperative complications. This finding highlights the importance of adequately preparing for emergency cesarean sections (e.g., fetal head pushing from the vagina or breach extraction) in these women.

Table 1- Demographic, clinical characteristics, maternal and neonatal outcomes by study groups

	Study group		p-value
	AOP≤ 116 (n=41)	AOP > 116 (n=127)	
Demographic characteristics			
Age (years)	29.7 ± 4.8	29.3 ± 4.8	0.64
Body mass index (kg/m^2)	25.5 ± 5.3	25.0 ± 4.8	0.57
Gestational age (weeks)	39 ± 1.4	39 ± 1.3	1.00
Birth weight (grams)	3453 ± 441.7	3465 ± 427	0.87
Clinical data			
Labor induction	56% (23)	52% (67)	0.70
Oxytocin augmentation	95% (39)	85% (109)	0.11
Occiput posterior	43% (18)	60% (77)	0.06
Second stage duration (minutes)	3:30 ± 0:57	4:11 ± 0:58	**<0.001**
Pre-surgery AOP rest (degree)	109° ± 7.5°	132° ± 11°	<0.001
Surgery following failed vacuum extraction	0% (0)	5% (7)	0.11
Maternal intraoperative complications			
Composite (some women had more than one complication)	29% (12)	47% (60)	**0.04**
Uterine extensions	26% (11)	37% (47)	0.23
Surgical-cut modification	0% (0)	0.7% (1)	0.55
Blood transfusion	7% (3)	2% (3)	0.14
Uterine rupture	0% (0)	0.7% (1)	0.55
Difficult extraction	7% (3)	16% (21)	0.14
Urologic complications	0% (0)	1% (2)	0.65
Maternal postoperative complications			
Composite (some women had more than one complication)	29% (12)	29% (38)	0.93
Relevant re-admission within one month	7% (3)	4% (5)	0.37
Primary postpartum hemorrhage	17% (7)	14% (19)	0.74
Blood transfusion	9% (4)	7% (9)	0.57
Fever	14% (6)	14% (19)	0.95
Endometritis	2% (1)	3% (4)	0.81
Urologic complications	0% (0	1% (2)	0.65
Re-laparotomy	0% (0)	0.7% (1)	0.56
Neonatal outcomes			
Apgar score at 1 minute	9 (9-9)	9 (8-9)	0.13
Apgar score at 5 minutes	10 (10-10)	10 (10-10)	0.55
Apgar score (5 minute) ≤ 7	4% (2)	3% (4)	0.60
Atrial cord pH< 7.0	0% (0)	1.6% (2)	0.41

* Data presented as mean ± SD or percentage (n) or median (IQR)

492 Can the angle of progression during a prolonged second stage increase the vaginal delivery rate?

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OBJECTIVE: The revised 2014 definition by the American College of Obstetricians and Gynecologists allows women to push during the second stage of labor as long as there is observable labor progress. Studies proposed using intrapartum ultrasound during the second stage, particularly the angle of progression (AOP) at rest, as an objective tool to monitor fetal head descent. This study aimed to assess the impact of AOP measurement to monitor fetal head descent on the delivery mode and maternal and neonatal morbidity in women with a second stage of labor of at least 4 hours.

STUDY DESIGN: This retrospective study included primiparous women with a prolonged second stage of labor of ≥4 hours who delivered in our labor ward. The study group that included women who delivered between 2017 and 2020 and had a documented AOP measurement at 3:30-4:30 hours from complete dilatation was compared to a control group comprised of women delivering between 2010 and 2014 (before AOP was routinely used in our labor ward). The delivery mode and the maternal and neonatal outcomes were compared between the two groups.

RESULTS: The demographic characteristics were comparable between the study (n=126) and the control (n=134) groups (**Table 1**). The second stage was longer, and the spontaneous vaginal delivery (VD) rate was higher in the study compared to the control group (268±21 vs. 249±21 min., p< 0.001 and 14% vs. 3%, p=0.001, respectively). Although not statistically significant, there was a trend towards lower rates of cesarean delivery and failed vacuum extraction (VE) in the study group (24% vs. 33%, p=0.08, 1.5% vs. 5%, p=0.1, respectively). No other significant differences were noted in maternal and neonatal outcomes. One case of neonatal death occurred in the control group.

CONCLUSION: In primiparous women with a second stage of labor of ≥4 hours, measurement of the AOP was associated with a longer second stage, a higher rate of spontaneous VD, and a trend toward a lower rate of failed VE attempts without compromising maternal or neonatal outcomes. Further prospective randomized trials are needed to validate our findings.

Table 1- Demographic, clinical characteristics, maternal and neonatal outcomes by study groups

	Study group (n=126)	Control group (n=134)	p-value
Delivery mode			
Normal vaginal delivery	14.3% (18)	3.0% (4)	**<0.01**
Vacuum extraction	61.1% (77)	63.4% (85)	0.80
Failed Vacuum extraction	1.6% (2)	5.2% (7)	0.10
Cesarean delivery	24.6% (31)	33.6% (45)	0.08
Demographic characteristics			
Age (years)	29.2 ± 4.7	27.9 ± 4.2	0.02
Body mass index (kg/m^2)	23.5 ± 4.47	24.4 ± 6.08	0.17
Gestational age (weeks)	39 ± 1	39 ± 1.5	1.00
Birth weight (grams)	3447.03 ± 391.6	3460 ± 270	0.75
Clinical data			
Labor induction	39% (50)	32% (43)	0.20
Oxytocin augmentation	79% (100)	79% (106)	0.95
Second stage duration (minutes)	268 ± 21	249 ± 21	**<0.001**
Maternal outcomes			
Perineal tear 3rd or 4th degree	2.4% (3)	1.5% (2)	0.60
Intrapartum fever ≥38°C	18% (23)	26% (36)	0.09
Primary postpartum hemorrhage	7% (9)	6% (9)	0.89
Neonatal outcomes			
Apgar score at 1 minute	9 (9-10)	9 (8-9)	0.13
Apgar score at 5 minutes	10 (10-10)	10 (10-10)	0.55
Apgar score (5 minute) < 7	0% (0)	1% (2)	0.16
Atrial cord PH< 7.0	1.5% (2)	0% (0)	0.14
Neonatal intensive care unit admissions	1.5% (2)	1.5% (2)	0.95
Early onset sepsis	0.8% (1)	0% (0)	0.30
Perinatal death	0% (0)	0.7% (1)	0.30

* Data presented as mean ± SD or percentage (n) or median (IQR)

493 Effects of chemotherapy agents on placental cells: implications for treating breast cancer during pregnancy

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OBJECTIVE: To examine anti-proliferative and cytotoxic effects of three breast cancer chemotherapeutics (5-fluorouracil (5-FU), doxorubicin (DXR), and cyclophosphamide (CP)) on human placental cell lines JAR and JEG-3. Tamoxifen (TAM) a hormone therapy contraindicated in pregnancy was also examined.

STUDY DESIGN: JAR and JEG-3 cell lines (ATTC) were used as human placental cell models.

Cell Proliferation: JAR and JEG-3 cells were plated at 5x10^3/well in media containing 10% FBS in 96 well plates. Cells were treated with chemotherapeutic agents (using a range of doses, n=4 wells/condition, n≥3 experiments). After 48 hours at 37°C/5% CO_2, cells were processed for proliferation using the CyQUANT assay kit (Invitrogen) to determine relative cell numbers.

Cytotoxicity: JAR and JEG-3 cells were plated at 3x10^4 cells per well and 6x10^4 cells per well, respectively, in 96 well plates in media containing 10% FBS. Cells were treated with chemotherapeutic agents (using a range of doses, n=6 wells/condition, n≥3 experiments). After 48 hours at 37°C/5% CO_2, cytotoxicity was determined by neutral red staining.

A 3-parameter nonlinear regression model (GraphPad Prism Version 10.0.0) was used to calculate half maximal inhibitory concentrations (IC_{50}) for cell proliferation and cytotoxicity for each agent. Extra sum of squares F-test was used to compare IC_{50} values between cell lines for each chemotherapeutic agent.

RESULTS: Chemotherapeutic IC_{50} values are shown in Table 1. DXR was the most and CP was the least anti-proliferative and cytotoxic. 5-FU and TAM had significantly higher anti-proliferative effects on JEG-3 than JAR cells. The cytotoxic effects of DXR were significantly higher for JEG-3 than JAR while the inverse was true for TAM. Overall, chemotherapeutic dosages that induced cytotoxicity were similar to those that inhibited proliferation, except CP, which showed more potent cytotoxic than anti-proliferative effects.

CONCLUSION: DXR exerted the most potent anti-proliferative and cytotoxic effects. Further studies comparing the effects of these agents on breast cancer and placental cell lines are warranted.

Table 1 – Chemotherapeutic IC_{50} values for placental cell lines with 95% confidence intervals

	Placental Cell Proliferation IC_{50}			Placental Cell Cytotoxicity IC_{50}		
Chemotherapy Agents	*JAR*	*JEG-3*	*Cell Line Comparison (p-value)*	*JAR*	*JEG-3*	*Cell Line Comparison (p-value)*
Doxorubicin (DXR, μM)	0.049 (0.029-0.082)	0.020 (0.004-0.146)	0.40	0.326 (0.069-inf)	0.012 (0.01-0.014)	<0.001*
5-Fluorouracil (5-FU, μM)	129 (89.7-187.5)	37 (17.8-74.6)	0.005*	58 (24.9-inf)	22.9 (12.2-46.3)	0.16
Tamoxifen (TAM, μM)	16.7 (12.5-22.4)	3.4 (0.9-9.8)	0.001*	20.5 (14.3-31.0)	115.2 (72.3-184.5)	<0.001*
Cyclophosphamide (CP, μM)	4,555 (1,535-inf)	41,390 (6,296-inf)	0.21	70 (13-428)	929 (362-2,057)	0.053

494 Developing a Novel Patient-Centered Definition of Severe Maternal Morbidity

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OBJECTIVE: Existing frameworks for severe maternal morbidity (SMM) do not account for how patients perceive and experience SMM. This study evaluated patient values and perceptions related to maternal complications with the goal of devising a patient-centered SMM composite.

STUDY DESIGN: This 2-part sequential qualitative to quantitative mixed-methods study first involved structured interviews of postpartum patients recruited from an urban, academic hospital with purposive sampling by race and mode of delivery. Qualitative data around patient-perceived adverse maternal events were analyzed thematically. Second, potential adverse maternal events derived from this interview data as well as established SMM criteria were evaluated in a survey which prompted ranking on a scale from 1 ["no big deal"]-5 ["worst thing imaginable"]. All postpartum patients were eligible to participate and completed the survey prior to discharge (from 6/2022-11/2022).

RESULTS: 18 patient interviews identified 9 themes distinct from established SMM criteria. 501 patients then participated in the survey study (60.7% Black, 6.5% Hispanic, median maternal age 31 [IQR 26-34], 40.6% had cesarean delivery, 6% had hemorrhage, and 1.6% had SMM without transfusion [CDC definition]). Patient rankings of potential SMM components are displayed in the Table. The 3 highest ranked outcomes were stroke/seizure, hysterectomy, and heart failure. 66.3% of patients ranked severe postpartum depression as a 4 or 5, higher than hemorrhage, transfusion, and

long-term physical disability, and > 25% ranked readmission (32.5%) and unplanned cesarean (25.7%) as 5/5.

CONCLUSION: Adverse maternal outcomes important to patients do not correlate directly with established SMM composites. Incorporating expanded maternal morbidity criteria —such as unplanned cesarean and postpartum depression —into research and intervention frameworks is important in order to take a patient-centered approach to evaluating and mitigating SMM.

Table. Patient Rankings of Potential Forms of Severe Maternal Morbidity

	Score = 5* N (%)	Score = 4* N (%)	Score of 4 or 5 N (%)	Mean Score [1-5] (SD)
Stroke, seizure, or other neurologic (brain-related) complications	343 (68.5%)	47 (9.4%)	390 (77.8%)	4.4 (1.3)
Hysterectomy (surgical removal of the uterus)	329 (65.7%)	49 (9.8%)	378 (75.4%)	4.3 (1.3)
Heart failure or other new heart problem	322 (64.3%)	70 (14.0%)	392 (78.2%)	4.3 (1.3)
Needing to be on a ventilator (breathing machine)	317 (63.3%)	60 (12.0%)	377 (75.2%)	4.3 (1.3)
Surgical complications from a c-section (like injury to the intestines or bladder)	269 (53.7%)	101 (20.2%)	370 (73.9%)	4.2 (1.3)
Needing an additional surgery after delivery because of bleeding or infection in the uterus	268 (53.5%)	114 (22.8%)	382 (76.2%)	4.2 (1.3)
Lung or breathing complication	268 (53.5%)	111 (22.2%)	379 (75.6%)	4.2 (1.3)
Being admitted to the intensive care unit (ICU)	252 (50.3%)	113 (22.6%)	365 (72.9%)	4.1 (1.3)
A new blood clot in the leg (deep vein thrombosis) or lungs (pulmonary embolism)	230 (45.9%)	133 (26.5%)	363 (72.5%)	4.1 (1.3)
Anesthesia complications (like having a complication from an epidural or needing to be unexpectedly put to sleep during a c-section)	217 (43.3%)	126 (25.1%)	343 (68.5%)	4.0 (1.3)
Another serious infection	214 (42.7%)	138 (27.5%)	352 (70.3%)	4.0 (1.3)
Having severe postpartum depression	207 (41.3%)	125 (25.0%)	332 (66.3%)	3.9 (1.3)
Uterine (womb) infection after delivery	201 (40.1%)	133 (26.5%)	334 (66.7%)	3.9 (1.3)
Wound infection at the area of a vaginal laceration (tear) or c-section scar	198 (39.5%)	127 (25.3%)	325 (64.9%)	3.9 (1.3)
Extra bleeding or hemorrhage	190 (37.9%)	128 (25.5%)	318 (63.5%)	3.8 (1.3)
Needing to be transferred to a different hospital	189 (37.7%)	129 (25.7%)	318 (63.5%)	3.8 (1.3)
Having an emergency c-section	171 (34.1%)	129 (25.7%)	300 (59.9%)	3.7 (1.4)
Being re-admitted to the hospital after being discharged	163 (32.5%)	136 (27.1%)	299 (59.7%)	3.7 (1.3)
Blood transfusion	159 (31.7%)	102 (20.4%)	261 (52.1%)	3.5 (1.4)
Having a major vaginal laceration (tear)	147 (29.3%)	118 (23.6%)	265 (52.9%)	3.5 (1.4)
Having an unplanned or unexpected c-section	129 (25.7%)	122 (24.4%)	251 (50.1%)	3.4 (1.4)
Preeclampsia or high blood pressure in pregnancy	128 (25.5%)	155 (30.9%)	283 (56.5%)	3.6 (1.3)
Having longer-term physical changes or disabilities from pregnancy like back pain, weight gain, or change in bladder control	126 (25.1%)	128 (25.5%)	254 (50.7%)	3.5 (1.3)
Staying in the hospital longer than I wanted or planned	51 (10.2%)	74 (14.8%)	125 (25.0%)	2.6 (1.4)
Needing to be delivered earlier than I wanted or planned	33 (6.6%)	66 (13.2%)	99 (19.8%)	2.4 (1.3)

*Patients were presented with a scale from 1 – 5 with 1 described as "no big deal" and 5 as "worst thing imaginable"

495 Evaluating Concordance Between Patient Perceptions of Risk for Maternal Morbidity and Established Risk Factors

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OBJECTIVE: Perception of risk is an important driver of health behaviors and engagement in care. It is unknown whether pregnant patients accurately recognize risk level for severe maternal morbidity (SMM). This study investigates patient evaluations of SMM risk compared to established criteria for assessing maternal risk.

STUDY DESIGN: This mixed methods study was designed to evaluate postpartum patients' experiences and perceptions related to SMM. Qualitative data from structured patient interviews were used to develop a survey assessing patient understanding of their own risk in pregnancy (domains in Table). Responses were collected on Likert scales and as rankings of pregnancy co-morbidities in terms of perceived risk level (scale of 0="no increased risk"-5="high risk"). Perceptions of personal risk and risk ratings of each condition were compared by patient obstetric co-morbidity index (OB-CMI) [low = < 6 vs high = ≥ 6] derived from chart review.

RESULTS: **501** patients participated in the study 6-11/2022 (60.7% Black, 6.5% Hispanic). Median OB-CMI score was 1 (IQR 0-3) [11.6% with high OB-CMI ≥ 6]. Patients with high OB-CMI perceived increased personal risk in all domains but reported similar ability to control risk as patients with low OB-CMI (Table). When ranking antenatal conditions by risk level, patients with high OB-CMI ranked preeclampsia and hypertension higher than those with low OB-CMI (mean 4.2 [SD 1.6] vs 3.5 [2.0]; p =0.01; 3.8 [1.9] vs 3.2 [2.1], p=0.03), with no other significant differences. Of all OB-CMI components, both groups rated preeclampsia highest and asthma lowest.

CONCLUSION: Patients with established risk factors for SMM accurately perceived themselves at higher risk. They also better appreciated risks associated with hypertension/preeclampsia. These data suggest that current frameworks for conveying risk to obstetric patients are effective, but may be enhanced by increased focus on strategies to increase patient agency to modify risk.

Table. Survey Responses Regarding Personal Risk for Maternal Morbidity in Pregnancy by Patient OB-CMI Score

Survey Responses "Top Box" (agree/strongly agree)	Patients with Low OB-CMI <6* N = 443 (N, %)	Patients with High OB-CMI ≥6* N = 58 (N, %)	P-Value
"I feel like I had a high-risk pregnancy."	118 (26.6%)	39 (67.2%)	<0.01
"I was told by others that I had a high-risk pregnancy."	136 (30.7%)	42 (72.4%)	<0.01
"I had control over my risk of complications in pregnancy."	223 (50.3%)	23 (39.7%)	0.13
"My pregnancy experience puts me at risk for complications in a future pregnancy."	76 (17.2%)	23 (39.7%)	<0.01
"My pregnancy experience puts me at risk for long-term health complications."	28 (6.3%)	13 (22.4%)	<0.01
"I had a typical pregnancy experience."	296 (66.8%)	30 (51.7%)	0.02
"I experienced pregnancy complications."	145 (32.7%)	39 (67.2%)	<0.01
"I experienced more pregnancy complications than most people that I know."	61 (13.8%)	22 (37.9%)	<0.01
"My pregnancy involved complications that I did not expect."	153 (34.5%)	36 (62.1%)	<0.01
"I delivered earlier than I expected."	182 (41.1%)	38 (65.5%)	<0.01
"I did not feel prepared to deliver when I did."	86 (19.4%)	18 (31.0%)	0.04
"I stayed in the hospital longer than I expected when I delivered my baby."	64 (14.4%)	16 (27.6%)	0.01
"I needed to communicate with my doctors or go to the ER during pregnancy or postpartum more than I expected."	76 (17.2%)	18 (31.0%)	0.01
"My birth experience was negatively impacted by the complications I experienced."	39 (8.8%)	17 (29.3%)	<0.01
"The complications I experienced in my pregnancy would impact my decision about having another pregnancy."	72 (16.3%)	21 (36.2%)	<0.01

*Low OB-CMI: Score < 6; High OB-CMI ≥ 6 (Easter SR, Bateman BT, Sweeney VH, Manganaro K, Lassey SC, Gagne JJ, Robinson JN. A comorbidity-based screening tool to predict severe maternal morbidity at the time of delivery. Am J Obstet Gynecol. 2019 Sep;221(3):271.e1-271.e10. doi: 10.1016/j.ajog.2019.06.025. Epub 2019 Jun 20. PMID: 31229427)

496 Defining Maternal Renal Morbidity: Application of Staging Systems to Peripartum Acute Kidney Injury

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OBJECTIVE: Acute kidney injury (AKI) is one of 21 severe maternal morbidity (SMM) diagnoses. Aiming to address maternal morbidity, appropriate recognition and response to AKI are essential. ACOG/SMFM have released conservative guidelines for AKI diagnosis. We reviewed our institution's obstetric AKI cases to establish characteristics and outcomes for AKI severity in the context of these staging systems.

STUDY DESIGN: This study was a retrospective cohort study of AKI cases (ICD 10 code N17.0-17.9) between 01/2018 - 12/2022 at a single academic institution with ~6,000 births annually. Information was extracted via chart review. Cases were stratified by Acute Kidney Injury Network (AKIN) staging and ACOG/SMFM severe renal injury criteria. Those with unknown baseline creatinine (Cr) were assigned 0.7 (the 95th% Cr value at 39-40 weeks). Groups were compared based on demographics, comorbidities, and outcomes (Table 1).

RESULTS: 230 cases were reviewed for AKI severity: 8.3% (19 cases) met criteria by ACOG/SMFM criteria. There were no significant differences in baseline demographics, medication dependent diabetes, chronic kidney disease (CKD), or use of gentamicin. Cesarean delivery and hypertension rates were high among all groups. Higher AKIN stage was associated with higher rates of infection (p=0.019) and use of ketorolac (p=0.020); which was not seen in ACOG/SMFM comparison groups. PPH rates were similar among groups; however, more severe AKI was associated with higher EBL (p=0.019 and p< 0.001, respectively). Worse AKI severity was associated with longer time for Cr resolution and higher co-incidence of other SMM in both groups, and longer maternal length of stay in the ACOG/SMFM group.

CONCLUSION: Peripartum AKI often occurred in the presence of multiple risk factors, including cesarean delivery, hypertension, infection, and hemorrhage. AKI meeting Stage 3 AKIN or ACOG/SMFM were associated with increased morbidity. Caution may be warranted in using AKIN Stage 1 or 2 AKI criteria as it may falsely elevate institutional reporting of SMM, and conservative AKI criteria may better reflect true maternal morbidity.

Table 1: Comparison of groups and outcomes as stratified by AKI staging criteria. Results are reported in mean (standard deviation) or N (%). Univariate analysis was performed using Chi-squared test, Fisher's exact test, independent samples t-test, or ANOVA as appropriate.

	AKIN Stage 1 N=142 (61.7%)	AKIN Stage 2 N=75 (32.6%)	AKIN Stage 3 N=13 (5.6%)	P value	Non ACOG SMFM AKI N=21 (91.7%)	ACOG SMFM AKI N=19 (8.3%)	P value
Criteria	Cr 1.5-1.9x baseline	Cr 2-2.9x baseline	Cr >3.0x baseline, dialysis requirement			- Cr >2.0 without CKD - Cr twice baseline in CKD - Acute tubular necrosis - Dialysis requirement - Oliguria requiring multiple doses of furosemide	
Cesarean Delivery (%)	105 (74.5)	58 (77.3)	11 (84.6)	0.733	157 (74.8)	17 (89.5)	0.259
Intrapartum Cesarean Delivery (% *of total cesarean*)	68 (64.8)	47 (81.0)	5 (45.5)	**0.019**	110 (70.1)	10 (58.8)	0.341
Hypertension (%)	93 (66.0)	41 (54.7)	8 (61.5)	0.266	131 (62.4)	11 (57.9)	0.700
Hemorrhage (%) (EBL >1000)	37 (26.1)	17 (22.7)	3 (23.1)	0.902	52 (24.6)	5 (26.3)	0.872
EBL (ml)	752.9 (532.1)	784.9 (783.2)	1364.2 (1853.0)	**0.019**	745.2 (550.7)	1378.3 (1821.3)	**<0.001**
Infection (%)	55 (39.0)	43 (57.3)	8 (61.5)	**0.019**	96 (45.7)	10 (52.6)	0.635
Gentamicin Use (%)	33 (23.2)	25 (33.3)	3 (23.1)	0.228	55 (26.1)	4 (21.1)	0.787
Ketorolac Use (%)	27 (19.0)	24 (32.0)	6 (46.2)	**0.020**	50 (23.7)	7 (36.8)	0.204
Time to AKI resolution (days)	1.6 (1.5)	1.8 (1.1)	3.6 (2.5)	**0.002**	1.6 (1.3)	3.4 (2.0)	**<0.001**
Maternal length of stay (days)	4.3 (2.0)	4.3 (2.6)	5.9 (2.9)	0.064	4.2 (2.0)	6.3 (3.8)	**<0.001**
SMM Frequency (*excluding AKI and transfusion*) (%)	18 (12.7)	10 (13.3)	5 (38.5)	**0.038**	26 (12.3)	9 (47.4)	**<0.001**

497 Fetal Heart Tracing Changes at Peak Methadone or Buprenorphine Dose Appear Unrelated to NOWS Severity

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OBJECTIVE: Medications for opioid use disorder (MOUD) are recommended, however prenatal predictors of Neonatal Opioid Withdrawal Syndrome (NOWS) remain poorly understood, creating distress for patients and providers. Studies suggest buprenorphine and methadone reduce fetal heart tracing (FHT) variability and accelerations, although not all fetuses exhibit this effect. We sought to determine if the presence of this effect is associated with NOWS.

STUDY DESIGN: We evaluated a retrospective cohort of term singleton pregnancies with MOUD administration at the time of labor and delivery at an academic urban hospital from 2016-2023. MOUD dose, dosing time, psychotropic medications, and non-prescribed substance exposures were obtained via chart review. Clinically documented FHT variability and accelerations were collected at pharmacological trough and peak levels. FHTs with greater than 45 minutes of minimal variability during the peak period were characterized as minimal, and those without accelerations for more than 1 hour were characterized as absent. Differences in NOWS treatment were compared between the group with minimal variability and absent accelerations and the group without these features.

RESULTS: Seventy-seven dyads met inclusion criteria, and 38 neonates (49%) received pharmacotherapy for NOWS. Fifteen (19%) had FHTs with minimal variability and 43 (56%) had absent accelerations. While methadone was associated with minimal variability in FHT, there was no significant difference in the need for NOWS pharmacotherapy, use of a second agent, higher level of treatment, length of stay, or need for discharge home with medications for NOWS between groups.

CONCLUSION: FHT changes at peak methadone or buprenorphine dose appear to have limited clinical utility in predicting the severity of NOWS. Larger studies are needed to better elucidate prenatal risk factors to improve the counseling of birthing persons receiving treatment for OUD.

	Overall cohort* (n=77)	Reassuring variability during peak (n=62)	Minimal variability during peak** (n=15)	p-value	Reassuring accelerations during peak (n=34)	Absent accelerations during peak*** (n=43)	p-value
Received buprenorphine at delivery	57 (75%)	49 (81%)	8 (53%)	**0.03**	25 (76%)	32 (74%)	0.84
Received methadone at delivery	20 (25%)	13 (19%)	7 (47%)	**0.03**	9 (24%)	11 (26%)	0.84
Buprenorphine dose (mean, range)	15.9 (0.25-40)	16.5 (0.25-40)	12.5 (4-24)	0.12	16.97 (0.25-40)	15.1 (0.9-32)	0.42
Methadone dose (mean, range)	114.4 (24-280)	108 (24-280)	125.7 (50-235)	0.62	119.3 (24-235)	110 (40-280)	0.76
Neonatal Opioid Withdrawal Syndrome (NOWS) severity							
Pharmacotherapy utilized for treatment	37 (48%)	32 (52%)	5 (33%)	0.20	14 (41%)	23 (53%)	0.28
Need for second pharmacologic agent	16 (21%)	13 (21%)	3 (20%)	0.42	7 (21%)	9 (21%)	0.52
Length of stay (mean, IQR)	7 (5,19)	10 (5,19)	5 (5,17)	0.26	6 (5,19)	10 (5,19)	0.86
Discharged home with medications for NOWS	12 (15%)	11 (18%)	1 (7%)	0.49	4 (12%)	8 (19%)	0.39

*Term singleton pregnancies in which MOUD was administered during labor and delivery, with at least 30 minutes of FHT data during the trough period (1 hour prior to the dose) and at least 1 hour of FHT data during the peak period (1 to 4 hours after the dose)
**Greater than 45 minutes of FHT categorized as such
***Greater than 1 hour of FHT categorized as such

498 Association of shift complexity and volume with cesarean delivery among nulliparous, term, singleton, vertex patients

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OBJECTIVE: : Studies have demonstrated high variability in obstetric outcomes between hospitals, but less is known about the effect of individual shift characteristics within a given hospital. We evaluated the association between obstetric unit shift characteristics (including volume and patient complexity) and cesarean delivery rate among nulliparous, term, singleton, vertex (NTSV) patients.

STUDY DESIGN: This retrospective cohort study evaluated all NTSV pregnancies delivering at 7 hospitals within a large academic health system in New York from 2019-2022. Individual 12-hour nursing shifts were characterized based on delivery volume, patient complexity, night/day, and weekday/weekend. Individual patient clinical and sociodemographic factors were also evaluated. Maternal comorbidity burden was assessed by the Obstetric Comorbidity Index (OB-CMI) score. Shift volume for each obstetric unit was classified into three categories based on delivery volume quartile: low (1st quartile), medium (2nd and 3rd quartile), and high (4th quartile). Shift complexity for each obstetric unit was classified as low complexity (1st, 2nd, or 3rd quartile) or high complexity (4th quartile) based on median OB-CMI score of the patients delivering during the shift. The primary outcome was CD. Multivariable logistic regression was used to evaluate the association between shift characteristics and CD, adjusting for potential confounders.

RESULTS: 38,114 subjects were included in the study. The overall rate of CD was 29.3% (n=11,159). Patients that delivered on a weekend or overnight shift were more likely to deliver vaginally (Table). There was no difference in the rate of CD based on shift complexity or volume. Patients with higher OB-CMI scores, and those who self-identified as Asian or Pacific Islander, Hispanic, non-Hispanic Black, and multiracial/other were more likely to deliver via CD.

CONCLUSION: NTSV patients are more likely to deliver vaginally on weekend and overnight shifts. Shift volume or complexity are not associated with this outcome.

Table: Multivariable logistic regression model.

Characteristic	aOR (95% CI)
Weekend shift	0.84 (0.80-0.89)
Overnight shift	0.91 (0.87-0.96)
High shift complexity	1.00 (0.94-1.06)
Shift volume	
Low	REFERENCE
Medium	0.96 (0.91-1.03)
High	0.93 (0.85-1.01)
Race and Ethnicity	
Non-Hispanic White	REFERENCE
Non-Hispanic Black	1.42 (1.31-1.52)
Hispanic	1.17 (1.09-1.26)
Asian/Pacific islander	1.13 (1.05-1.21)
Other/Multiracial	1.27 (1.16-1.38)
Public insurance	0.84 (0.78-0.89)
Married	1.00 (0.95-1.06)
OB-CMI score	
1	1.65 (1.54-1.77)
2	1.82 (1.70-1.95)
3	2.24 (2.04-2.46)
≥4	3.22 (2.98-3.47)

499 Effect of exogenous oxytocin on placental oxidative stress in mice before onset of labor

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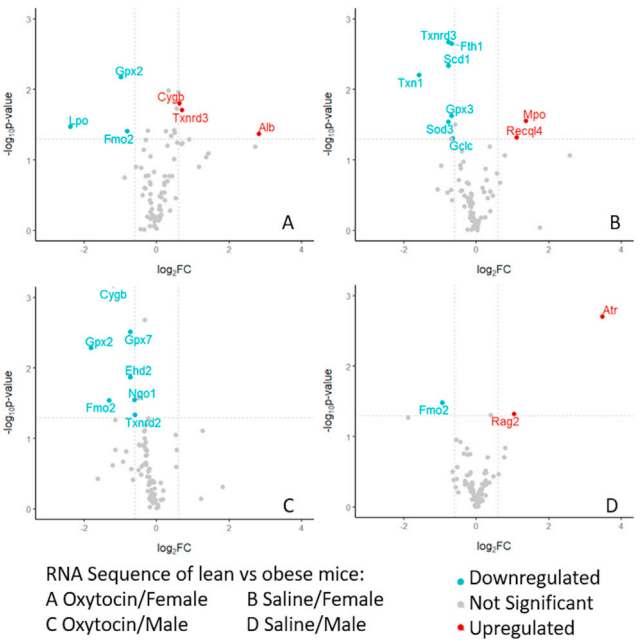
OBJECTIVE: Oxidative stress (OS) in the placenta encompasses both negative and positive regulatory effects. The aim of this study was to determine how placental oxidative stress before the onset of labor is affected by exogenous oxytocin (OXT).

STUDY DESIGN: Lean and obese C57BL/6 mice were obtained from Charles River Laboratories. On gestational age (GA) 18 day, both groups were administered either saline (100 μL) or OXT, 1 U/mouse every 30 min for 2 hours (cumulative dose 5U/mouse). Pups and placentas were delivered by cesarean section and pups and dams were euthanized. Placentas were collected, immediately flash frozen in liquid nitrogen, and stored at -80°C. High quality RNA was extracted from placentas. RNA quantity and quality were analyzed using the NanoDrop spectrophotometer. Gene expression was analyzed with the RT^2 Profiler PCR Array for mouse oxidative stress and antioxidant defense (Qiagen) using the Roche LightCycler 480. The p values were calculated based on Student's t-test of the replicate $2^{(-\text{ Delta CT})}$ values for each gene in the control group and treatment groups. P-values< 0.05 were considered statistically significant.

RESULTS: Placentas of lean and obese mice at gestational age were harvested on (GA) 21 days were selected for this study. There were 84 genes analyzed. In the saline group, there was an 11-fold increase of the *Atr* gene expression as compared vs. 6-fold increase in the OXT group. *Atr* is activated by DNA damage. There was a 2-fold increase in *Rag2* gene expression in the saline group vs. $<$ 1.0-fold increase in the OXT group. The *Rag2* gene has been implicated in increased OS. In the OXT group, there was an increase in *Nqo1*, encoding NAD(P)H dehydrogenase, which functions as an oxido-reductase, leading to a decrease in OS.

CONCLUSION: Exogenous OXT upregulated antioxidant genes in the placenta of obese mice vs. lean mice. Further studies involving human placental cells are needed to confirm this effect.



500 Combined Vaginal-Cesarean Delivery of Twins: National Risk Factors and Trends

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OBJECTIVE: Combined vaginal-cesarean delivery is a known and concerning outcome of trial of labor in twin gestations. We sought to analyze trends in and risk factors for combined vaginal-cesarean twin births during delivery hospitalizations in the United States.

STUDY DESIGN: This cross-sectional study utilized 2016 to 2020 delivery data from the Nationwide Readmissions Database of women aged 15 to 54 years with monochorionic diamniotic (MCDA) or dichorionic diamniotic (DCDA) twin gestations who had vaginal or combined vaginal-cesarean births. Combined deliveries were ascertained via diagnosis codes for both vaginal and cesarean birth in the same delivery hospitalization. Trends analyses were conducted using

joinpoint regression to estimate the average annual percent change (AAPC) with 95% confidence intervals (CI). Adjusted logistic regression models were performed to evaluate the relationship between clinical, hospital, and demographic risk factors and the primary outcome of combined delivery with odds ratios (aOR) expressed as measures of association.

RESULTS: Of 75,591 hospitalizations, 66,952 (88.6%) resulted in vaginal birth of both twins and 8,639 (11.4%) in combined delivery. From 2016 to 2020, the rate of combined deliveries decreased from 12.2% to 10.8% (AAPC -3.0%, 95% CI -4.2, -2.0%), while vaginal twin births increased and cesarean births decreased. Factors associated with elevated odds of combined delivery include advanced maternal age, Medicaid payer, obesity, history of cesarean birth, and placental abruption. Compared to term twins, preterm gestational age at delivery was associated with combined delivery (Table). MCDA gestations were less likely to have a combined delivery compared to DCDA gestations (aOR 0.58, 95% CI 0.52, 0.64).

CONCLUSION: Combined deliveries decreased over the study period but were the ultimate mode of delivery in over 1 in 10 twin pregnancies. Clinical risk factors associated with combined twin delivery include advanced maternal age, obesity, prior cesarean birth, and preterm gestational age at delivery.

Table: Predictors of combined vaginal-cesarean twin births in the United States

	Combined Delivery			
	Unadjusted		Adjusted	
	OR	95% CI	aOR	95% CI
Maternal age				
15-19 years old	0.87	0.69, 1.11	0.79	0.62, 1.02
20-24 years old	0.94	0.83, 1.05	0.87	0.77, 0.98
25-29 years old	Ref	Ref	Ref	Ref
30-34 years old	0.97	0.89, 1.06	1.04	0.95, 1.14
35-39 years old	1.08	0.98, 1.19	1.17	1.05, 1.30
40-54 years old	1.25	1.04, 1.51	1.35	1.11, 1.64
Maternal payer				
Medicare	0.77	0.51, 1.16	0.68	0.43, 1.05
Medicaid	1.27	1.18, 1.36	1.22	1.12, 1.32
Private insurance	Ref	Ref	Ref	Ref
Self-pay	1.07	0.81, 1.42	1.03	0.76, 1.39
No Charge	0.00	0.00, 0.00	0.00	0.00, 0.00
Other	1.08	0.90, 1.29	1.09	0.91, 1.31
Missing payer	0.95	0.43, 2.08	0.82	0.35, 1.92
Clinical factors				
Chronic hypertension	1.45	1.19, 1.76	1.13	0.91, 1.39
Pregestational diabetes	1.26	0.89, 1.79	0.93	0.63, 1.37
Gestational diabetes	0.95	0.84, 1.08	0.94	0.82, 1.07
Obesity	1.27	1.15, 1.40	1.19	1.08, 1.32
Hypertensive disease of pregnancy	0.89	0.82, 0.97	0.92	0.84, 1.01
History of cesarean birth	1.74	1.48, 2.05	1.56	1.32, 1.84
Placental abruption	4.77	4.08, 5.58	3.72	3.12, 4.42
Twin type				
Monochorionic diamniotic	0.62	0.56, 0.68	0.58	0.52, 0.64
Dichorionic diamniotic	Ref	Ref	Ref	Ref
Gestational age				
23-27 weeks	3.89	3.40, 4.45	3.56	3.06, 4.15
28-31 weeks	2.35	2.03, 2.73	2.31	1.97, 2.70
32-36 weeks	1.12	1.04, 1.20	1.21	1.12, 1.30
37+ weeks	Ref	Ref	Ref	Ref

501 Comparing the effectiveness of postpartum transition strategies for patients with impaired glucose tolerance (IGT)

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OBJECTIVE: Patients with IGT receive less antenatal support compared to patients with gestational or pregestational diabetes but carry long-term metabolic risk. At our institution, 15% repeat glucose testing postpartum and 29% follow up with primary care (PCP). We compared the effectiveness of text messaging support (BRIDGE) to text message support and IGT-focused postpartum visit (BRIDGE+) for care transitions.

STUDY DESIGN: Patients with IGT (A1C 5.7-6.4% < 20 weeks gestation) who delivered at a single tertiary care center October 2021-April 2023 were enrolled in BRIDGE, text messaging support with IGT education and follow-up reminders. From July 2022 to April 2023, BRIDGE participants were offered an additional postpartum visit for standardized IGT education (iPPV). Patients were excluded if they were non-English speaking, had gestational or pregestational diabetes, or did not complete third trimester glucose testing.

Our dual primary outcomes were A1C completion and scheduled PCP visit by 12 weeks postpartum. Bivariate comparisons assessed demographic and clinical differences. Multivariable regression models with stepwise backward elimination using $p > 0.20$ compared outcomes.

RESULTS: Characteristics of BRIDGE (n=84) and BRIDGE+ (n=80) participants were similar. 27.4% of patients completed A1C and 45.7% of patients scheduled PCP visit by 12 weeks postpartum. Controlling for scant prenatal care (< 5 visits) and history of IGT prior to pregnancy, BRIDGE+ did not increase A1C completion or PCP visit scheduling rates compared to BRIDGE (Table 1). iPPV attendance was higher than PCP visit attendance (48.9% vs 32.5%, p=0.02). Only 34% of PCP visits included documented IGT education.

CONCLUSION: Text message support improved A1C completion and PCP follow-up for patients with IGT relative to our institution's historic baseline. iPPV did not improve transitions of care compared to text message support alone. iPPV had higher rates of IGT education and visit attendance compared to PCP visits.

Table 1: Comparing the effectiveness of text messaging support (BRIDGE) vs text messaging support + wraparound postpartum visit (BRIDGE+) in completing postpartum transitions of care for patients with IGT

Demographics (n,%)	BRIDGE (n=84)	BRIDGE+ (n=80)	P value
Age (median, IQR[a])	32 (28, 35.5)	33 (29, 36)	0.42
Insurance			0.57
Private	31 (36.9%)	33 (41.3%)	
Public	53 (63.1%)	47 (58.8%)	
Race			0.03
White	3 (3.6%)	8 (10.1%)	
Black	74 (88.1%)	60 (75%)	
Asian	4 (4.7%)	6 (7.6%)	
Other	3 (3.5%)	6 (7.6%)	
Hispanic ethnicity	2 (2.4%)	5 (6.3%)	0.22
Scant prenatal care (<5 visits)	0 (0%)	2 (2.5%)	0.14
Late prenatal care initiation (>16 weeks)	4 (4.7%)	6 (7.6%)	0.44
Nulliparous	19 (22.6%)	23 (28.8%)	0.52
Primary care (PCP)			0.32
In network	25 (29.4%)	29 (36.7%)	
Out of network	20 (23.5%)	29 (36.7%)	
None	40 (47.1%)	27 (34.2%)	
Clinical Characteristics	**BRIDGE**	**BRIDGE+**	**P value**
History of prior IGT	17 (20.2%)	25 (31.3%)	0.08
History of macrosomia	0 (0%)	1 (1.8%)	0.77
Family history of diabetes	23 (27.4%)	27 (33.8%)	0.26
History of PCOS	5 (6.0%)	6 (7.5%)	0.57
History of metformin use	5 (6.0%)	2 (2.5%)	0.29
Induction of labor	40 (48.2%)	34 (43.6%)	0.45
Cesarean delivery	28 (32.9%)	30 (38.0%)	0.50
Gestational age at delivery in weeks, median(IQR)	39.3 (38.4-40.2)	39.4 (38.6-40)	0.69
Postpartum Transitions	**BRIDGE**	**BRIDGE+**	**aOR (95% CI)[c]**
A1C completion	**17 (20.2%)**	**28 (35.4%)**	**2.69 (0.81-8.91)**
Postpartum days until A1C completed (median, IQR)	69 (44, 77)	70 (58.5, 93.5)	12.9 (-3.35-29.1)
PCP visit scheduling (n,%)			
In network PCPs	20 (80%)	21 (72.4%)	0.89 (0.22-3.64)
All patients	**28 (33.7%)**	**26 (32.5%)**	**0.29 (0.01-6.15)**
PCP visit attendance			
In network PCPs	19 (76.0%)	21 (72.4%)	0.83 (0.24-2.83)
All patients	27 (32.1%)	26 (32.5%)	1.00 (0.51-1.94
PCP visits which included IGT counseling			
In network PCPs	15 (78.9%)	11 (52.4%)	0.77 (0.22-2.65)
All PCPs	9 (33.3%)	9 (34.6%)	0.99 (0.51-1.93)
BRIDGE+ iPPV visit			
Appt scheduled		47 (59.5%)	
Appt attended		24 (51.0%)	

[a]Abbreviations: IQR, interquartile range; PCP, primary care physician; PCOS, polycystic ovarian syndrome; A1C, hemoglobin A1C
[b]Odds ratios adjusted for history of prior IGT and scant prenatal care.

502 Does obstructive sleep apnea in obese patients affect neonatal outcomes?

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OBJECTIVE: Rates of obesity continue to rise within the United States and with it, the rates of obstructive sleep apnea (OSA). This study aims to determine if there is an association between the presence of OSA in obese pregnant patients and neonatal outcomes compared to obese pregnant patients without OSA.

STUDY DESIGN: This was a retrospective cohort study of all pregnant patients with BMI over 40 kg/m^2 who delivered between Jan. 1, 2011 and Dec. 31, 2020 at a single-center institution. Maternal medical history, neonatal outcomes including APGAR scores at 1 and 5 minute, need for neonatal continuous positive airway pressure (CPAP), neonatal intensive care unit (NICU) admission, mechanical ventilation (MV) requirement, development of transient tachypnea of the newborn (TTN) and respiratory distress syndrome (RDS) were collected. Descriptive and comparative analysis with chi-square and T-test was performed.

RESULTS: 870 cases were analyzed and 70 (8%) of patients were diagnosed with OSA prior to delivery. Average BMI at delivery for patients with OSA was 55.9 kg/m^2 and those without was 50.8 kg/m^2. The presence of OSA in obese pregnant patients was significantly associated with neonatal CPAP ($p < 0.01$), NICU admission ($p < 0.01$), and development of RDS ($p < 0.01$) in comparison to those born to mothers without OSA. There was no significant association between presence of OSA and neonatal MV ($p= 0.581$) and development of TTN ($p= 0.095$). APGAR scores at 1 minute were significantly lower in neonates born to obese mothers with OSA in comparison to those without OSA (7 vs. 8, $p= 0.02$). APGAR scores at 5 minutes did not differ significantly between groups (8 vs. 8, $p= 0.075$).

CONCLUSION: This study shows that OSA in an obese pregnant patient prior to delivery is associated with increased neonatal oxygen support and escalated care in the NICU, compared to those without OSA. This highlights the importance of appropriate OSA diagnosis and treatment in order to decrease likelihood of neonatal respiratory complications. Additionally, counseling obese pregnant patients of increased risks of OSA is critical.

Table 1. Neonatal outcomes born to obese mothers with and without OSA.

	Maternal OSA (n=70)	No maternal OSA (n=800)	Chi-squared (χ^2)	p-value
NICU Admission	28 (40%)	163 (20.3%)	14.47	0.00014
Neonatal CPAP requirement	25 (35.7%)	135 (16.9%)	15.22	9.60E-05
Development of TTN	8 (11.4%)	50 (6.5%)	2.774	0.0958
Development of RDS	15 (21.4%)	88 (11%)	6.7069	0.0096
Mechanical ventilation requirement	3 (4.3%)	47 (5.8%)	0.3001	0.5838

503 Fetal and neonatal drug exposure following nipocalimab treatment in pregnant women at risk of EOS-HDFN

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OBJECTIVE: Nipocalimab is a fully human, anti-neonatal Fc receptor (FcRn) blocking antibody that is under evaluation for the treatment of early-onset severe hemolytic disease of the fetus and newborn (EOS-HDFN) based on its potential to block placental transfer of FcRn-mediated maternal to fetal IgG alloantibodies, with insignificant placental transfer of nipocalimab itself. To evaluate the placental transfer of nipocalimab in pregnancy, serum nipocalimab concentrations were evaluated in fetal and neonatal participants whose mothers received nipocalimab in the Ph2 UNITY study.

STUDY DESIGN: UNITY is a Ph2, multicenter, open-label, single-arm study evaluating the safety, efficacy, PD, and PK of nipocalimab in 14 pregnancies at high risk of EOS-HDFN who were treated with 30 or 45 mg/kg weekly intravenous nipocalimab from 14 weeks and up to 35 weeks gestational age (GA) with planned deliveries at 37 weeks GA. To evaluate serum nipocalimab concentrations, one blood sample was collected from fetuses during a clinically indicated cordocentesis as well as from neonates in cord blood at birth and venous blood at Week 4 postpartum.

RESULTS: Of the 14 pregnancies, 13 were included in the PK analysis; 1 participant enrolled twice, and only latter was included. Of the 13 pregnancies, 12 resulted in live births, 1 resulted in fetal loss due to IUT, and 6 required cordocentesis. Nipocalimab was detected in 1/5 available fetal samples (0.04 μg/mL) and 1/11 available neonatal

samples at birth (0.7 μg/mL) but was undetectable in all neonates at Week 4 postpartum. The detectable nipocalimab concentrations were observed in a single fetus and in a different single neonate during the study. Neonatal serum IgG was low at birth especially when maternal treatment ended approximately 2 weeks before delivery.

CONCLUSION: These observations imply minimal fetal and neonatal drug exposure upon maternal nipocalimab dosing and that low neonatal IgG may be the result of nipocalimab inhibition of placental IgG transfer. The potential for nipocalimab exposure in the fetus and newborn will be further evaluated in a Ph3 study.

504 Determinants of fetal growth and birth weight: the role of the mother's birth weight

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OBJECTIVE: It is regularly difficult to determine whether the estimated low weight of a fetus is of constitutional origin or secondary to placental dysfunction or other pregnancy problems. A better understanding of the factors associated with limited growth of constitutional origin could help improve the interpretation and management of small for gestational age (SGA) fetuses.

STUDY DESIGN: We carried out a secondary analysis of a prospective study that recruited nulliparous pregnant women in the 1st trimester of pregnancy and followed them through to birth. We assessed the statistical correlation between newborn weight and several factors that may contribute to fetal growth, including maternal and paternal weight and BMI, maternal age, their respective birth weights, blood biomarkers (PAPP-A, PlGF) measured in the 1st trimester, and uterine Doppler. Multiple linear regression analysis was performed to determine significant variables after adjustments.

RESULTS: Among 1766 women recruited, we obtained complete data for 1703 participants. We found a positive and significant correlation between birth weight and the following variables: mother's weight and height, father's weight and height, mother's birth weight, father's birth weight, PlGF and PAPP-A. We found a significant negative correlation with the following variables: maternal age and 1st trimester uterine artery pulsatility index. After adjustment for confounding variables, 4 variables emerged as determinants of birth weight prediction: mother's birth weight ($p< 0.001$), mother's height ($p< 0.001$), PlGF level in the 1st trimester of pregnancy ($p< 0.001$), and maternal age ($p=0.03$).

CONCLUSION: The mother's birth weight and maternal height have an important influence on the birth weight of a newborn, while PlGF in the 1st trimester seems to be the early placental marker with the greatest impact. These factors should be considered when interpreting fetal weight estimates, particularly in cases of SGA.

505 Evaluating the Detection of Ferning with Previable Rupture of Membranes

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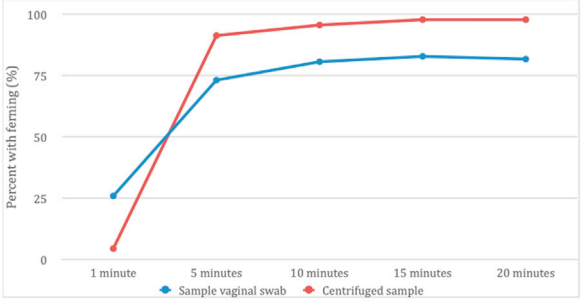
OBJECTIVE: To evaluate the impact of gestational age and drying time on the detection of ferning in vaginal amniotic fluid samples from second trimester pregnancies with rupture of membranes (ROM). Additionally, to evaluate if the use of a centrifuge for removal of red blood cells would improve the detection of ferning.

STUDY DESIGN: A prospective study evaluating vaginal amniotic fluid in individuals undergoing pregnancy termination between 15-24 weeks from 8/1/2021 to 6/9/2023 at a single institution. A control vaginal swab was collected prior to ROM and a sample vaginal swab was collected after ROM at the time of the termination procedure. A 10-ml sample of amniotic fluid was also collected and centrifuged for removal of red blood cells. All samples were analyzed and images captured under a microscope using 10x magnification at 1, 5, 10, 15 and 20 minutes after ROM. Images were assessed for ferning by two blinded investigators with a third reviewer in the case of any discrepancies. Statistical analysis was performed using descriptive statistics and regression analyses.

RESULTS: A total of 99 individuals consented and 93 were included. The mean gestational age was 19.5 weeks (2.6 STDEV). Ferning was not seen during any time point in a total of 14 cases (15.1%). None of the control samples had ferning detected. The detection of ferning increased with longer drying time in a regression analysis (OR 1.2; 95% CI 1.17-1.25). The largest difference was observed between 1 and 5 minutes (25.8% at 1 minute versus 73.1% at 5 minutes). Gestational age did not impact the detection of ferning (OR 1.06; 95%CI 0.98-1.15, $p=0.099$). Overall, ferning was detected more frequently on centrifuged samples than vaginal at all time points (Figure 1).

CONCLUSION: Both drying time and blood impacted the detection of ferning with previable ROM. Optimal detection was seen after allowing drying for 5 minutes and with centrifuge for the removal of red blood cells. These findings may improve the detection of ferning in suspected cases of previable ROM.

Figure 1. The Presence of Ferning in Vaginal Swabs versus Centrifuged Samples in Cases of Known Previable Rupture of Membranes



Statistically significant difference in the detection of ferning at all time points.

506 Association between maternal depression and opioid use following cesarean delivery

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OBJECTIVE: To evaluate whether there is an association between treated or untreated maternal depression and opioid use after cesarean delivery (CD).

STUDY DESIGN: Secondary analysis of a multicenter randomized trial of individuals who underwent CD at 31 U.S. hospitals (2020-22).

We evaluated two primary exposures: self-reported treated depression (pharmacologic or non-pharmacologic therapy during pregnancy) or self-reported untreated depression. The primary outcome was inpatient oral opioid use in morphine milligram equivalents (MME) per day between 12 hours after surgery through hospital discharge. Secondary outcomes included outpatient opioid

use (MME of opioid prescriptions through 6 weeks postpartum) and moderate-severe perceived pain (≥4) and interference in daily activities (≥4) on the Brief Pain Inventory (BPI, 1-10) at 1-week postpartum. Multivariable modeling evaluated the association between untreated or treated depression compared with no depression and the selected outcomes.

RESULTS: Of 5,478 study participants, 1,508 (28%) had depression of whom 663 (44%) were treated. Those with depression were more likely to have a chronic pain condition, use tobacco, and experience disordered sleep. In adjusted modeling, neither treated nor untreated depression was associated with inpatient postpartum MME (Table). Untreated depression, but not treated, was associated with higher MME use through 6 weeks postpartum (adjusted median difference 19.2, 95% CI 11.5-26.8) and higher patient perceived pain severity (Table). Both treated and untreated depression were associated with higher patient perceived pain interference in daily activities.

CONCLUSION: Inpatient postpartum opioid use did not differ by depression (treated or not). However, untreated (but not treated) depression was associated with increased outpatient opioid use and worse perceived pain. This information can inform clinicians when counseling patients. Further, it is notable that only 44% of gravidae in this cohort who reported depression received treatment for it.

Table. Association between untreated or treated depression and opioid use and pain following cesarean delivery

	Untreated depression (N=845)	Treated depression (N=663)	No depression (N=3971)		Untreated depression vs. no depression	Treated depression vs. no depression
		Median [IQR]			MME median difference [95% CI]	
Inpatient MME/day[a]	20.9 [4.9-40]	19.2 [4.5-42.4]	11.8 [0-28.8]	Un	9.1 [6.8,11.4]	7.4 [4.9,10]
				Adj	2.0 [-0.7, 4.7]	-0.1 [-3.2,3]
Outpatient total MME[b]	60.0 [7.5-120]	45.0 [0-112.5]	22.5 [0-90]	Un	37.5 [29.3, 45.7]	22.5 [11.8, 33.2]
				Adj	19.2 [11.5, 26.8]	7.9 [-1.2, 17]
		N (%)			Odds ratio (95% CI)	
BPI pain score ≥ 4[c]	528 (67.7)	407 (66.0)	2080 (57.1)	Un	1.6 [1.3, 1.9]	1.5 [1.2, 1.7]
				Adj	1.4 [1.1, 1.7]	1.2 [0.9, 1.5]
BPI pain interference[d]	418 (53.7)	344 (56)	1602 (44.1)	Un	1.5 [1.3, 1.7]	1.6 [1.4, 1.9]
				Adj	1.4 [1.1, 1.7]	1.4 [1.2, 1.8]

MME, morphine milliequivalent; BPI, brief pain inventory; Un, unadjusted comparisons; Adj, adjusted comparisons
[a]MME per day from 12 hours after surgery to discharge
[b]Total MME used from discharge to 6 weeks post-discharge
[c]BPI worst pain score in prior 24 hours ≥4 at 1 week from discharge
[d]BPI pain interference score ≥4 at 1 week from discharge
The pairwise analysis is presented in unadjusted and adjusted format for median differences for MME/day and total MME and odds ratios for BPI pain and inference. Adjusted for maternal age, chronic pain conditions, delivery body mass index, neuraxial morphine administration, postpartum hemorrhage, disordered sleep, and tobacco and/or substance use.

507 Association of patient health literacy with the decision to pursue trial of labor after cesarean

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OBJECTIVE: To analyze the association of health literacy with electing a trial of labor (TOLAC) and having a vaginal birth after cesarean (VBAC).

STUDY DESIGN: Secondary analysis of a multicenter randomized trial of pregnant people with one prior cesarean and no prior VBAC conducted from 2016-19. Participants were randomized before 25 weeks' gestation to have usual care or use a tablet-based decision support tool focused on TOLAC choice. Baseline health literacy was evaluated using the Newest Vital Sign (NVS) tool. Delivery approach and mode were ascertained via medical record review. Logistic regression (adjusting for primary language, age, recruitment site, and prior vaginal delivery) was performed to estimate the association of limited health literacy (defined as NVS score < =4/6) with TOLAC and VBAC. For TOLAC and VBAC, we elected *a priori* to perform interaction analyses to examine if there was effect modification of health literacy with treatment group or recruitment site.

RESULTS: Among 1455 participants (n=396 limited- and n=1059 adequate-health literacy), 44.6% had a TOLAC, and 71.0% of those who had TOLAC had a VBAC. Compared to participants with adequate health literacy, those with limited health literacy had a similar probability (45.0% vs. 43.7%, p=0.646) of opting for TOLAC. However, participants with limited health literacy who underwent TOLAC had a lower chance of VBAC than those with adequate health literacy (65.1% vs. 73.2%, p = 0.047). After adjusting for covariates, limited health literacy was associated with both TOLAC and VBAC (TOLAC: aOR 0.69, 95% CI [0.51, 0.94], p=0.020; VBAC: aOR 0.54, 95% CI [0.33, 0.88], p=0.013). Pre-specified interaction analyses showed no significant effect modification (p>= 0.10 for all).

CONCLUSION: In this study of pregnant people with a prior cesarean and no prior VBAC, those with limited health literacy had lower odds of TOLAC and VBAC. Given persistently low rates of VBAC in the US and the greater morbidity of cesarean delivery compared to vaginal birth, research is needed to learn if patient- or provider-oriented interventions can mitigate these disparities.

508 Association of health literacy on patient decision quality regarding mode of delivery after cesarean

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OBJECTIVE: To assess the association of health literacy with patient decision quality regarding mode of delivery after cesarean.

STUDY DESIGN: Secondary analysis of a multicenter randomized trial of pregnant people with one prior cesarean and no prior vaginal birth after cesarean conducted 2016-19. Participants were randomized before 25 weeks' gestation to use a tablet-based decision support tool focused on the choice between trial of labor after cesarean (TOLAC) and elective repeat cesarean delivery (ERCD) or to having usual care (no tablet) before deciding on a mode of delivery. Health literacy was assessed at enrollment using the Newest Vital Sign (NVS) tool. Validated scales measuring decision quality (knowledge, decisional conflict, shared decision-making, decision self-efficacy, decision satisfaction) were administered by phone at 34-37 weeks' gestation. To assess the association of limited health literacy (defined as NVS score < =4/6) with decision quality, we calculated mean scores for each scale by level of health literacy (limited vs adequate) and estimated adjusted mean differences (aMD) using linear regression. Model covariates were selected by backwards stepwise regression.

RESULTS: Compared to participants with adequate health literacy (n=1059), those with limited health literacy (n=396) had significantly lower knowledge scores (3.9 vs 5.4; aMD -0.8, 95% CI [-1.0, -0.5], p< 0.001). Scores were similar for decisional conflict (17.7 vs 17.2; aMD 0.0, 95% CI [-1.9, 2.0], p=0.971), shared decision-making (76.9 vs 73.9; aMD 1.5, 95% CI [-0.8, 3.8], p=0.196), decision self-efficacy (91.1 vs 90.4; aMD 0.4, 95% CI [-1.4, 2.2], p=0.685) and decision satisfaction (4.7 vs 4.6; aMD 0.4, 95% CI [0.0, 0.1], p=0.328).

CONCLUSION: Individuals with limited health literacy reported similar levels of decision quality compared to those with adequate health literacy but had lower knowledge scores. Future efforts should be

directed towards understanding how best to support informed and values concordant decision making for individuals with limited health literacy.

509 Association of non-English primary language with patient decision quality regarding mode of delivery after cesarean

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OBJECTIVE: To analyze the association of non-English primary language (NEPL) with patient decision quality regarding mode of delivery after cesarean.

STUDY DESIGN: Secondary analysis of a multicenter randomized trial of pregnant people with one prior cesarean and no prior vaginal birth after cesarean conducted 2016-19. Participants were randomized before 25 weeks' gestation to use a tablet-based decision support tool focused on trial of labor after cesarean (TOLAC) choice or to have usual care before electing a mode of delivery. Primary language was self-reported at enrollment. Validated scales measuring decision quality (decisional conflict, decision self-efficacy, decision satisfaction, knowledge, and shared decision-making) were administered by phone at 34-37 weeks' gestation. To assess the association of NEPL (defined as use of non-English for primary language communication) with decision quality, we calculated mean scores for each scale by NEPL status and estimated adjusted mean differences (aMD) by using linear regression. Model covariates were selected by backwards stepwise regression.

RESULTS: Compared to those who used English as their primary language (n = 1037), those with NEPL (n = 248) had significantly higher scores for decisional conflict (20.9 vs 16.7; aMD 4.1, 95% CI [1.9, 6.4], $p< 0.001$). Decision self-efficacy (88.6 vs 90.9; aMD -3.9, 95% CI [-5.9, -1.8], $p< 0.001$) and decision satisfaction (4.6 vs 4.7; aMD -0.1, 95% CI [-0.2, 0.0], $p=0.013$) were both worse (as indicated by lower scores) for NEPL participants. The aMD for knowledge scores (0.0, 95%CI [-0.3, 0.3), $p=0.956$) and shared decision-making scores (-1.1, 95%CI [-3.7, 1.6], $p=0.426$) were similar between the two groups.

CONCLUSION: In the context of decision making regarding TOLAC, NEPL participants had lower decision quality scores compared to those who used English as their primary language. Given the association of NEPL with decreased participation in shared decision-making and poorer healthcare outcomes, further research is needed to understand the experience of NEPL individuals and improve counseling strategies to mitigate disparities.

510 Congenital pulmonary airway malformations and bronchopulmonary sequestrations: features of prenatal evaluation that predict postnatal surgery

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OBJECTIVE: Congenital pulmonary airway malformations (CPAM) and bronchopulmonary sequestrations (BPS) are residual masses of embryonic lung bud anomalies that can be detected on prenatal ultrasound. When indicated, postnatal resection is performed to alleviate respiratory symptoms or prevent recurrent pneumonias. Beyond increased CPAM-volume ratio (CVR), prenatal sonographic features of CPAM/BPS that herald postnatal symptoms remain elusive. This study sought to identify prenatal characteristics that predict need for postnatal surgery for fetuses with CPAM/BPS.

STUDY DESIGN: The maternal-fetal medicine database of a quaternary medical center was queried for pregnancies diagnosed with CPAM or BPS from January 2004 to November 2022. Patient and disease characteristics were collected from the paired medical records of pregnant patient and child. Initial and final prenatal ultrasounds were reviewed. Appropriate statistical methods were applied to categorical and continuous variables.

RESULTS: From 9,699 records at a single high-volume fetal center, we identified 122 pregnancies with a diagnosis of CPAM or BPS on prenatal ultrasound. Outcomes for 19 cases were unknown or pending and were excluded. Of 103 fetuses with known outcomes, 60 (58%) underwent postnatal surgery and 43 (42%) did not. A higher CVR predicted likelihood of surgery ($p=0.05$). Presence of cardiac displacement on last ultrasound before birth associated with surgery ($p=0.027$), while cardiac displacement on initial ultrasound did not ($p=0.18$). CPAM/BPS type, sonographic appearance of the mass, and indicators of non-immune hydrops were not associated with surgical management. Steroid administration prenatally trended towards greater CVR reduction for pathology-proven CPAM than BPS, but this did not reach statistical significance. Median follow up time of the cohort was 4.5 [1.8-9.2] years.

CONCLUSION: Late gestation cardiac displacement may predict increased risk of surgical intervention — an association not previously described. This study adds to existing literature demonstrating a positive association between CVR and postnatal surgery.

511 Comparing the yield of meaningful findings in targeted versus genome-wide cell free DNA screening

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OBJECTIVE: Over 2 million cell free DNA (cfDNA) screens have been performed since the technology was introduced to clinical practice in 2011. Currently, three unique cfDNA screening modalities are available and range from targeted screens to genome wide. The objective of this study was to determine if genome wide cfDNA screening reveals clinically meaningful results at a higher rate than targeted cfDNA screening.

STUDY DESIGN: We conducted a retrospective cohort study that included all subjects who underwent cfDNA screening at a single academic center between 5/1/2016 and 4/1/2023. A retrospective chart review was performed to identify all screens that yielded abnormal results. Outcomes were compared between three cfDNA screening modalities: 5-cfDNA screens that detect abnormalities in chromosome 13, 18, 21 X and Y, 5-cfDNA plus selected microdeletions, and genome wide cfDNA screens.

RESULTS: 9,062 patients underwent cfDNA screening at a single institution. 1,502 were 5-cfDNA screens, 4,257 5-cfDNA and microdeletion screens and 3,303 were genome wide screens. 146 (1.6%) screens were abnormal. Of the 146 abnormal results, 118 (80.8%) would have been detected by the 5-cfDNA screen. An additional yield of 19.2% was noted when screening beyond the five most common aneuploidies. The 5-cfDNA and common microdeletion screens had an incremental yield of 8.2% (12/146) and 387 patients need to be screened for one clinically meaningful finding. There is a further 11.0% (16/146) additional yield when genome-

wide cfDNA screening was performed. Compared to 5-cfDNA screen, 254 patients needed to be screened with whole genome cfDNA to find had an additional yield of 11.0% (16/146). Most abnormal results in this category ended in first trimester loss, one ended in termination and two had live births. (Table 1).

CONCLUSION: There is an addition 21.9% yield in screening beyond the common five chromosomes. More than half of that additional yield comes from genome-wide cfDNA screens. The number needed to screen may be considered when selecting a cfDNA screen.

Table 1: Abnormal results and outcomes by screen category

Test category	cfDNA result	Invasive testing	Outcome
5-cfDNA with microdeletions	microdeletion 15q11.2	Normal	Unknown
	microdeletion 22q11.2	Normal	First trimester loss
	microdeletion 1p36	Normal	Live birth
	Duplication 22q11.21	Not done	Maternal in nature
	Deletion 22q11	Not done	Live birth
	Nonspecific multichromosomal CNVs	Normal	Live birth, maternal cancer diagnosis
	Trisomy 22	Not done	First trimester loss
	Trisomy 22	Unknown	Unknown
	Trisomy 22	Not done	First trimester loss
	Trisomy 22	Not done	First trimester loss
	Trisomy 22	Unknown	First trimester loss
	Trisomy 16	Not done	First trimester loss
Genome-Wide	Trisomy 4	Not done	First trimester loss
	Duplication of 5p	Not done	Unknown
	Chromosome 8 duplication	Not done	Live birth, maternal origin
	Trisomy 8 mosaic	Not done	Live birth
	Trisomy 8	Unknown	Unknown
	Loss of chromosome 10	Unknown	Unknown
	Trisomy 10	Normal	Live birth
	Trisomy 11	Not done	Unknown
	Trisomy 14	Not done	First trimester loss
	Trisomy 15	Not done	First trimester loss
	Trisomy 15	Not done	First trimester loss
	Trisomy 15	Not done	Termination
	Trisomy 15	Not done	First trimester loss
	Trisomy 13/Trisomy 20	Normal	Unknown
	Mosaic Trisomy 20	Normal	Unknown
	Trisomy 20	Not done	First trimester loss

512 Differences in Evidence-Based Induction of Labor Practices by Race

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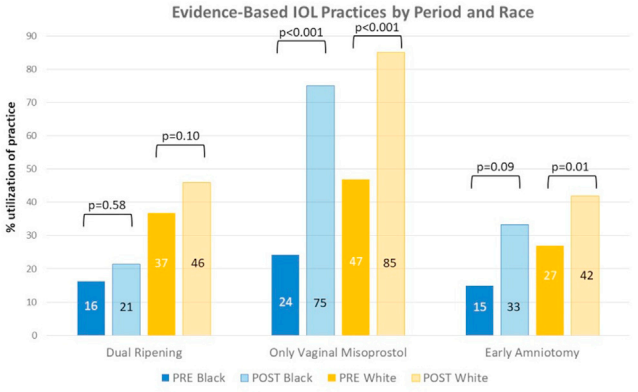
OBJECTIVE: Limited data suggests standardized induction of labor (IOL) improves outcomes for Black birthing people. To assess the impact and uptake of a standardized protocol for IOL by self-reported race.

STUDY DESIGN: We conducted a single center quality improvement project to examine the impact of standardizing IOL with use of 3 evidence-based practices: 1) dual agent cervical ripening with foley; 2) vaginal misoprostol instead of buccal; and 3) early amniotomy ($\leq$ 4 cm). We compared IOL length and cesarean before-implementation (PRE, 11/1/21-1/31/22) and after (POST, 3/1/22-4/30/22). Singleton IOL with intact membranes, initial cervical dilation $\leq$ 2 cm, and self-reported non-Hispanic (NH) Black or NH White race/ethnicity were included. Prior cesarean and stillbirth were excluded. Chi-squared and rank sum tests were used for bivariate comparisons. Time to delivery was compared PRE to POST with Cox proportional hazard models, stratified by race, adjusting for nulliparity, age, and body mass index (BMI).

RESULTS: Of 407 included, 18.9% (N=77) were NH Black and 81.1% where NH White (N=330). NH Black patients were younger (29.5 vs. 31.6 years, p< 0.01), had higher BMI (35.5 vs. 31.3 kg/m^2, p< 0.01), and were less likely to be nulliparous (42.9% vs. 59.6%, p< 0.01). There was a significant increase in use of only vaginal misoprostol for both groups (p< 0.01) and early amniotomy among NH White (p=0.01, **Figure**). IOL length decreased among NH White (21.3 [IQR 13.2-31.0] vs. 18.3 h [IQR 12.3-25.3], p=0.02); the difference was not significant for NH Black (22.9 [IQR 14.2-29.2] vs. 20.0 h [IQR 13.4-29.8], p=0.53). After adjustment, time to delivery was shorter for NH White (HR 1.52, 95% CI 1.21-1.91) but not NH Black (HR 1.30, 95% CI 0.79-2.12). This may be due to limited sample size. Cesarean birth was no different PRE vs. POST for NH Black (22.5 vs. 28.6%, p=0.55) or NH White (28.6 vs. 26.3%, p=0.64).

CONCLUSION: Standardizing IOL has the potential to improve IOL and limit biases in care; however, barriers to implementation of evidence-based practices need to be addressed to optimize outcomes for Black pregnant people.



513 Association between maternal anemia and postpartum depression in women with vaginal delivery

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OBJECTIVE: Prevention of postpartum depression(PPD) requires an understanding of its risk factors, particularly those that can be modified. Our objective was to assess the association between maternal anemia in the immediate postpartum and PPD 8 weeks after vaginal delivery.

STUDY DESIGN: Ancillary cohort study of the TRAAP trial, a French multicentric trial conducted in 2015-2016, which included women with a singleton pregnancy and vaginal delivery $\geq$ 35 weeks. The primary outcome was PPD at 8 weeks postpartum, defined as an Edinburgh Postpartum Depression Scale(EPDS) score $\geq$ 11. The exposure was the latest maternal hemoglobinemia measured in the postpartum before discharge(available per TRAAP trial's protocol). We assessed the association between hemoglobin and PPD with multivariable logistic regression. A sensitivity analysis differentiated 2 levels of PPD severity: moderate(11$\leq$ EPDS< 13) and severe(-EPDS$\geq$ 13) depressive symptoms.

RESULTS: Among the 2672 women included, 1115(43.6%) had postpartum anemia(hemoglobin< 11g/dL) and 369(13.8%) had PPD at 8 weeks. The relation between hemoglobinemia and PPD was linear. In multivariable analysis, the risk of PPD increased by 10% for each 1g/dL decrease in hemoglobinemia (aOR=0.90[0.81-0.998]). Sensitivity analysis showed that postpartum hemoglobinemia was associated with the risk of moderate depressive symptoms(18% increase for each 1g/dL reduction in hemoglobinemia) but not with severe depressive symptoms. We found a significant interaction with maternal place of birth: associations were found in European-born women but not in non-European-born women, in whom the prevalence of PPD was much higher.

CONCLUSION: This study shows an association between hemoglobin level in the immediate postpartum period and PPD at 8 weeks, with a 10% increase in the risk of PPD for each 1g/dL reduction in hemoglobin. This association specifically concerns moderate depressive symptoms and European-born women. These results emphasize the importance of precise characterization of PPD risk factors to improve its prevention. This study highlights the importance of correcting postpartum anemia.

Association between hemoglobin level in the immediate postpartum period and postpartum depression symptoms at 8 weeks postpartum, overall and according to maternal place of birth

	Prevalence of the outcome n (%)	OR[a] *For each 1g/dL increase in Hb*	aOR[b] *For each 1g/dL increase in Hb*	aOR[c] *For each 1g/dL increase in Hb*
OVERALL POPULATION n=2672				
PPD (EPDS ≥11)	**369 (13.8)**	**0.92 [0.842 – 0.995]**	**0.90 [0.81 – 0.998]**	**0.91 [0.831 – 1.004]**
PPD Symptoms				
None	2202 (82.4)	Ref	Ref	Ref
Mild depressive symptoms[e]	139 (5.2)	0.90 [0.79-1.02]	0.82 [0.70 – 0.96]	0.84 [0.72 – 0.97]
Severe depressive symptoms[f]	230 (8.6)	0.93 [0.84-1.03]	0.95 [0.83 - 1.09]	0.96 [0.85-1.08]
ACCORDING TO MATERNAL PLACE OF BIRTH[g]				
EUROPEAN-born WOMEN n=2287				
PPD (EPDS ≥11)	282 (12.3)	0.92 [0.84 – 1.01]	0.90 [0.81 – 1.0005]	0.93 [0.84 – 1.02]
PPD Symptoms				
None[d]	1919 (83.9)	Ref	Ref	Ref
Mild depressive symptoms[e]	112 (4.9)	0.87 [0.7576 – 1.0097]	0.81 [0.69 – 0.95]	0.85 [0.73-0.98]
Severe depressive symptoms[f]	170 (7.4)	0.95 [0.85 – 1.07]	0.97 [0.85 – 1.11]	0.98 [0.86 – 1.11]
NON EUROPEAN-born WOMEN n=274				
PPD (EPDS ≥11)	63 (23.0)	1.04 [0.84 – 1.28]	0.97 [0.76 – 1.24]	0.95 [0.75 – 1.21]
PPD Symptoms				
None[d]	199 (72.6)	Ref	Ref	Ref
Mild depressive symptoms[e]	20 (7.3)	1.26 [0.89 – 1.77]	1.25 [0.84-1.86]	1.24 [0.84-1.81]
Severe depressive symptoms[f]	43 (15.7)	0.94 [0.73 – 1.21]	0.83 [0.61-1.12]	0.82 [0.61-1.10]

aOR: adjusted odd ratio, EPDS: Edinburgh Postnatal Depression Scale, OR: odd ratio, PPD: Postpartum Depression
[a] Unadjusted odd ratio
[b] Complete case analysis
multivariable logistic regression including maternal age, BMI, parity, place of birth, chronic condition, diabetes, preeclampsia, induction of labor, duration of labor, mode of delivery. Overall population n=2195, European-born women n=1950, non-European-born women n=243
[c] After multiple imputation
multivariable logistic regression including maternal age, BMI, parity, place of birth, chronic condition, diabetes, preeclampsia, induction of labor, duration of labor, mode of delivery. Overall population n=2672, european-born women n=2287, non-European-born women n=274
[d] EPDS <11 [e] 11≤EPDS<13 [f] EPDS ≥ 13 [g] 111 missing data on maternal place of birth

514 Etiology of Severe Early-Onset Fetal Growth Restriction: Implications for Prenatal Diagnosis (The Multicenter PERIMETER Study)

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OBJECTIVE: Severe early onset fetal growth restriction (EO-FGR) represents a particularly challenging obstetric cohort. The PERIMETER Study collated prenatal diagnostic, obstetric and neonatal outcome data on all EO-FGR cases, with the objective being to analyze the etiology of these most severe cases.

STUDY DESIGN: The PERIMETER Study collected all singleton cases of EO-FGR confirmed by ultrasound between 18^0 and 27^6wks, at the three largest tertiary referral obstetric hospitals in one city from July 2016 to June 2020. FGR diagnosis was confirmed using electronically-stored ultrasound data, with international Delphi consensus criteria used for diagnosis, including biometry and Doppler data. Data relate to ultrasound parameters determined at the time of initial FGR diagnosis.

RESULTS: The PERIMETER Study included 445 cases of severe EO-FGR. Causes of EO-FGR included: uteroplacental (319, 72%), major structural fetal anomalies (71, 16%), genetic abnormalities (54, 12%) and congenital infection (parvovirus) in 1 (< 1%) case. Aneuploidy (42/54; 78%) was the most common genetic abnormality. FGR diagnosis was made later in pregnancy in uteroplacental cases compared with all other causes (mean 24.5 (SD 2.4) v 22.9 (SD 2.5) weeks' gestation; p< 0.001). Abdominal circumference (AC) or estimated fetal weight (EFW) < 3rd centile identified the majority of cases from any cause, including uteroplacental (235/319; 74%) and other causes combined (117/126; 93%). Umbilical artery Doppler abnormalities at sentinel scan were less common in cases of structural fetal anomaly or genetic abnormality (20/125, 16%) compared with uteroplacental cause (129/319, 40%) (p< 0.001).

CONCLUSION: Non-uteroplacental causes account for nearly one-third of all cases of severe EO-FGR, and should therefore be considered in the diagnostic work-up of all such cases. AC or EFW < 3rd centile at initial FGR diagnosis, in particular when combined with reassuring umbilical artery Doppler assessment, should prompt consideration for invasive genetic testing.

Table: Causes and ultrasound diagnostic criteria for early-onset FGR

Cause	Ultrasound criteria for early-onset FGR diagnosis				
	AC <3rd centile	EFW <3rd centile	UA EDF abnormality	AC <10th centile and UA PI >95th centile	EFW <10th centile and UA PI >95th centile
Uteroplacental, n=319	129 (40%)	197 (62%)	38 (12%)	72 (23%)	91 (29%)
Structural fetal anomaly[a], n=71	33 (46%)	58 (82%)	1 (1%)	9 (13%)	10 (14%)
Genetic abnormality[*], n=54	34 (63%)	49 (91%)	2 (4%)	5 (9%)	6 (11%)
Congenital infection (parvovirus), n=1	1 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

[a]Structural malformations: neurological, n=16; cardiovascular, n=11; multisystem, n=10; gastrointestinal, n=9; lung, n=4; genitourinary, n=3; skeletal dysplasia, n=15 (non-lethal, n=8; lethal, n=3; unspecified, n=4) and other musculoskeletal, n=3.
[*]Genetic abnormality: aneuploidy, n=42 (T21, n=10; T18, n=20; T13, n=4; 45,X, n=2; triploidy, n=6); other genetic, n=12.

515 Association of unintended pregnancy with pre-pregnancy and pregnancy-related healthcare utilization

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OBJECTIVE: Unintended pregnancy is associated with adverse pregnancy outcomes. Decreased access to or engagement in pre-pregnancy or pregnancy care may underlie this relationship. We aimed to evaluate the association between unintended pregnancy and healthcare utilization before and during pregnancy.

STUDY DESIGN: This was a cross-sectional analysis of the Pregnancy Risk Assessment Monitoring System (2016-2020) respondents with singleton live births. The primary exposure was unintended pregnancy including respondents who reported ambivalence, had mistimed, or had undesired pregnancies. Outcomes included key metrics of pre-pregnancy and pregnancy-related health care utilization. Multivariable models controlled for significant (p< 0.05) sociodemographic and comorbidity differences. A subgroup analysis

examined these relationships in respondents with undesired pregnancy compared to intended pregnancy. All analyses were population weighted.

RESULTS: The weighted population included 9 million respondents, of whom 40.5% reported unintended pregnancy and 6.2% reported undesired pregnancy. In the 12 months prior to pregnancy, respondents with unintended pregnancy were less likely to have seen an Obstetrician/Gynecologist or to have had a discussion with a health care worker about their desire to become pregnant or the need to optimize medical comorbidities prior to pregnancy when compared to those with intended pregnancy (Table). During/after pregnancy, they were less likely to initiate prenatal care in the first trimester, receive adequate prenatal care, receive the flu vaccine, and attend a postpartum visit (Table). On secondary analysis, these findings were even more pronounced in respondents with undesired pregnancy. In contrast, postpartum contraception use was higher among individuals with unintended or undesired pregnancy.

CONCLUSION: Unintended pregnancy is associated with less optimal obstetric healthcare utilization. These data can be used to develop public health measures targeting barriers to care in this population, particularly as unintended pregnancy is likely to rise in the current political landscape.

Table: Multivariable regression models for relationship of unintended pregnancy with pre-pregnancy and pregnancy-related healthcare utilization[1,2]

	Unintended (40.5%)		Undesired (6.2%)	
	OR (95% CI)	aOR (95% CI)[3]	OR (95% CI)	aOR (95% CI)[3]
Pre-pregnancy[4] OB/GYN visit	0.52 (0.51-0.54)	**0.75 (0.73-0.78)**	0.50 (0.47-0.53)	**0.71 (0.65-0.76)**
Pre-pregnancy[4] discussion with a health care worker about desire for more children	0.38 (0.37-0.39)	**0.54 (0.52-0.56)**	0.39 (0.36-0.42)	**0.55 (0.51-0.60)**
Pre-pregnancy[4] discussion with a health care worker about improving chronic medical conditions	0.41 (0.39-0.42)	**0.42 (0.43-0.47)**	0.31 (0.28-0.35)	**0.33 (0.30-0.37)**
Prenatal care in the first trimester	0.38 (0.37-0.40)	**0.59 (0.56-0.62)**	0.26 (0.25-0.29)	**0.43 (0.40-0.47)**
Adequate prenatal care[5]	0.53 (0.51-0.55)	**0.73 (0.70-0.76)**	0.44 (0.41-0.47)	**0.64 (0.60-0.69)**
Flu vaccine receipt during pregnancy	0.59 (0.57-0.61)	**0.83 (0.80-0.86)**	0.50 (0.47-0.53)	**0.73 (0.68-0.78)**
Postpartum visit attendance	0.54 (0.51-0.56)	**0.85 (0.80-0.90)**	0.43 (0.39-0.47)	**0.75 (0.68-0.83)**
Postpartum contraception	1.29 (1.24-1.34)	**1.46 (1.40-1.52)**	1.52 (1.40-1.64)	**1.83 (1.68-1.99)**
LARC	1.34 (1.29-1.39)	**1.13 (1.08-1.18)**	1.15 (1.06-1.25)	0.98 (0.90-1.08)

aOR, adjusted odds ratio; CI, confidence interval; OB/GYN, obstetrician and gynecologist; LARC, long-acting reversible contraceptive

[1]N=172,752 respondents (weighted population of 8,986,948) with live singleton births from 43 states and the District of Columbia, excluding Arizona, California, Idaho, Nevada, Ohio, South Carolina, and Texas

[2]Referent group is birthing persons with intended pregnancy

[3]Adjusted for maternal race and ethnicity (as a social construct), age, education, marital status, parity, pre-pregnancy insurance, BMI, smoking, pregestational diabetes, chronic hypertension, and history of depression

[4]Pre-pregnancy defined as any visit/discussion within 12 months prior to pregnancy

[5]Adequate prenatal care as defined by the Kessner Adequacy of Prenatal Care Index

516 Association of unintended pregnancy and maternal and neonatal outcomes: Evaluation in a contemporary cohort

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OBJECTIVE: Nearly half of births in the United States are unintended, a metric that may rise with increasing abortion restrictions. Prior data demonstrated an association between unintended pregnancy and adverse birth outcomes among individuals who have live births. Our objective was to evaluate this relationship in a contemporary cohort of birthing individuals.

STUDY DESIGN: This was a cross-sectional analysis of the Pregnancy Risk Assessment Monitoring System (2016-2020) respondents with singleton live births. The primary exposure was unintended pregnancy including respondents who reported ambivalence, had mistimed, or had undesired pregnancies. Outcomes included adverse maternal and neonatal outcomes. Multivariable models controlled for significant ($P< 0.05$) sociodemographic and comorbidity differences. A subgroup analysis examined these relationships in respondents with undesired pregnancy compared to intended pregnancy. All analyses were population weighted.

RESULTS: The weighted population included 9 million respondents, of whom 40.5% reported unintended pregnancy and 6.2% reported undesired pregnancy. On adjusted analyses, unintended pregnancy, was significantly associated with adverse maternal outcomes (Table). Respondents with unintended pregnancy had greater odds of depression, both during pregnancy (aOR 1.51, 95% CI 1.42-1.60) and postpartum (aOR 1.28, 95% CI 1.21-1.35), intimate partner violence during pregnancy (aOR 1.18, 95% CI 1.04-1.35), and lower odds of breastfeeding for more than three months (aOR 0.89, 95% CI 0.85-0.92) compared to those with intended pregnancy. Neonatal outcomes did not differ by pregnancy intendedness. On subgroup analysis of respondents with undesired pregnancy, these findings were more pronounced, and they had 18% higher odds of developing a hypertensive disorder of pregnancy.

CONCLUSION: Unintended pregnancy, particularly when undesired, is associated with adverse maternal outcomes in this contemporary cohort. This risk factor for maternal morbidity is particularly relevant in the current political landscape and highlights the importance of preserving abortion access.

Table: Multivariate models for relationship of unintended pregnancy with maternal and neonatal outcomes[1,2]

	Unintended (40.5%)		Undesired (6.2%)	
	OR (95% CI)	aOR (95% CI)[3]	OR (95% CI)	aOR (95% CI)[3]
Maternal Outcomes				
Hypertensive disorder of pregnancy	1.15 (1.011-1.21)	1.02 (0.97-1.07)	1.37 (1.27-1.49)	**1.18 (1.07-1.29)**
Depression during pregnancy	2.29 (2.20-2.39)	**1.51 (1.42-1.60)**	3.41 (3.16-3.67)	**2.21 (1.98-2.47)**
IPV during pregnancy	3.04 (2.75-3.36)	**1.18 (1.04-1.35)**	4.40 (3.79-5.11)	**1.44 (1.16-1.79)**
Cesarean birth	0.94 (0.91-0.97)	**0.95 (0.91-0.98)**	1.01 (0.95-1.08)	---
Breastfeeding for > three months	0.51 (0.49-0.52)	**0.89 (0.85-0.92)**	0.41 (0.39-0.44)	**0.72 (0.68-0.78)**
Depression postpartum	1.15 (1.011-1.21)	**1.28 (1.21-1.35)**	2.38 (2.20-2.58)	**1.62 (1.48-1.76)**
Neonatal Outcomes				
Preterm birth <37 weeks' gestation	1.24 (1.19-1.30)	1.00 (0.95-1.06)	1.43 (1.31-1.56)	1.04 (0.95-1.14)
Small for gestational age (<10%)	1.18 (1.12-1.24)	1.01 (0.95-1.07)	1.13 (1.02-1.24)	1.04 (0.94-1.15)
Low birth weight (<2500g)	1.35 (1.29-1.41)	0.98 (0.93-1.03)	1.49 (1.37-1.61)	1.01 (0.92-1.10)
Length of stay >5 days	1.29 (1.23-1.35)	1.00 (0.95-1.06)	1.45 (1.32-1.59)	1.03 (0.93-1.15)

aOR, adjusted odds ratio; CI, confidence interval; IPV, intimate partner violence

[1]N=172,758 respondents (weighted population of 8,994,734) with live singleton births from 43 states and the District of Columbia, excluding Arizona, California, Idaho, Nevada, Ohio, South Carolina, and Texas

[2]Referent group is birthing persons with intended pregnancy

[3]Adjusted for maternal race and ethnicity (as a social construct), age, education, marital status, parity, history of preterm birth, pre-pregnancy insurance, BMI, smoking, pregestational diabetes, chronic hypertension, and history of depression

517 Factors associated with unintended pregnancy: A cross-sectional evaluation in a contemporary cohort

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OBJECTIVE: Unintended pregnancy is associated with adverse birth outcomes. Recent restrictions on access to abortion make understanding factors associated with experiencing an unintended pregnancy especially important. Our objective was to understand the association between maternal demographic and socioeconomic factors and unintended pregnancy.

STUDY DESIGN: This was a cross-sectional analysis of Pregnancy Risk Assessment Monitoring System (2016-2020) respondents with singleton live births. The primary outcome was unintended pregnancy (including respondents who reported they were ambivalent, had mistimed, or had undesired pregnancies). Multivariable models estimated the independent association between demographic and socioeconomic variables and unintended pregnancy. A conceptual framework based on the US Department of Health and Human Services Healthy People 2030 domains of social determinants of health was used to select variables. Secondary analyses examined these relationships in respondents with undesired pregnancy. All analyses were population weighted.

RESULTS: The weighted population included 8.6 million respondents, of whom 40% reported unintended pregnancy including 6.2% with undesired pregnancy. Among demographic factors, young maternal age and non-Hispanic Black race had the highest association with unintended pregnancy (Table). Social/community and economic factors, including being unmarried, greater number of prior live births, greater number of dependents, Medicaid or lack of insurance, and lower income, were also significantly associated. Education of less than 12 years was associated with lower odds of unintended pregnancy. Similar associations were seen with undesired pregnancy with the addition of advancing maternal age.

CONCLUSION: Multiple demographic and socioeconomic factors that are markers for inequity and lower access to resources are associated with unintended pregnancy. Findings highlight populations that are vulnerable to the adverse consequences of unintended pregnancy, which is of particular importance in the era of restricted reproductive freedom.

Table. Social determinants of health associated with unintended pregnancy in birthing persons with a live birth[1]

	Unintended[2] (40.0%)	Undesired (6.2%)
	aOR (95% CI)[3]	aOR (95% CI)[3]
Demographic Characteristics		
Age (years)		
<20	2.61 (2.45-2.78)	1.71 (1.53-1.90)
20-30	(Ref)	(Ref)
30-40	0.71 (0.70-0.73)	1.19 (1.14-1.25)
>40	0.70 (0.66-0.75)	2.32 (2.12-2.55)
Race and ethnicity		
Non-Hispanic White	(Ref)	(Ref)
Non-Hispanic Black	1.67 (1.61-1.72)	1.47 (1.40-1.55)
Hispanic	1.00 (0.97-1.03)	0.91 (0.85-0.97)
Asian	1.25 (1.19-1.31)	1.09 (0.99-1.21)
Other	1.14 (1.09-1.18)	1.05 (0.98-1.13)
Social and Community Context		
Unmarried	2.51 (2.44-2.58)	2.10 (1.99-2.21)
Parity		
Nulliparous	(Ref)	(Ref)
1 prior live birth	1.21 (1.17-1.25)	1.95 (1.82-2.10)
2 prior live births	1.89 (1.81-1.98)	4.04 (3.58-4.39)
3 or more prior live births	2.28 (2.15-2.39)	5.32 (4.87-5.81)
Income dependents		
1 (self)	1.52 (1.45-1.58)	1.32 (1.22-1.43)
2	(Ref)	(Ref)
3	0.96 (0.93-1.00)	0.85 (0.80-0.91)
4	1.21 (1.16-1.27)	1.10 (1.02-1.19)
≥5	1.39 (1.32-1.46)	1.32 (1.21-1.43)
Economic Stability		
Insurance		
Private	(Ref)	(Ref)
Medicaid	1.29 (1.25-1.33)	1.13 (1.06-1.20)
Health care exchange	1.05 (0.99-1.11)	1.01 (0.89-1.14)
None	1.43 (1.38-1.50)	1.27 (1.18-1.37)
Income category (per year)		
<$20,000	1.73 (1.67-1.79)	1.51 (1.40-1.61)
$20-40,000	1.52 (1.47-1.57)	1.42 (1.33-1.52)
$40-60,000	1.32 (1.27-1.37)	1.31 (1.22-1.42)
$60-85,000	1.14 (1.10-1.46)	1.20 (1.10-1.43)
>$85,000	(Ref)	(Ref)
Education Access and Quality		
Educational attainment		
Less than 12 years	0.84 (0.81-0.87)	0.79 (0.75-0.84)
High school	0.99 (0.97-1.02)	1.00 (0.96-1.06)
More than 12 years	(Ref)	(Ref)

OR = odds ratio; aOR = odds ratio; CI = confidence interval

[1]Categories based on the US Department of Health and Human Services Healthy People 2030 domains of social determinants of health

[2]Unintended pregnancy includes respondents who reported they were ambivalent, had mistimed, or had undesired pregnancies

[3]Models adjusted for all variables shown here

518 Association between neighborhood poverty and adverse birth outcomes

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OBJECTIVE: Community-level factors, including neighborhood deprivation, have been associated with adverse birth outcomes. Our objective was to evaluate the association between area poverty and birth outcomes in a large cohort of diverse birthing persons residing in a metropolitan area in the Midwest.

STUDY DESIGN: This was a retrospective study of birthing persons delivering at one large metropolitan health system, including a large academic medical center and eight community hospitals, from 1/

2018-7/2023. The primary exposure was area poverty rate which was identified by matching patient zip codes at delivery hospitalization to the American Community Survey Zip Code Tabulation Area (ZCTA) data. The ZCTA data were coded for percentage of households living at or below the federal poverty level and categorized as < 5%, 5-9.9%, 10-19.9%, or ≥20%. Outcomes included adverse maternal and neonatal outcomes. Multivariable models controlled for socio-demographic and comorbidity differences.

RESULTS: Our cohort included 84,512 deliveries with 48.5% who lived in areas with < 5% poverty, 30.3% who lived in areas with 5-9.9% poverty, 16.4% who lived in areas with 10-19.9% poverty, and 4.7% who lived in areas with ≥20% poverty. Of birthing persons living in areas with the highest poverty rates, 98% delivered at the academic hospital. On adjusted analyses, living in an area with poverty rates ≥20% was significantly associated with increased risk of hypertensive disorders of pregnancy (aIRR 1.33, 95% CI 1.17-1.51), complication after vaginal birth (aOR 1.15, 95% CI 1.03-1.28) and cesarean birth (aIRR 1.16, 95% CI 1.01-1.34), preterm birth (aIRR 1.14, 95% CI 1.01-1.27), low birth weight (aIRR 1.20, 95% CI 1.06-1.36), and admission to the neonatal intensive care unit (aIRR 1.44, 95% CI 1.30-1.60, Table).

CONCLUSION: Neighborhood poverty was independently associated with adverse maternal and neonatal outcomes, even after accounting for other adverse social determinants of health. Findings are relevant as health systems seek to develop quality initiatives and community interventions to improve outcomes for vulnerable populations.

Table. Multivariate models for relationship of ZCTA household poverty rate and birth outcomes[1]

	<5% N=41,016 (48.5%)	5-9.9% N=25,628 (30.3%)	10-19.9% N=13,873 (16.4%)	≥20% N=3,995 (4.7%)
	aIRR or aOR (95% CI)[2,3]	aIRR or aOR (95% CI)[2,3]	aIRR or aOR (95% CI)[2,3]	aIRR or aOR (95% CI)[2,3]
Hypertensive disorder of pregnancy	Ref	1.05 (0.98-1.12)	1.04 (0.95-1.13)	**1.33 (1.17-1.51)**
Gestational diabetes	Ref	**1.08 (1.02-1.15)**	1.07 (0.98-1.16)	---
Cesarean birth[4]	Ref	---	---	**0.91 (0.85-0.97)**
Vaginal birth complication[4,5]	Ref	1.01 (0.96-1.07)	**1.14 (1.06-1.22)**	**1.15 (1.03-1.28)**
Cesarean birth complication[6]	Ref	1.04 (0.98-1.12)	**1.12 (1.02-1.22)**	**1.16 (1.01-1.34)**
Severe maternal morbidity[7]	Ref	---	1.06 (0.91-1.25)	1.02 (0.79-1.31)
Preterm birth	Ref	**1.14 (1.08-1.21)**	**1.12 (1.04-1.20)**	**1.14 (1.01-1.27)**
Low birth weight	Ref	**1.16 (1.09-1.24)**	**1.19 (1.09-1.29)**	**1.20 (1.06-1.36)**
NICU admission	Ref	1.06 (1.00-1.12)	1.04 (0.96-1.11)	**1.44 (1.30-1.60)**

aIRR = adjusted incidence rate ratio; aOR = adjusted odds ratio CI = confidence interval; NICU = neonatal intensive care unit

[1]American Community Survey Zip Code Tabulation Area (ZCTA) data are coded for percentage of households living at or below the federal poverty level

[2]Logistic regression used to calculate OR for outcomes with 10-25% incidence

[3]Adjusted for age, race/ethnicity (as a social construct), insurance, parity, body mass index, pregestational diabetes, chronic hypertension, history of mental illness, anemia, and a comorbidity composite which included cardiac disease, bleeding disorder, pulmonary hypertension, chronic renal disease, gastrointestinal disease, HIV, moderate asthma, autoimmune conditions, neuromuscular disease, thyrotoxicosis, or history of bariatric surgery. Findings not shown for relationships that were non-significant on unadjusted analyses.

[5]Vaginal birth complication includes postpartum hemorrhage, infection, or thrombosis

[6]Cesarean birth complication includes operative complication, hemorrhage, infection, or thrombosis

[7]Severe maternal morbidity, as defined by the CDC, includes hysterectomy, transfusion, sepsis, shock, eclampsia, disseminated intravascular coagulation, severe anesthesia complication, acute renal failure, amniotic fluid embolism, acute myocardial infarction, cardiac arrest, pulmonary edema, heart failure, adult respiratory distress syndrome, and cerebrovascular accident

519 Cost-effectiveness of first trimester ultrasound for identifying congenital anomalies in states with 16-20-week abortion bans

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OBJECTIVE: Fetal anomalies contribute significantly to infant morbidity in the United States. In states with 16-20-week abortion bans, the standard practice of identifying fetal anomalies in the second trimester limits an individual's pregnancy decision-making. This study aimed to evaluate the cost-effectiveness of a universal first-trimester ultrasound among pregnant individuals in the setting of abortion restrictions.

STUDY DESIGN: A decision-analytic model was built using TreeAge software to evaluate the cost-effectiveness of first-trimester ultrasound in states with 16-20-week abortion bans. Our theoretical cohort included 1,500,000 individuals to represent the annual number of pregnancies in 19 states with bans to date. Fetal anomalies were categorized as lethal or major. Outcomes included abortion, stillbirth, maternal death, preeclampsia, and neonatal death. The cost-effectiveness threshold was set at $100,000/QALYs. Model inputs were derived from the literature, and sensitivity analyses were used to assess the robustness of the results.

RESULTS: In our theoretical model, 3,960 lethal and 7,875 major anomalies were identified in the first trimester (Table 1). Relative to the standard second-trimester scan, the first-trimester ultrasound strategy was associated with 8,318 more first-trimester abortions, 1,970 fewer out-of-state second-trimester abortions, 266 fewer cases of preeclampsia, 831 fewer stillbirths, and 1,952 fewer neonatal deaths. First-trimester ultrasound led to 1,555 and 3,160 fewer live births with lethal and major anomalies, respectively. First-trimester ultrasound was the dominant strategy, with a 2.2 billion reduction in costs and an increase in 25,830 QALYs. The results were robust over a wide range of assumptions on sensitivity analyses.

CONCLUSION: Universal first-trimester ultrasound in states with abortion bans is cost-saving, resulting in improved neonatal outcomes, decreased healthcare costs, and improved quality of life. These findings may inform clinical practice and policies to improve individual and societal outcomes in the context of restricted healthcare access.

Table 1: Outcomes for first versus second trimester ultrasound for all pregnant individuals in states with a 16-20-week abortion ban among a theoretical cohort of 1,500,000 people

	First-Trimester Ultrasound	Second-Trimester Ultrasound	Difference
First-trimester diagnosis of lethal anomaly	3,960	0	↑ 3,960
First-trimester diagnosis of major anomaly	7,875	0	↑7,875
Abortion first-trimester	8,318	0	↑ 8,318
Abortion second-trimester, out-of-state	4.367	6,337	↓1,970
Maternal death	107	107	0
Stillbirth	7,523	8,355	↓ 831
Preeclampsia	56,427	56,694	↓ 266
Neonatal death	4,581	6,533	↓ 1,952
Live birth with lethal anomaly	830	2,384	↓ 1,555
Live birth with major anomaly	15,444	18,604	↓ 3,160
Cost	$9,933,145,877	$12,123,260,828	↓ $2,190,114,951
Effectiveness	40,407,105	40,381,275	↑ 25,830

520 Could Environmental Heat Exposure Contribute to Fetal Growth Dysregulation?

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OBJECTIVE: Evidence suggests increased heat exposure is associated with adverse fetal outcomes such as preterm birth & stillbirth. Less is known about the impacts of heat exposure on fetal growth restriction (FGR). We investigated if 1st trimester (Tri1) or 2nd trimester (Tri2) maximum (Tmax), minimum (Tmin), average (Tavg), or ambient (AT) temperatures experienced during pregnancy were associated with a diagnosis of FGR.

STUDY DESIGN: We performed a retrospective cohort study of pregnant subjects who received prenatal care & delivered at an urban hospital between 1/2016-3/2022. Those diagnosed with FGR were identified with ICD-10 codes from an institutional database. Zip-code level Tri1 & Tri2 Tmax, Tmin, Tavg, & AT were derived from 1 km gridded Daymet products & reported in degrees Celsius. After testing for normality, median temperature values were compared among those with & without FGR using the Wilcoxon Rank Sum Test. Categorical variables were compared using Chi Square Test.

RESULTS: Of N=14336 subjects, 10.5% (n=1499) had FGR (Table 1a). Those with FGR had a higher Tri2 Tmax & Tavg vs without FGR (Table 1b). No significant differences in Tri1 Tmax, Tri1/Tri2 Tmin or AT were noted among those with & without FGR (Table 1b). We also investigated whether low birth weight (LBW) defined as birth weight (BW) < 2500 kg or very low birth weight (VLBW) defined as BW < 1500kg associated with heat exposure. Those with VLBW vs without had a higher Tri2 AT *(20.27[IQR 12.55-26.18] vs 18.87[IQR 11.89-25.54], p=.05)* & Tavg *(19.56 [IQR 12.48-24.5] vs 18.34 [IQR 11.97-24.05], p=.05)*.

CONCLUSION: Our data innovatively suggests higher heat exposure in the 2nd trimester may mechanistically impact placental function & fetal growth dysregulation. Our data utilized ICD-10 coding for FGR diagnosis; hence, FGR could have been under-coded & therefore the association may even be stronger, a possibility highlighted by the stronger relationship between VLBW & heat exposure. These hypothesis generating data demonstrate significant need for future studies to investigate the role of heat exposure in fetal growth and development.

Table 1 a: Demographic Data

	FGR n=1,499	NO FGR n=12,837	P-value
Age (years) (mean±SD)	26.2±6.20	27.5±6.3	**<0.001**
BMI (kg/m^2) (mean±SD)	28.7±8.4	30.1±8.2	**<0.001**
Obesity % (N)	13.12 (198)	15.0 (1,945)	**<0.05**
Race % (N)			**<0.05**
Black	83.7 (1,263)	73.25 (9,497)	
White	8.95 (135)	18.66 (2,420)	
Other	7.36 (111)	8.09 (1,049)	
Parity % (N)			**<0.05**
Nulliparity	67.26 (1,015)	76.04 (9,859)	
Multiparity	32.74 (494)	23.96 (3,107)	
Table 1b: Temperature Values: *Median [IQR]*			
Tri1 Tmax	23.42°C [16.86,29.44°C]	23.28°C [16.8,29.49°C]	0.837
Tri1 Tmin	10.74°C [5.04,17.84°C]	10.56°C [5.07,17.86°C]	0.909
Tri1 Tavg	17.08°C [10.9,23.6°C]	16.91°C [10.9,23.7°C]	0.97
Tri1 AT	17.57°C [10.88,25.07°C]	17.22°C [10.84,25.13°C]	0.982
Tri 2 Tmax	25.04°C [18.24,29.95°C]	24.52°C [18.12,29.73°C]	***0.0724****
Tri2 Tmin	12.56°C [6.16,18.46°C]	12.08°C [5.99,18.29°C]	0.123
Tri2 Tavg	18.86°C [12.0,24.25°C]	18.29°C [11.9,24.05°C]	**0.09***
Tri 2 AT	19.43°C [11.98-25.72°C]	18.82°C [11.89-25.54°C]	0.104

FGR: Fetal growth restriction
Tri1: 1st Trimester
Tri2: 2nd Trimester
Tmin: Minimum temperature
Tmax: Maximum Temperature
Tavg: Average Temperature
AT: Ambient Temperature
*Trend: P<0.1

521 Association of obstetric comorbidity index with postpartum hemorrhage in a large health system

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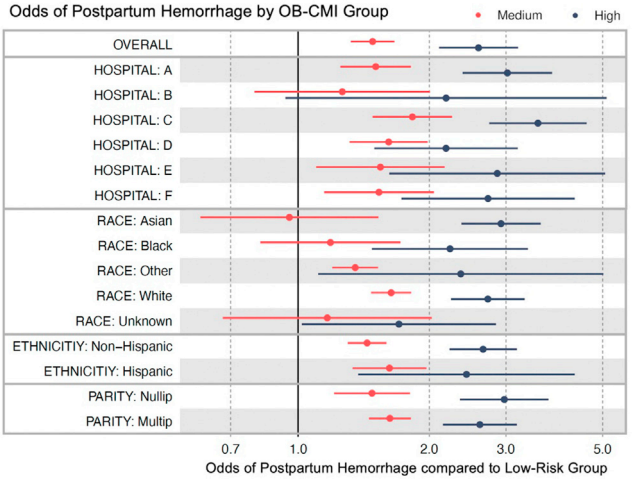
OBJECTIVE: Postpartum hemorrhage (PPH) is the leading cause of severe maternal morbidity in the United States and of maternal mortality worldwide, but existing risk-prediction tools have low sensitivity and specificity. We sought to examine whether the Obstetric Comorbidity Index (OB-CMI), which has been validated to predict severe maternal morbidity, was associated with PPH in a large health system.

STUDY DESIGN: This retrospective cohort study included all patients admitted for delivery at ≥24 weeks gestational age between 3/2021 and 11/2022 at 8 hospitals in an integrated healthcare system with an OB-CMI score recorded on admission. Patients were categorized into low- (OB-CMI ≤2), medium- (OB-CMI 3-5), and high-risk (OB-CMI ≥6) categories. Logistic regressions were used to assess the odds of PPH (estimated blood loss, EBL ≥1000 mL) by OB-CMI category with standard errors clustered at the level of the hospital. The odds of PPH by OB-CMI category were also compared among the following subgroups to evaluate if the associations varied: hospital, self-reported race, self-reported ethnicity, parity.

RESULTS: 24,877 patients were included: 18,639 (74.9%) were low-risk, 4,831 (19.4%) were medium-risk, and 1,407 (5.7%) were high-risk. The rates of PPH were 8.9%, 12.6%, and 20.3% in the low-, medium-, and high-risk groups. The odds ratio of PPH for medium- and high-risk groups were 1.47 (95% CI 1.31-1.65) and 2.60 (95% CI 2.10-3.22). Similar magnitudes of effect were seen when the logistic models were stratified by hospital, race, ethnicity, and parity (Figure 1), though sample size limited the ability to fully evaluate all hospital and race subgroups.

CONCLUSION: In a large healthcare system, OB-CMI was reliably associated with PPH. Future work should compare this tool to other hemorrhage risk stratification tools to determine how these tools can be accurately and effectively used to prevent PPH and associated morbidity.



522 Femur Length Correlates With Growth Restriction, Low Birthweight In Smokers: Secondary Analysis Of STOP RCT

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OBJECTIVE: Cigarette smoking is associated with a 3.5 fold increased risk of low birthweight. Smoking induces a late-onset pattern of fetal growth restriction (FGR). This study compares fetal biometry at two timepoints in the 3rd trimester with birthweight in pregnancies complicated by smoking.

STUDY DESIGN: This is a secondary analysis of Smoking Cessation Through Optimization of clinical care in Pregnancy (STOP) RCT, which tested a novel antenatal clinic for pregnant smokers. Singleton pregnancies smoking ≥1 cigarette daily were recruited prior to 20 weeks gestation at an urban maternity hospital. Ultrasound screening for FGR was performed at 32 and 36 weeks.

RESULTS: **436** women participated in the STOP RCT, with 285 women undergoing ultrasound screening for FGR. 261 and 228 scans were performed at 32 weeks and 36 weeks, respectively. For normally grown infants the estimated fetal weight (EFW) at 32 weeks correlated poorly with birthweight. However, when biometry of < 10th centile was analyzed, each parameter significantly correlated with low birthweight.

To further characterize the relationship between FL and FGR in smokers, a correlation matrix was generated between biometry at 32 and 36 weeks. The mean FL Z-score at 32 weeks was poorly correlated with EFW at 36 weeks. However, FL < 10th centile at 32 weeks was predictive of EFW < 10th centile at 36 weeks (p=0.003), and birthweight < 10th centile (p=0.001).

A logistic regression analysis provided an odds ratio for birthweight < 10th centile, dependent on a FL < 10th centile at 32 weeks, of 0.98 (95%CI: 0.97 - 0.99; p< 0.001). The odds ratio for EFW < 10th centile at 36 weeks, dependent on a FL < 10th centile at 32 weeks, was 4.9 (95% CI: 1.6 - 15.7; p=0.007).

CONCLUSION: FL is easy to obtain, with high accuracy and reproducibility. Short fetal FL is a common abnormal finding in smokers. Although there were strong associations between short FL and birthweight < 10^{th} centile, the positive predictive values were not strong. However, the negative predictive values were > 90%, implying that a FL > 10^{th} centile is a reassuring indicator of later normal fetal growth.

523 Fetal and Neonatal Outcomes after "Atypical Finding for Sex Chromosomes" on Cell-Free Fetal DNA Screening

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OBJECTIVE: Prenatal cell-free fetal DNA (cfDNA) screening is primarily used to identify pregnancies at risk for common autosomal trisomies (CAT). Common cfDNA results include low risk (LR) or high risk (HR) for CAT or sex chromosomal aneuploidies (SCA), and low fetal fraction (FF). In 2020, a new report output was noted on a common cfDNA platform, labeled "atypical finding for sex chromosomes" (AFSC), stratified as "no result for all" (AFSC-NR), "LR for other conditions, no fetal sex" (AFSC-LR), or "LR for other conditions, XX sex" (AFSC-LR-XX). We aim to identify the outcomes of AFSC results on cfDNA.

STUDY DESIGN: We performed a retrospective cohort study of AFSC results at a single referral center from 01/2020-12/2022. Exclusion criteria included HR for CAT/SCA, low FF, & AFSC of suspected maternal origin. All AFSC patients were offered diagnostic testing, or if declined, neonatal phenotyping. Maternal demographic and outcome data were abstracted from medical records. Independent sample t-test, ANOVA, Chi-square, and multinomial logistic regression were used to compare outcomes between groups as indicated.

RESULTS: Of 5050 cfDNA samples (4931 singletons; 118 twins), 38 (0.008%) patients with 43 fetuses (5 twins) yielded AFSC outputs: 17 (39.5%) AFSC-NR, 11 (25.6%) AFSC-LR, and 15 (34.9%) AFSC-LR-XX. Genetic testing overview and results are listed in Figure 1. Compared to AFSC-NR, AFSC-LR were more likely to have higher rate of genetic testing (p=0.008), abnormal diagnostic testing (p=0.033), lower gestational age at lab draw (p=0.035), lower rate of twins (p=0.021), and higher likelihood of a female fetus (p=0.034). AFSC-NR had higher likelihood of preterm birth (p=0.013) and NICU admission (p=0.03). After controlling for twins, these findings lost significance.

CONCLUSION: Incidence of AFSC on cfDNA screening is low. Majority of cases result in normal genetic testing or neonatal phenotype. AFSC-LR is associated with abnormal results on karyotype or microarray. In this limited cohort, maternal & neonatal outcomes are overall reassuring.

Figure 1A: Flow Diagram of Testing after cell-free fetal DNA (cfDNA) samples with "Atypical Findings for Sex Chromosome" (AFSC) Results

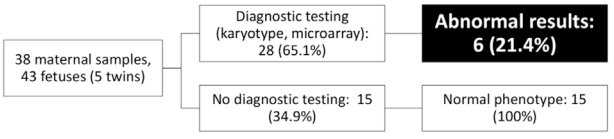
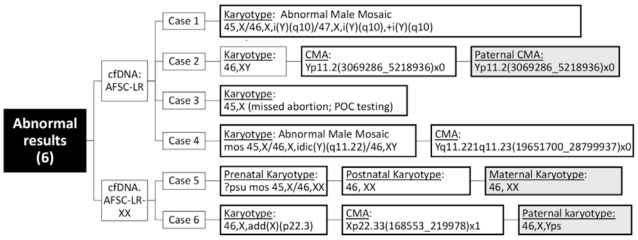


Figure 1B: Abnormal Diagnostic Genetic Testing Results after AFSC Results



524 Factors Affecting Success of Vaginal Delivery in Nulliparous Patients Receiving Magnesium Sulfate During Labor Induction

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OBJECTIVE: Magnesium sulfate administration for preeclampsia with severe features during labor induction has been associated with increased risk of cesarean delivery (CD). We aim to evaluate associations with successful vaginal delivery (VD) in nulliparous patients undergoing labor induction while receiving magnesium sulfate.

STUDY DESIGN: This was a secondary analysis from the Consortium on Safe Labor, a multicenter cohort study of 228,438 deliveries in 19 U.S. hospitals. The analysis included nulliparous women ≥ 18 years

old with singleton gestation undergoing induction of labor for preeclampsia with severe features and receiving magnesium sulfate. Primary outcome was characteristics associated with successful VD. Secondary outcomes were maternal and neonatal outcomes. Chi-square and independent samples t-test were used to compare groups. The study was deemed IRB exempt #20-000360.

RESULTS: Total 4,122 women met inclusion criteria, of whom 2256 (54.7%) had a successful VD. Patients who had a VD were more likely to have lower maternal age ($p< 0.001$) and BMI ($p< 0.001$), higher gestational age ($p< 0.001$), higher rate of public insurance ($p=0.001$), lower rate of anti-hypertensive medication usage ($p< 0.001$), and lower admission systolic blood pressure ($p=0.049$). Other factors associated with VD included having more than 3 contractions in 10 minutes on admission ($p=0.002$), higher Bishop's score on admission ($p< 0.001$), cervical dilation greater than 0 or 1cm ($p< 0.001$), effacement greater than 50% ($p< 0.001$), and undergoing AROM ($p=0.003$) or Pitocin administration ($p< 0.001$). Successful VD was associated with shorter induction time ($p< 0.001$), higher 1-minute APGAR($p< 0.001$), and lower rates of NICU admission ($p< 0.001$) and composite neonatal morbidity ($p< 0.001$).

CONCLUSION: Rates of cesarean delivery are high in patients undergoing induction of labor for severe preeclampsia and receiving magnesium sulfate. Various characteristics are associated with increased rate of successful VD. Appropriate care should be taken in expeditiously managing labor for this high risk patient cohort.

Table 1. Characteristics between Vaginal and Cesarean Delivery

	Vaginal Delivery (n=2256)	Cesarean Delivery (n=1866)	p-value
Maternal age (years, mean±SD)	24.8±5.7	27.0±6.6	**<0.001**
BMI (kg/m^2, mean±SD)	25.9±6.5	27.8±7.4	**<0.001**
Advanced maternal age	172 (7.6%)	288 (15.4%)	**<0.001**
Gestational age (mean±SD)	36w1d±4d	35w0d±4d	**<0.001**
Preterm delivery	69 (43.0%)	1051 (56.3%)	**<0.001**
Marital Status			
Married	965/2188 (44.1%)	923/1796 (51.4%)	**<0.001**
Divorced/Widowed	17 /2188 (0.8%)	16 /1796 (0.9%)	
Single	1206 /2188 (55.1%)	857 /1796 (47.7%)	
Insurance			
Private	1187 /2114 (56.1%)	1052 /1698 (62%)	**0.001**
Public	884 /2114 (41.8%)	607 /1698 (35.7%)	
Self-Pay	38 (/2114 1.8%)	29 /1698 (1.7%)	
Other	5 /2114 (0.2%)	10 /1698 (0.6%)	
Diabetes mellitus	87 (3.9%)	141 (7.6%)	**<0.001**
Gestational diabetes	64 /2055 (3.1%)	88/1634 (5.4%)	**0.001**
Chronic hypertension	184/2228 (8.3%)	189/1828 (10.3%)	**0.023**
PROM	170 (7.5%)	93 (5.0%)	**0.001**
Fetal growth restriction	54 /2203(2.5%)	89/1805 (4.9%)	**<0.001**
Use of hypertensive medication	352/2175 (16.2%)	544/1767 (30.8%)	**<0.001**
Admit SBP	142.4±17.2	146.9±18.4	**0.049**
Admit DBP	88.1±14.6	90.0±14.8	0.77
More than 3 contractions / 10 mins on admission	1268 (56.2%)	960 (51.4%)	**0.002**
Bishop's score on admission	5.0±3.1	3.2±2.5	**<0.001**
Cervical dilation > 0 cm	1662 (73.5%)	876 (46.9%)	**<0.001**
Cervical dilation > 1 cm	1154 (51.2%)	430 (23.0%)	**<0.001**
Cervical effacement > 50%	1230 (54.5%)	511 (27.4%)	**<0.001**
Induction/ Augmentation methods			
Misoprostol	94 /1881 (5.0%)	79/1526 (5.2%)	0.81
Mechanical dilation	66/1881 (3.5%)	63/1526 (4.1%)	0.35
Dinoprostone	65/1881 (3.5%)	66/1526 (4.3%)	0.19
AROM	274/1881 (14.6%)	169/1526 (11.1%)	**0.003**
Pitocin	850/1881 (45.2%)	529/1526 (34.7%)	**<0.001**
Intrapartum fetal distress	60/1935 (3.1%)	421/1536 (27.4%)	**<0.001**
Induction of labor time (minutes, mean±SD)	1520.8±1488.5	1741±1720.3	**<0.001**
Labor length over 24 hours	705 (31.3%)	794 (42.6%)	**<0.001**

525 Effects of Dutch tocolysis protocol adjustment for threatened preterm birth after 30 weeks of gestation

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OBJECTIVE: In 2019, the Dutch protocol was adjusted to not administer tocolysis for threatened preterm birth (PTB) between 30 and 34 weeks of gestation, since its effect on improving perinatal outcome is unclear. Administration of corticosteroids for fetal lung maturation was unchanged. The aim of this study is to evaluate the adjustment by investigating neonatal outcomes between 30 and 32 weeks of gestation before and after the protocol change.

STUDY DESIGN: We performed a nationwide cohort study comparing outcomes of births in the years 2018 (before protocol change) and 2020 (after protocol change). Data was extracted from the national Perinatal Registry (PERINED). Women with a spontaneous PTB from 30^{+0} to 31^{+6} weeks of gestation were included. The primary outcome was a composite of mortality, severe intraventricular hemorrhage, severe necrotizing enterocolitis, cystic periventricular leukomalacia, and retinopathy of prematurity needing therapy. Secondary outcomes included additional neonatal outcomes.

RESULTS: We included 521 women with PTB. There was no significant difference in composite neonatal outcome of births in 2018 compared to 2020 (8.4% (18/215) vs 8.2% (25/306) respectively, Odds Ratio (OR) 0.97 (95% Confidence Interval (CI) 0.52-1.83)). No difference was found when analyzing the groups as singletons (7.1% (12/170) vs 9.3% (19/204), OR 1.35 (95% CI 0.64-2.9)), and multiples (13.3% (6/45) vs 5.9% (6/102), OR 0.41 (95% CI 0.12-1.3)).

CONCLUSION: We found no significant difference in composite neonatal outcome in pregnancies resulting in spontaneous PTB between 30 and 32 weeks of gestation in 2018 (with tocolysis) compared to 2020 (no tocolysis). These results support the adjustment to not administer tocolytic treatment in women with threatened PTB between 30 and 32 weeks of gestation.

Table: Primary composite neonatal outcome in all births.

	2018 (n=215) % (n)	2020 (n=306) % (n)	P-value	OR (CI 95%)
Composite neonatal outcome	8.4 (18)	8.2 (25)	0.93	0.97 (0.52-1.83)
Neonatal mortality	3.7 (8)	1.3 (4)	0.07	
Mortality during birth	0 (0)	0 (0)	N.A.	
Neonatal death < 7 days	2.8 (6)	0.7 (2)	0.05	
IVH > grade II	1.9 (4)	1.3 (4)	0.61	
PVL > grade I	0.9 (2)	2.6 (8)	0.17	
NEC ≥ stage II	2.8 (6)	3.9 (12)	0.49	
ROP needing therapy	0.5 (1)	0 (0)	0.23	

OR: odds ratio. CI: confidence interval. IVH: intraventricular hemorrhage. PVL: periventricular leukomalacia. NEC: necrotizing enterocolitis. ROP: retinopathy of prematurity. N.A.: Not available.

526 Bedside nurses' perspectives on the role of language barriers on postpartum pain management

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OBJECTIVE: Language barriers can adversely affect medical outcomes. However, knowledge of the role of language barriers on postpartum pain management is limited. Bedside nurses (RNs) spend significant time communicating with patients regarding pain treatment

preferences. We therefore evaluated RNs' perspectives on the role of language barriers on postpartum pain management.

STUDY DESIGN: We performed a qualitative study of postpartum bedside RNs at a tertiary academic medical center (9-12/2022). We used a semi-structured guide to facilitate in-depth interviews regarding postpartum pain management, including the role of language barriers. Purposive sampling was used to ensure inclusion of multilingual participants. Data were analyzed using the constant comparative method.

RESULTS: Of 21 participants, 33% were multilingual, with nine languages represented. Data yielded several themes related to the role of language barriers on postpartum pain assessment and management (Table). Nurses reported the significant time intensity associated with language barriers, leading some providers to forego the use of translator services, which hinders education and reduces the quality of pain management decisions. Participants also noted increased reliance on non-verbal cues in evaluating pain for non-English speaking patients. Even use of translator-mediated conversations were felt to be more limited in their ability to convey empathy and facilitate a connection with patients. Participants perceived non-English speaking patients to be more hesitant to fully express their pain or to ask for pain medications due to guilt regarding inconvenience and time intensity of translator services. Adverse effects of language barriers were particularly noted by multilingual RNs, who shared how communicating in a patient's preferred language helped bridge gaps.

CONCLUSION: Language barriers can hinder accurate pain assessment and may contribute to disparities in postpartum pain management. Increased accessibility to and enhanced quality of interpreter services may improve pain control in this population and promote equitable pain management.

Table. Nurses' perspectives on the role of language barriers on postpartum pain assessment and management

Theme	Exemplary quotation
Time intensity for providers	Yeah. Let's say we have five moms and five babies we don't necessarily have time to go into a room for 30 minutes and speak with an interpreter…then you can't really properly assess the patient's pain by asking a Spanish-speaking patient dolor, uno, dos, tres [pain, one, two, three]. And sometimes that's what ends up happening.
Inadequate patient education	A young girl, Spanish speaking…probably had poor discharge and poor follow-up because she didn't speak English and the nurse I'm sure was probably just like here's your medication, here's your discharge papers, good luck, congratulations…so on our end maybe there just wasn't a lot of follow-up on teaching or what to do.
Language barriers affect pain management decisions	I can't connect to an interpreter right now, I'm just gonna continue bringing them their oxy every four hours to keep their pain under control so they're not sitting there in pain and then I think the other side of it is it's night shift…they're not calling out telling me they're in pain, so I'm just not gonna ask them.
Reliance on nonverbal cues	So you usually can just go to the room and know by their face that she has more pain than what she's saying…does she have an idea of what 0 to 10 is? Does she want to tell you how much pain she's going through?…So such a person you need to round on that person more just to kind of catch the pain level at the right time because it's always facial to me. It's all mostly facial.
Translator-mediated conversations are more limited	Having to use a translator it's a lot harder to show your empathy to a patient if they're in pain through a translator…You have to stop every chunk of words…it's a little bit harder to understand what they're feeling.
Guilt regarding perceived inconvenience of translator use	It's just such a process and I know the patients they always feel bad when they feel like we need to use an interpreter because it takes so much more time. I think a lot of times those patients withhold some of their pain, like telling us, because they feel bad.

527 Differences in LDASA initiation for preeclampsia prevention in at-risk pregnancies between White and non-White patients

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OBJECTIVE: The Society for Maternal Fetal Medicine (SMFM) and the US Preventive Services Task Force recommend low-dose aspirin (LDASA) for preeclampsia (PEC) risk reduction in at-risk pregnancies. Current evidence suggests inconsistent prescribing practices for at risk patients. SMFM developed a checklist to make these practices more uniform. We sought to understand if LDASA prescribing practices for at risk patients differed between White and non-White patients at our institution.

STUDY DESIGN: We launched a PEC risk screen and LDASA eligibility smart-phrase modeled after SMFM checklist within the electronic medical record for use by all prenatal care providers. A retrospective chart review was performed to identify all patients who would be candidates for LDASA during their pregnancy between December 2022 and May 2023 to assess differences in prescribing practices by patient self-identified race.

RESULTS: 714 LDASA eligible patients with documented self-identified race were identified. Overall, 57.8% (413/714) were prescribed LDASA. 12.9% (92/714) self-identified as Asian, with 58.7% (54/92) prescribed LDASA. 21.6% (154/714) as Black, with 41.6% (64/154) prescribed LDASA. 28.6% (204/714) as Hispanic, with 68.1% (139/204) prescribed LDASA. 2.1% (21/714) identified as Multiracial, with 57.1% (12/21) prescribed LDASA. 34% (243/714) identified as White, with 59.3% (144/243) prescribed LDASA. Logistic regression was used to analyze the relationship between patient race and LDASA use. Black patients were 52% ($P < .001$) less likely than White patients to be given LDASA (OR 0.489, 95% CI [.32 - .73]). Though not statistically significant, Hispanic patients were 47% ($P=0.53$) more likely than White patients to be given LDASA (OR 1.47, 95% CI [.995 - 2.17]). No statistical difference in LDASA use was found between White patients, Asian and Multiracial patients.

CONCLUSION: Over 40% of patients with known risk factors for PEC were not prescribed LDASA during pregnancy. Black patients were less likely to be prescribed LDASA than White patients. Further work is needed to improve disparities in LDASA prescribing practices.

LDASA Prescription by Self-Identified Race

			LDASA Prescription		
			No	Yes	Total
Race	Asian	Count	38	54	92
		% taking LDA	41.3%	58.7%	100.0%
		% of Total			12.9%
	Black	Count	90	64	154
		% taking LDA	58.4%	41.6%	100.0%
		% of Total			21.6%
	Hispanic	Count	65	139	204
		% taking LDA	31.9%	68.1%	100.0%
		% of Total			28.6%
	Multiracial	Count	9	12	21
		% taking LDA	42.9%	57.1%	100.0%
		% of Total			2.9%
	White	Count	99	144	243
		% taking LDA	40.7%	59.3%	100.0%
		% of Total			34.0%
	Total	Count	301	413	714
		% of Total	42.2%	57.8%	100.0%

LDASA prescription compared to White patients

		Regression Coefficient	S.E.	P-value	Odds Ratio (95% CI)
Race	Asian	-.023	.249	.925	.977 (0.600,1.591)
	Black	-.716	.209	<.001	.489 (0.324, 0.737)
	Hispanic	.385	.199	.053	1.470 (0.995, 2.172)
	Multiracial	-.087	.460	.850	.917 (0.372, 2.258)

528 Association of antenatal anxiety, short sleep duration, and blood pressure parameters: a pilot study

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OBJECTIVE: Anxiety and short sleep are individually associated with hypertensive disorders of pregnancy, yet their interactive effect on specific blood pressure (BP) parameters are unknown. We evaluated the association between anxiety and BP, and the moderating effect of short sleep duration.

STUDY DESIGN: We conducted a prospective pilot study of pregnant people between 16 to 36 weeks' gestation between 2021-22. Anxiety was defined as State Trait Anxiety Inventory-State (STAI-S) score $\geq$ 40, and short sleep duration was defined as average sleep duration of $<$ 5 hours per day obtained over 3 to 7 days from a wrist-worn actigraphy device. Primary outcomes were systolic (SBP), diastolic (DBP), and mean (MAP) non-invasive BP measurements from enrollment. Generalized estimating equations (GEE) were used to first assess anxiety (independent variable) and each BP parameter (dependent variables), accounting for age, body mass index, and antihypertensive medications (Model 1). These models were then repeated including short sleep and an interaction term for short sleep and anxiety as covariates (Model 2).

RESULTS: Of 60 participants, 15 (25%) screened positive for anxiety and 36 (61%) had short sleep duration. In Model 1, anxiety was not significantly associated with any BP parameters. When short sleep was included in Model 2, all BP parameters were significantly associated with anxiety (SBP: beta 9.6, p=0.01, DBP: beta 8.1, p $<$ 0.001, and MAP: beta 8.8, p $<$ 0.001). No further significant statistical interaction was detected between short sleep duration and anxiety on BP (p-interaction SBP 0.12, DBP 0.24, and MAP 0.13) (Table 1).

CONCLUSION: Pregnant people with anxiety had 9.6 mmHg higher systolic, 8.1 mmHg higher diastolic, and 8.8 mmHg higher mean BPs than people without anxiety accounting for short sleep duration. Short sleep duration strengthened the association between anxiety and BP in this prospective cohort.

Table 1. Generalized estimating equations (GEE) assessing effect of anxiety on blood pressure parameters.

	Model 1 Beta coefficient (95% CI) for effect of anxiety on blood pressure parameter	P-value	Model 2 Beta coefficient (95% CI) for effect of anxiety on blood pressure parameter	P-value
Systolic blood pressure	2.0 (-4.2, 8.2)	0.52	9.6 (1.9, 17.4)	0.01
Diastolic blood pressure	4.9 (-0.3, 10.1)	0.07	8.1 (4.2, 12.0)	<0.001
Mean arterial pressure	3.9 (-1.2, 9.1)	0.13	8.8 (4.3, 13.4)	<0.001

*Model 1 includes anxiety, age, body mass index, antihypertensives
** Model 2 includes anxiety, short sleep, age, body mass index, antihypertensives

529 Association between method of conception of DCDA twin pregnancies and hypertensive disorders of pregnancy

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OBJECTIVE: Twin pregnancy is a known risk factor for hypertensive disease of pregnancy (HDP). Conception via In vitro fertilization (IVF) has been associated with HDP. However, current data on risk of HDP development in twin pregnancies conceived via IVF is limited and conflicting. We aim to investigate whether conception of dichorionic diamniotic (DCDA) twins via IVF is associated with increased odds of HDP compared to DCDA pregnancies conceived spontaneously, via intrauterine insemination (IUI) or ovulation induction (OI).

STUDY DESIGN: Retrospective cohort of DCDA twins delivered at Mount Sinai Hospital from 2008-2022. Primary outcome was HDP (gestational hypertension and preeclampsia [PEC]) defined by ACOG criteria. Secondary outcomes included mode of delivery, birthweight, gestational age at delivery, and NICU admission. Outcomes were compared between DCDA pregnancies conceived via IVF and those conceived spontaneously/IUI/OI. Univariable and multivariable regression analyses were performed.

RESULTS: Of 657 DCDA pregnancies included in this study, 265 (40.3%) were conceived via IVF and 392 (59.7%) were conceived spontaneously/IUI/OI. There was no significant difference in HDP among DCDA pregnancies conceived via IVF compared to spontaneous/IUI/OI conception (p=0.56). Patients who conceived via IVF were more likely to be nulliparous, older, have lower BMI, and commercial insurance, compared to patients who conceived spontaneously/IUI/OI (all p$<$ 0.0001). Adjusting for known risk factors of HDP, IVF DCDA pregnancies were at 2.03 increased odds of PEC without severe features compared to spontaneous/IUI/OI DCDA pregnancies (Table 1). Secondary outcomes showed IVF DCDA pregnancies were more likely to be delivered by Cesarean delivery

(p=0.0001) and were more likely to have lower birth weight (p=0.03) compared to spontaneous/IUI/OI pregnancies.

CONCLUSION: Conception of DCDA twins via IVF does not appear to be associated with an increase in HDP compared to DCDA twins conceived spontaneously/IUI/OI. While IVF DCDA twins may be at increased odds of developing PEC without severe features, larger studies are needed.

Table 1: Univariable and Multivariable Logistic Regression Analyses on Hypertensive Diseases of Pregnancy

Outcome variable	Factor	Crude*		Adjusted**	
		Odds Ratio (95% CI)	P value	Odds Ratio (95% CI)	P value
All hypertensive diseases of pregnancy (PIH)	IVF vs. Spontaneous/IUI/Clomid	1.11 (0.79-1.55)	0.56	1.11 (0.58-2.14)	0.75
Gestational hypertension	IVF vs. Spontaneous/IUI/Clomid	1.06 (0.70-1.62)	0.78	1.34 (0.59-3.02)	0.49
Preeclampsia w/o severe features	IVF vs. Spontaneous/IUI/Clomid	2.03 (1.04-3.96)	0.04	2.65 (1.28-5.50)	0.009
Preeclampsia w/ severe features	IVF vs. Spontaneous/IUI/Clomid	1.14 (0.76-1.72)	0.52	0.78 (0.35-1.74)	0.54

*Non-adjusted odds ratio estimated with the use of a simple logistic regression model.
** The outcomes of all hypertensive diseases of pregnancy, gestational hypertension, and preeclampsia w/ severe features were adjusted for age, BMI at admission, insurance, nulliparity, history of chronic hypertension or pre-gestational diabetes, and preeclampsia/gHTN in prior pregnancy. The outcome of preeclampsia w/o severe features was adjusted for BMI at admission and nulliparity.

530 Comparison of the normal mid-trimester cervical length between singleton and twin gestations

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OBJECTIVE: Limited information exists in the literature establishing a normal cervical length (CL) among asymptomatic twin pregnancies in the mid-trimester. It is unclear if the same standard normal values should be used in twins as is used for singletons. We aim to compare these two populations.

STUDY DESIGN: This is a retrospective cohort study at an academic medical center reviewing all pregnancies over a 5-year period where mid-trimester transvaginal CL data between 15-28 weeks were available among asymptomatic twin gestations. All CLs were performed by Registered Diagnostic Medical Sonographers at a single site. Previous literature has described the mean mid-trimester CL among singleton gestations to be 39.2±6.0mm, with the 10th percentile between 16-22 weeks and 22-24 weeks in singleton gestations described as less than 30mm and 25mm, respectively. In our twin cohort, the mean CL between 19 weeks through 20 weeks and 6 days, as well as the 10th percentile at 16-22 weeks and 22-24 weeks was calculated. Following a D'Agostino-Pearson normality test, these values were compared to the corresponding values in singletons using paired t-tests. Subgroup analyses were performed for those who delivered preterm and term and compared to all-comers above using ANOVA.

RESULTS: 179 twin gestations with at least one documented mid-trimester CL were analyzed. The mean CL among asymptomatic twin gestations between 19 weeks through 20 weeks and 6 days was 40.1±0.8mm, compared to the mean of 39.2±6.0mm among singletons (p< 0.001). There was no difference among those who delivered term and preterm, with values of 40.2±0.8mm and 40.1±0.8mm, respectively (p=0.999). The 10th percentile CL at 16 weeks through 21 weeks and 6 days and 22 weeks through 23 weeks and 6 days among asymptomatic twins was 32mm (n=275) and 25mm (n=193), respectively.

CONCLUSION: The thresholds for a normal mid-trimester CL among asymptomatic patients is similar between singleton and twin gestations.

531 Establishing risk thresholds for asymptomatic cervical lengths in twin pregnancies

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OBJECTIVE: In singleton gestations, a mid-trimester cervical length (CL) < 25mm (< 10th percentile) is a risk factor for spontaneous preterm birth (sPTB). This threshold unlocks interventions to reduce this risk. Currently, the same threshold is used to trigger interventions for twin gestations, however there is a paucity of data to guide whether the same CL thresholds should be used in twin gestations. We aim to determine a CL threshold of concern for sPTB among twins, as well as the optimal time for transvaginal assessment.

STUDY DESIGN: This is a retrospective cohort study at an academic medical center reviewing all twin pregnancies over a 5-year period where an asymptomatic mid-trimester transvaginal CL was available. All CL were performed by Registered Diagnostic Medical Sonographers at a single site. The mean CL was calculated at various points between 15-28 weeks' gestation among patients who had a sPTB (defined as preterm labor or PPROM leading to sPTB before 37 weeks) and patients who did not have a sPTB. T-tests compared the means at each time point to determine if there was a gestational age among patients with sPTB where there was a deviation in mean CL.

RESULTS: 179 twin gestations with at least one documented asymptomatic mid-trimester CL were available. Table 1 shows the mean CL at various gestational ages for all patients, those with a sPTB, and those without a sPTB. Differences in CL are noted beginning at 23 weeks and are most pronounced between 26 and 28 weeks with the mean CL in the sPTB group being 29.7±11.6mm compared to 36.8±10.3mm in those without sPTB (p=0.004). Importantly, the mean CL among twin gestations with a sPTB remained above the 25mm risk threshold, and often above 30mm prior to 26 weeks.

CONCLUSION: In twin pregnancies, a higher CL threshold may be considered when determining those at higher risk of sPTB. Larger studies are needed to validate these findings, which may lead to consideration of interventions to prevent sPTB in twin pregnancies at a longer CL. Additionally, there may be limited value for CL as a risk assessment before 21 weeks in twins.

Table 1. Cervical Lengths at Various Gestational Ages Among Twin Pregnancies.

Gestational Age Range (weeks)	CL Among Patients with SPTB (millimeters)	CL Among Patients without SPTB (millimeters)	p-value	CL Among All Patients (millimeters)
15w0d – 16w6d	42.6 ± 7.26 (n=22)	40.9 ± 6.50 (n=49)	0.352	41.4 ± 6.74 (n=71)
17w0d – 18w6d	40.1 ± 7.50 (n=28)	40.5 ± 8.86 (n=64)	0.825	40.4 ± 8.43 (n=92)
19w0d – 20w6d	40.1 ± 7.75 (n=38)	40.2 ± 7.80 (n=74)	0.949	40.1 ± 7.75 (n=112)
21w0d – 22w6d	38.4 ± 9.38 (n=39)	39.2 ± 8.30 (n=80)	0.652	39.0 ± 8.63 (n=119)
23w0d – 23w6d	30.4 ± 13.1 (n=21)	38.3 ± 9.59 (n=51)	**0.018***	36.0 ± 11.2 (n=73)
24w0d – 25w6d	33.7 ± 11.9 (n=43)	38.4 ± 8.42 (n=88)	**0.023***	36.8 ± 9.99 (n=131)
26w0d – 28w0d	29.7 ± 11.6 (n=32)	36.8 ± 10.3 (n=75)	**0.004***	34.6 ± 11.1 (n=106)

*Continuous data is represented as mean ± standard deviation. *P-value <0.05 was deemed statistically significant.*

532 Effect of Low-Dose Aspirin on Preterm Prelabor Rupture of Membranes in Low-Risk Nulliparous Women

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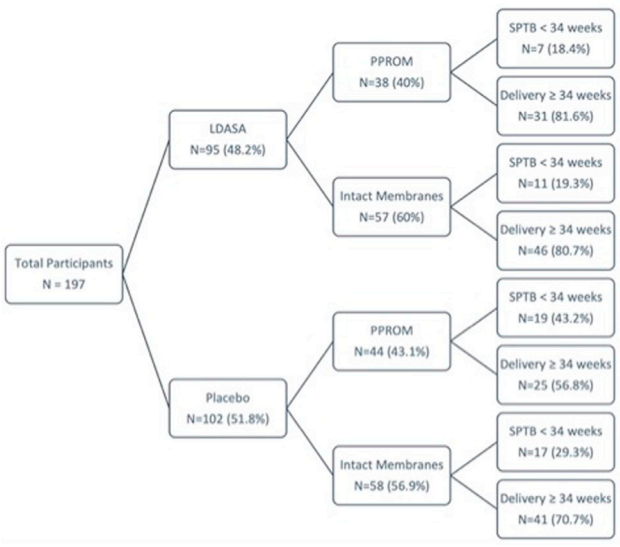
OBJECTIVE: We previously showed that low-dose aspirin (LDASA) is associated with a reduction in spontaneous preterm birth < 34 weeks (SPTB34) (Andrikopoulou, Gyamfi-Bannerman, et al. AJOG 2018), likely by an anti-inflammatory mechanism. Inflammation likely plays a role in preterm prelabor rupture of membranes (PPROM). Our objective was to determine whether a reduction in PPROM drove the decrease in SPTB.

STUDY DESIGN: This was a secondary analysis of a randomized controlled trial of LDASA for the prevention of preeclampsia in low-risk, nulliparous women. Low risk was defined by the absence of medical complications, including hypertension, renal disease, and diabetes. We included non-anomalous singleton gestations that delivered preterm, and rates of PPROM vs. preterm labor (PTL) with intact membranes were compared by LDASA exposure. Logistic regression was performed to control for clinically relevant confounders. We then performed sensitivity analyses to evaluate the rates of SPTB34 in PPROM vs. PTL with intact membranes by LDASA exposure.

RESULTS: 197 subjects were included (Figure 1). Of those, 95 (48.2%) received LDASA and 102 (51.8%) received placebo. There were no significant differences in baseline characteristics between the two groups. The rate of PPROM was similar in the LDASA and placebo groups (40.0% vs. 43.1%, respectively; p=0.66). This finding held true when adjusting for confounders (aOR 0.87; p=0.65). Limiting the analysis to those with PPROM, the median gestational age at delivery was similar in both groups, 35 weeks (IQR 34, 36) in the LDASA group and 34 weeks (IQR 32, 36) in the placebo group (p=0.62). The rate of SPTB34 was significantly lower in the LDASA group (18.4% vs. 43.2%; p=0.02). When assessing only those with PTL/intact membranes, the difference in SPTB34 was not significant (19.3% vs. 29.3%, p=0.21).

CONCLUSION: Administration of LDASA does not reduce the rate of PPROM overall, but SPTB34 by PPROM was less frequent in the LDASA group compared to placebo. A larger sample is needed to confirm these findings.

Figure 1: PPROM and SPTB<34 weeks by treatment group



533 Elevated 1st Trimester Environmental Temperatures May Underlie Development of Preeclampsia

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OBJECTIVE: Elevated environmental temperatures correlate with hypertension & diabetes in the nonpregnant state. Whether elevated temperature values may underlie metabolic disease development during pregnancy is unclear. We investigated if elevated 1st trimester (Tri1) or 2nd trimester (Tri2) maximum (Tmax), minimum (Tmin), average (Tavg) or ambient (AT) temperatures were associated with the development of preeclampsia(PRE).

STUDY DESIGN: We conducted a retrospective cohort study of subjects receiving prenatal care at an urban tertiary care center from 1/2016-3/2022. Individuals diagnosed with PRE were identified with ICD-10 codes from an institutional database. Zip-code level Tri1 & Tri2 Tmax, Tmin, Tavg, & AT were derived from 1 km gridded Daymet products & reported in degrees Celsius. After testing for normality, median temperature values were compared among those with & without PRE using Wilcoxon Rank Sum tests. Categorical variables were compared using Chi Square tests. Generalized linear regression models (GLM) estimated associations between the individual exposures (Tmax/Tmin/ Tavg/AT) and outcome (PRE) while controlling for confounders.

RESULTS: Of N=14,336 subjects, 12.48% (n=1,806) were diagnosed with PRE (Table 1a). Those with PRE had a higher Tri1 Tmax*(p=0.01)*, Tmin (*p=0.01*), Tavg*(p=0.01)*, & AT*(p=0.01)* compared to those without PRE (Table 1b). Even when performing GLM models controlling for maternal age, race, parity and obesity, the associations remained: Tmax (*β=0.001,95% CI 0.00026-0.0019, P=0.01*); Tmin (*β=0.001, CI 0.0003-0.0019, P=0.006);* Tavg (*β=0.001, CI 0.0003-0.0019, P=0.008*); AT (*β=0.001, CI 0.0028-0.0017, P=0.007*). No significant differences were noted in Tri2 temperature values.

CONCLUSION: This hypothesis generating line of inquiry noted higher environmental temperatures in early pregnancy associated with the development of PRE. It is imperative for future studies to investigate the mechanistic underpinnings connecting environmental temperature & gestational metabolic disease development, especially as climate change looms in our future.

Table 1 a: Demographic Data			
	PRE n= 1,806	Without PRE n=12,669	P-value
Age (years) (mean±SD)	27.04 ±6.78	27.51±6.32	**0.0005**
BMI (kg/m^2) (mean±SD)	30.43 ±8.31	29.95± 8.31	0.10
Obesity % (N)	19.21 (347)	14.18 (1,796)	**<0.05**
Race % (N)			**<0.05**
Black	77.91 (1,407)	73.83 (9,353)	
White	16.28 (294)	17.85 (2,261)	
Other	5.81 (105)	8.33 (1,055)	
Parity % (N)			**<0.05**
Nulliparity	63.51 (1,147)	76.78 (9,727)	
Multiparity	36.49 (659)	23.22 (2,942)	
Table 1b: Temperature Values: *Median [IQR]*			
Tri1 Tmax	23.97°C [17.04-29.97°C]	23.19°C [16.78-29.4°C]	**0.01**
Tri1 Tmin	11.38°C [5.25-18.56°C]	10.48°C [5.05-17.78°C]	**0.01**
Tri1 Tavg	17.73°C [11.13-24.3 °C]	16.85°C [10.93- 23.63°C]	**0.01**
Tri1 AT	18.21°C [11.03-25.8°C]	17.15°C [10.82-25.03°C]	**0.01**
Tri 2 Tmax	24.98°C [18.61-29.67°C]	24.52°C [18.27-29.76°C]	0.34
Tri2 Tmin	12.60°C [6.47-18.29°C]	12.07°C [5.94-18.32°C]	0.19
Tri2 Tavg	18.83°C [12.44-23.97°C]	18.28°C [11.92-18.28°C]	0.26
Tri 2 AT	19.43°C [12.37 -19.43°C]	18.82°C [11.85-25.58°C]	0.23

PRE: Preeclampsia
Tri1: 1st Trimester
Tri2: 2nd Trimester
Tmin: Minimum temperature
Tmax: Maximum Temperature
Tavg: Average Temperature
AT: Ambient Temperature

534 Comparison of Obstetrical Randomized Controlled Trials During and Peri-Pregnancy

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OBJECTIVE: Recent attention has focused on the preconception and postpartum periods as important areas for improving perinatal outcomes. This study aimed to examine characteristics of obstetrical randomized controlled trials (RCTs) based on timing of intervention.

STUDY DESIGN: All obstetrical RCTs published in seven journals (NEJM/JAMA/Lancet, AJOG/Obstetrics & Gynecology/BJOG/AJOG MFM) from 2017-22 were collected and analyzed. Studies were categorized based on the time period (antepartum/intrapartum or preconception/postpartum) that the primary intervention was applied. Data was analyzed using Fisher's exact and Wilcoxon rank-sum test. P-value of < 0.05 was considered to be statistically significant.

RESULTS: Of the 247 RCTs, only 35 (14.2%) focused on preconception or postpartum time period. While the preconception and postpartum RCTs were mostly single-center studies (84.9%) in the US (70.6%), antepartum and intrapartum RCTs were more often multicenter studies (52.4%) performed in the US *and* other countries (56.7%$p< 0.003$). Preconception or postpartum studies were more likely to involve a drug intervention compared with studies performed in the ante/intrapartum period (44.1% vs 35.1%, $P < 0.01$). Preconception or postpartum studies were far more likely than antenatal studies to benefit the mother alone vs benefiting the fetus/newborn or both (91.2% vs 44.6%, $p< 0.001$).

CONCLUSION: The majority of obstetrical RCTs published in the 7 journals from 2017-22 were focused on interventions in the antepartum/intrapartum period versus the preconception/postpartum period. RCTs focusing on the preconception/postpartum period are lacking, and of the published studies the majority had small sample sizes and were performed at a single institution. There is a need for more large, multi-center obstetrical RCTs with interventions in the preconception or postpartum period.

Table 1: Timing of Intervention

	Ante/intrapartum N =212	Pre/postpartum N =35	P
Journals – N (%)			**0.04**
NEJM/JAMA/Lancet	45 (21.2)	2 (5.7)	
AJOG/Obstet Gynecol/BJOG/AJOG MFM	167 (78.8)	33 (94.3)	
Centers – N (%)			**<0.001**
Single	99 (47.6)	28 (84.9)	
Multiple	109 (52.4)	5 (15.1)	
Country – N (%)			**0.003**
USA--Alone	86 (41.0)	24 (70.6)	
USA and Other Countries	119 (56.7)	9 (26.5)	
Other Countries	5 (2.4)	1 (2.9)	
Sample Size	271 (124-870)	165 (96-241)	**0.002**
Length of Study (months)	27.4 (16.2-42)	13.7 (7.1-22.4)	**0.0004**
Intervention Type – N (%)			**0.01**
Drug	74 (35.1)	15 (44.1)	
Behavior	38 (18.0)	9 (26.5)	
Procedure	40 (19.0)	0	
Device	38 (18.0)	4 (11.8)	
Other	21 (9.9)	6 (17.7)	
Positive Trial -N (%)	60 (30.0)	13 (38.2)	0.42
Purpose -N (%)			0.57
Preventative	115 (54.5)	19 (55.9)	
Treatment	75 (35.6)	10 (29.4)	
Other	21 (9.9)	5 (14.7)	
Beneficiary – N (%)			**<0.001**
Mother	94 (44.6)	31 (91.2)	
Fetus/ Neonate	66 (31.3)	0	
Both	49 (23.2)	3 (8.8)	
Other	2 (0.9)	0	

535 Comparison of Obstetrical Randomized Controlled Trials That Target Maternal or Fetal/Neonatal Benefit

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OBJECTIVE: Obstetrical research is often both physiologically and ethically complex. Maternal and fetal interests may diverge, particularly in the research setting. This study aimed to evaluate the characteristics of randomized controlled trials (RCTs) focused on maternal versus fetal / neonatal outcomes.

STUDY DESIGN: Obstetrical articles published in seven journals (NEJM/JAMA/Lancet, AJOG/Obstetrics & Gynecology/BJOG/AJOG MFM) from 2017-22 were analyzed. Studies were classified as investigating either maternal or fetal/neonatal benefit based on the documented primary study objective. Data was analyzed using Fisher's test and Wilcoxon rank-sum test. P-value of < 0.05 was considered to be statistically significant.

RESULTS: Of 248 RCTs, 191 examined solely maternal (125, 65%) or solely neonatal/fetal (66, 34.6%) outcomes in the primary objective. Interventions for fetal/neonatal benefit were more often international (80.3% vs 47.1%, $p< 0.001$), multi-center (68.2% vs 40.0%, $p< 0.001$), and published in non-obstetrical journals (39.4% vs 12.8%, $p< 0.001$). Fetal/Neonatal benefit trials examined preventative measures more often than treatment (75.8% vs 56.0%, $p< 0.001$) and occurred most commonly in the antepartum (versus intrapartum) setting (71.2% v 28.8%, $p< 0.001$). Studies with maternal benefit as the primary outcome were smaller (200 [90-504] vs 476 (200-1600), $p< 0.001$) and carried out over a shorter time period (22.3 (11.2-36.0)mo vs 36.0 (21.4-47.7)mo, $p< 0.001$). There was no difference between the cohorts in the type of intervention or whether the trials demonstrated a positive result.

CONCLUSION: While the majority of obstetrical RCTs focused on maternal benefit as the primary outcome, fetal/neonatal oriented trials were larger and more likely to focus on prevention of disease in the antepartum period. Our results may inform investigators, and policy makers regarding trends and gaps in the obstetrical research completed over the past 5 years.

Table 1: Primary Beneficiary of the Primary Outcome in Obstetrical Randomized Controlled Trials

	Maternal N =125	Fetal/Neonatal N =66	P
Journals – N (%)			**<0.001**
NEJM/JAMA/Lancet	16 (12.8)	26 (39.4)	
AJOG/Obstet Gynecol/BJOG/AJOG MFM	109 (87.2)	40 (60.6)	
Centers – N (%)			**<0.001**
Single	72 (60.0)	21 (31.8)	
Multiple	48 (40.0)	45 (68.2)	
Country – N (%)			**<0.001**
USA--Alone	65 (52.9)	13 (19.7)	
USA and Other Countries	57 (46.3)	48 (72.7)	
Other Countries	1 (0.8)	5 (7.6)	
Sample Size	200 (90-504)	476 (200-1600)	**<0.001**
Length of Study (months)	22.3 (11.2-36.0)	36.0 (21.4-47.7)	**<0.001**
Time of Intervention- N(%)			**<0.001**
Preconception	2 (1.6)	0	
Antepartum	36 (28.8)	47 (71.2)	
Intrapartum	58 (46.4)	19 (28.8)	
Postpartum	29 (23.2)	0	
Intervention Type – N (%)			0.91
Drug	47 (37.6)	24 (36.4)	
Behavior	27 (21.6)	12 (18.2)	
Procedure	19 (15.2)	10 (15.1)	
Device	18 (14.4)	13 (19.7)	
Other	14 (11.2)	7 (10.6)	
Positive Trial -N (%)	43 (35.3)	14 (22.6)	0.09
Purpose -N (%)			**0.02**
Preventative	70 (56.0)	50 (75.8)	
Treatment	44 (35.2)	12 (18.2)	
Other	11 (8.8)	4 (6.0)	

536 Betamethasone Exposure Among Term Newborns Following Recommendation for Late Preterm Antenatal Corticosteroids

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OBJECTIVE: Since the Antenatal Betamethasone for Women at Risk for Late Preterm Delivery (ALPS) Trial, antenatal corticosteroids (ACS) have become standard of care for patients at risk of late preterm delivery. Emerging data suggest term newborns exposed to preterm ACS are at increased risk of adverse outcomes. We aim to compare betamethasone exposure among term newborns before and after implementation of late preterm ACS.

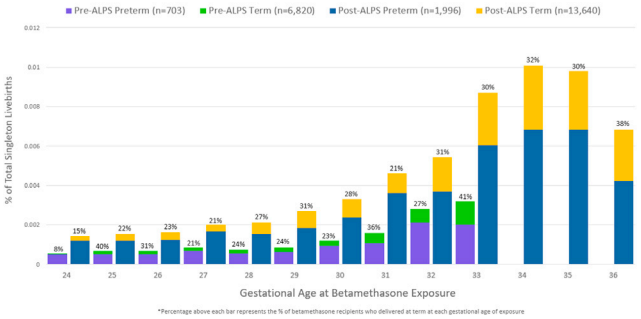
STUDY DESIGN: We conducted a cohort study of singleton live born term deliveries within a regional hospital system between 1/2013-3/2019. Deliveries were classified as pre- and post-ALPS, matched 1:2 in sequential fashion. Pre-ALPS deliveries occurred between 1/2013-4/2016; post-ALPS deliveries occurred between 4/2017-3/2019 with a 1-year post-publication washout. Exclusions were dexamethasone recipients and missing delivery data. The primary outcome was

betamethasone exposure among term newborns. Secondary outcomes included neonatal intensive care unit (NICU) admission and small for gestational age (SGA). Analyses were performed with student's T test and chi-square test.

RESULTS: Among 20,460 term deliveries, 6,820 were pre-ALPS and 13,640 were post-ALPS. Baseline characteristics were similar. Post-ALPS term neonates had increased exposure to betamethasone compared to pre-ALPS infants (3.1% versus 1.2%, OR 2.6, 95% CI 2.0-3.3). The percentage of pregnancies exposed to betamethasone that subsequently delivered at term increased with advancing gestational age at administration (figure). Among term-born neonates, 315 received ACS before 34 weeks, 190 after 34 weeks and 19,938 were ACS unexposed. SGA was most common in the ACS < 34 week group (11.4%) followed by the ≥ 34 week group (11.0%) and then unexposed neonates (6.1%, p< 0.001). Similarly, NICU admission was highest among < 34 week infants followed by late preterm ACS and unexposed, respectively (6.0% vs 4.7% vs 2.6%, p< 0.01).

CONCLUSION: Implementation of late preterm ACS correlated with substantially increased risk for betamethasone exposure among term-born neonates, potentially increasing both short- and long-term morbidity.

Figure: Betamethasone Exposure by Gestational Age Among Term versus Preterm Deliveries



537 Fetal growth restriction diagnosed at anatomy ultrasound is associated with an increased risk of stillbirth

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OBJECTIVE: Although fetal growth restriction (FGR) is associated with an increased risk of stillbirth, the data are limited regarding the stillbirth risk for FGR diagnosed in early second trimester. We aimed to determine the association between FGR diagnosed at anatomy ultrasound and risk of stillbirth.

STUDY DESIGN: We conducted a retrospective cohort study of singleton pregnancies delivered between 2017 to 2022 who had both a first trimester dating ultrasound and an anatomy ultrasound between 18 0/7 and 23 6/7 weeks. Cases with known major structural or genetic abnormality or congenital infection were excluded. FGR was defined as estimated fetal weight (EFW) or abdominal circumference (AC) below the 10th percentile for gestational age. Primary outcome was occurrence of stillbirth. Patient characteristics were compared, and logistic regression models were performed to estimate adjusted odds ratios (aORs) for stillbirth accounting for demographic factors and maternal medical conditions.

RESULTS: Of the 6871 patients that met the inclusion criteria, 197 (2.9%) were diagnosed with FGR at the anatomy ultrasound. Patients in the FGR group were more likely to be Black or Asian, younger, and delivered at an earlier gestational age when compared to those without FGR. Fewer male fetuses were reported in the FGR group (38.1% vs 50.6%, p=0.001). There were no significant differences in rates of chronic hypertension, hypertensive diseases of pregnancy, diabetes, obesity, autoimmune disease, or COVID-19 during pregnancy between the two groups (Table 1). The rate of stillbirth was higher in the FGR at anatomy ultrasound group (3.6% vs 0.7%, aOR 5.18 (95%Cl 2.31-11.64)) with stillbirth diagnosed at an earlier gestational age (22.4 weeks vs 29.2 weeks, OR 0.88, 95% CI 0.75-1.03) compared with the no FGR group.

CONCLUSION: Diagnosis of FGR in fetuses without known structural or genetic abnormality at anatomy ultrasound was independently associated with an increased risk of stillbirth.

Table 1. Patient characteristics

Characteristics	FGR at anatomy (n=197)	No FGR at anatomy (n=6,674)	OR, 95% CI
Age, years	29.0±5.8	30.5±5.6 [6,671]	0.96 (0.93-0.98)
Race			
White	43 (21.9%) [196]	2,669 (40.1%) [6,658]	Referent
Black	95 (48.5%) [196]	2,477 (37.2%) [6,658]	2.38 (1.65-3.43)
Asian	42 (21.4%) [196]	775 (11.6%) [6,658]	3.63 (2.18-5.18)
Other	16 (8.2%) [196]	737 (11.1%) [6,658]	1.35 (0.75-2.41)
Chronic hypertension	46 (32.6%) [141]	1,326 (27.8%) [4,769]	1.26 (0.88-1.80)
HDP	29 (16.0%) [181]	839 (13.4%) [6,254]	1.23 (0.82-1.84)
Diabetes in pregnancy	29 (20.6%) [141]	784 (16.4%) [4,771]	1.32 (0.87-2.00)
Pregestational DM	6 (20.7%) [29]	133 (17.3%) [768]	Referent
GDMA1	12 (41.4%) [29]	312 (40.6%) [768]	0.85 (0.31-2.32)
GDMA2	11 (37.9%) [29]	323 (42.1%) [768]	0.75 (0.27-2.08)
BMI	31.5±6.9 [193]	32.4±7.1 [6,585]	0.98 (0.96-1.00)
Autoimmune disease	2 (1.4%) [141]	165 (3.5%) [4,772]	0.40 (0.10-1.64)
COVID-19 in pregnancy	9 (13.6%) [66]	472 (12.6%) [3,762]	1.10 (0.54-2.24)
GA at delivery*	37.5±3.8	38.7±2.1 [6,671]	0.87 (0.84-0.90)
Male neonatal sex	75 (38.1%)	3,377 (50.6%)	0.60 (0.45-0.80)
Stillbirth	7 (3.6%)	48 (0.7%)	5.01 (2.23-11.26)*
GA at stillbirth	22.4 (22.3, 26.3)	29.2 (25, 35)	0.88 (0.75-1.03)
GA ≤24 weeks	5 (71.4%)	9 (18.8%)	10.83 (1.80-65.07)
GA ≤28 weeks	6 (85.7%)	23 (47.9%)	6.52 (0.73-58.36)
GA ≤32 weeks	6 (85.7%)	30 (62.5%)	3.6 (0.40-32.37)

Data presented as mean±standard deviation, N(%) [N, if missing], or median (interquartile range)
*adjusted for maternal age

538 Cardiac structural and functional assessment of monochorionic twin pregnancies complicated by selective fetal growth restriction

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OBJECTIVE: Selective fetal growth restriction (sFGR) complicates 10-15% of monochorionic twin gestations. Prior studies reported neonatal cardiac hypertrophy present in 25% of twins impacted by sFGR, most commonly the larger twin (AGA, 80%). Our primary objective was to characterize fetal cardiac structural and functional echocardiogram findings in these complex twins pairs.

STUDY DESIGN: A retrospective cohort analysis was performed of monochorionic twin pregnancies complicated by sFGR managed and delivered at a single tertiary center from 2015-2023. Patients undergoing laser treatment were excluded. All twin pairs underwent fetal echocardiogram by board-certified pediatric cardiologists at our center. Clinically relevant data was obtained from electronic medical records. Right and left myocardial performance index (MPI) were calculated incorporating ejection, isovolumetric contraction and isovolumetric relations times.

RESULTS: During the study period, 34 pairs of monochorionic twins were managed by our team. 2 patients were excluded as they did not undergo fetal echocardiograms as planned. The remaining 32 twin pairs underwent echocardiogram analysis at 20 weeks ± 6 days on average. Compared to the sFGR fetuses, AGA fetuses were more likely to have tricuspid regurgitation (TR, 38 vs 9%, p=0.02), right ventricular hypertrophy (RVH, 44 vs 9%, p=0.003), left ventricular hypertrophy (31 vs 3%, p=0.006), elevated right MPI (0.36 [0.26, 0.49] vs 0.29 [0.24, 0.35], p=0.03) and elevated left MPI (0.32 [0.29, 0.47] vs 0.29 [0.25, 0.35], p=0.02). No difference was noted in cardiac output (534 [483, 596] vs 522mL/min [447, 596], p=0.41). At birth, 40% (6/15) of AGA fetuses with abnormal fetal echocardiograms, had RVH and TR compared to 25% (1/4) of sFGR fetuses.

CONCLUSION: In this cohort of expectantly managed monochorionic twins complicated by sFGR, AGA twins were noted to have findings consistent with hemodynamic changes which could reflect cardiac overload in the perinatal period. Further assessment of neonatal and pediatric outcomes is needed to determine the long-term implications of these sonographic findings.

Table 1. Echocardiography findings

Factor	sFGR fetus (n=32)	AGA fetus (n=32)	p-value
Gestational age (weeks)	20 ± 6		-
Mitral regurgitation	0 (0)	0 (0)	-
Tricuspid regurgitation	3 (9)	12 (38)	**0.02**
Pulmonary stenosis	0 (0)	0 (0)	-
RVOT obstruction	0 (0)	0 (0)	-
RV hypertrophy	3 (9)	14 (44)	**0.003**
RV dysfunction	0 (0)	3 (9)	0.24
LV hypertrophy	1 (3)	10 (31)	**0.006**
LV dysfunction	0 (0)	0 (0)	-
Combined cardiac output	522 [447, 596]	534 [483, 596]	0.41
Right MPI (mL/min)	0.29 [0.24, 0.35]	0.36 [0.26, 0.49]	**0.03**
Left MPI (mL/min)	0.29 [0.25, 0.35]	0.32 [0.29, 0.47]	**0.02**
Pericardial effusion	1 (3)	1 (3)	-

RVOT= Right Ventricular Outflow Tract, RV= Right Ventricle, LV= Left Ventricle, MPI= Myocardial Performance Index, sFGR= selective fetal growth restriction, AGA = appropriate for gestational age
Data presented as n (%), average ± standard deviation, or median [25P, 75P].
Bold = p<0.05

539 Clinical characteristics and outcomes of intrauterine blood transfusion (IUT) for infectious etiologies

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OBJECTIVE: Congenital viral infectious may result in fetal anemia and thrombocytopenia. While intrauterine blood transfusions (IUTs) are more commonly performed for Rh disease, studies have reported the utilization of IUT for this indication with varying success. Our primary objective was to characterize outcomes of patients undergoing IUT for infectious etiologies at our center compared to Rh disease.

STUDY DESIGN: This was a retrospective cohort analysis of patients who underwent IUT at our fetal center from 2012-2023. Infectious etiologies were identified by maternal serologies and confirmed by amniotic fluid PCR. Clinically relevant outcomes were obtained from electronic medical records. Statistical analysis was performed using GraphPad Prism 9.

RESULTS: During the 12-year study period, 70 patients underwent IUT at our center, 34% (24/70) for Rh disease and 17% (12/70) for infectious etiologies. The remaining causes varied and were excluded from this study. Within the infectious etiology cohort, 7/12 (58%) were for parvovirus and 5/12 (42%) for CMV. Compared to Rh disease, those with infectious etiologies were more likely to be diagnosed at earlier gestational ages (22 [20, 24] vs 25 [22, 28] weeks, p=0.04), present with hydrops (75 vs 33%, p=0.03), have lower fetal platelets (27 ±33 x10^3 vs 163 ±112 x10^3, p< 0.01) and have a fewer number of procedures (2 [1, 2] vs 5 [2, 6], p< 0.01). Perinatal death was significantly greater in cases of CMV (4/5, 80%) when compared to parvovirus (1/7, 14%) or Rh disease (5/24, 21%) (p=0.02).

CONCLUSION: Fetal infectious etiologies may be an indication for IUT, but are associated with earlier gestational age at presentation, development of hydrops and, in the case of CMV, significantly greater rates of perinatal death when compared to IUT performed for Rh disease. In contrast to Rh disease, significant fetal thrombocytopenia was noted in both CMV and parvovirus infectious, yet perinatal outcomes for CMV were significantly worse. Patients should be counseled on the various outcomes and implications by indication.

Table 1. Pre-surgical and Perinatal outcomes

Factor	Rh disease (n=24)	Infectious etiology (n=12)	p-value
Maternal age (years)	29.4 ± 6.1	27.3 ± 7.5	0.38
Gravidity	3 [2, 4]	1 [1, 3]	**0.02**
Parity	2 [1, 2]	0 [0, 1]	**<0.01**
Gestational age (weeks)	25 [22, 28]	22 [20, 24]	**0.04**
Hydrops	8 (33)	9 (75)	**0.03**
Middle cerebral artery doppler			
Peak systolic velocity (MoM)	1.8 [1.6, 2.1]	2.0 [1.9, 2.1]	0.16
Pulsatility index	1.7 ± 0.2	1.6 ± 0.5	0.29
Fetal hematocrit (%)*	15.1 ± 15	18.4 ± 18	0.35
Fetal Platelets (x10³/mL)*	163 ± 112	27 ± 33	**<0.01**
Blood transfused (mL)	29 ± 17	18 ± 8	**0.04**
Total # of procedures	5 [2 ,6]	2 [1, 2]	**<0.01**
Perinatal death	5 (21)	CMV: 4/5 (80) Parvovirus: 6/7 (14)	**0.02**

*values from initial cordocentesis sample.
Data presented as n (%), average ± standard deviation, or median [25P, 75P].
Bold = p<0.05

540 Exploring effects of meal supplementation on pregnancy outcomes amongst food insecure pregnant persons

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OBJECTIVE: Pregnant people with food insecurity (FI) are at increased risk of adverse perinatal outcomes. A program providing free meals from Meals on Wheels (MoW) for pregnant people with FI was initiated at an urban academic clinic.

STUDY DESIGN: The Hunger Vital Sign™ was used to screen pregnant people for FI at their prenatal intake visit. All patients with FI were offered enrollment in MoW until delivery. From May 2023 to June 2023, perinatal outcomes were compared from those with FI who did versus did not enroll in the MoW and, among those who participated, those who disenrolled versus continued in MoW until delivery.

RESULTS: Among 810 screened patients, 51 (6%) had FI. Of these, 57% (n=29) enrolled in the program and, of these, 18 (62%) received meals until delivery. There were no significant differences amongst those who did or did not enroll in MoW or amongst those enrolled and continued or discontinued MoW services. FI patients who did not enroll in MoW were more likely than those who did enroll to deliver at an earlier gestational age (37.71 vs 39.43 P< 0.01), but there was no difference in GA of delivery among those enrolled who did versus did not continue MoW until delivery. Those who were obese with FI (BMI 30-35) were more likely to remain within recommended weight gain if they were ever in MoW (14lbs vs 30lbs p< 0.04). The prevalence of gestational diabetes and pre-eclampsia was lower amongst those who received MoW compared to those who declined; this was not statistically significant. The prevalence of perinatal depression differed amongst FI pregnant patients who stayed in MoW (45.5%) versus those who disenrolled (38.9%) or who never enrolled (31.8%), but this difference did not achieve statistical significance.

CONCLUSION: A free meal delivery service is feasible in urban care perinatal clinics. Trends in this small cohort suggest this survey may improve perinatal outcomes. However, mixed methods data are needed to examine why ~40% of eligible participants declined enrollment and ~40% of enrolled patients disenrolled pre-delivery.

Table 1: Outcomes and characteristics

Characteristics Total (n= 51)	Enrolled in program N (%) N=29	No enrollment N (%) N=22	p-value	Disenrolled in program N (%) N=18	Stayed in program N (%) N=11	p-value
Pregestational Diabetes	0 (0)	3 (13.64)	0.07	0 (0)	0 (0)	---
cHTN	4 (13.79)	7 (31.82)	0.17	2 (11.11)	2 (18.18)	0.62
Non English Speaking	18 (62.07)	8 (36.36)	0.09	13 (72.22)	5 (45.45)	0.24
Gestational Diabetes	2 (6.90)	4 (18.18)	0.38	2 (11.11)	0 (0)	0.51
Preeclampsia	5 (17.24)	8 (36.36)	0.19	3 (16.67)	2 (18.18)	0.99
Severe Preeclampsia	4 (80.00)	8 (100.00)	0.38	3 (100.00)	1 (5.00)	0.40
Preterm Birth	4 (13.79)	5 (22.73)	0.47	3 (16.67)	1 (9.09)	0.99
Spontaneous Preterm Birth	2 (50.00)	1 (20.00)	0.52	1 (33.33)	1 (100.00)	0.99
Gestational age at Delivery Median + IQR	39.43 (1.43)	37.71 (1.86)	<0.01	39.43 (1.00)	39.29 (3.14)	0.39
Anemia	18 (62.07)	12 (54.55)	0.77	12 (66.67)	6 (54.55)	0.70)
PCS	5 (17.24)	4 (18.18)	0.92	3 (16.67)	2 (18.18)	0.92
Depression	12 (41.38)	7 (31.82)	0.57	7 (38.89)	5 (45.45)	0.99
Pre-pregnancy depression	10 (83.33)	6 (85.71)	0.99	5 (71.43)	5 (100.00)	0.47
Postpartum depression	8 (80.00)	5 (100.00)	0.52	5 (83.33)	3 (75.00)	0.99

541 Blood Pressure Threshold to Prevent Post Partum Readmission

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OBJECTIVE: Ideal postpartum blood pressure (BP) parameters are poorly defined. Improved guidance on BP parameters may help prevent maternal morbidity and mortality. We conducted an exploratory study comparing the BP values in patients readmitted for postpartum preE (PPP) with matched controls to determine BP threshold that is most associated with increased risk of readmission.

STUDY DESIGN: This is a retrospective case control study comparing women readmitted for PPP to matched controls without readmission between 01/2019 to 03/2022. Cases were matched to controls by age, gestational age and delivery year. BP values in the inpatient postpartum period (e.g., time of delivery to time of discharge) were evaluated. Primary outcome was postpartum BP threshold that would prevent PPP readmission; secondary outcome was proportion of target BP that would prevent PPP readmission. We calculated the proportion of post-partum BP readings below various thresholds and applied logistic regression, identifying area under the curve (AUC) for each threshold. Using the post-partum BP threshold with the highest AUC, we developed confusion matrices at proportions of BPs below the threshold ranging from 0.05 to 1 by 0.05. We observed which proportion had the highest Youden's Index (sensitivity + specificity − 1) to maximize predictive effectiveness.

RESULTS: There were 121 subjects readmitted for PPP and 121 controls. Patients readmitted for PPP were more likely to have HDP (OR 2.43, 95% CI 1.24-4.79), history of HDP (OR 4.02, 95% CI 1.44-11.21), and more likely to have cesarean delivery (OR 1.99, 95% CI 1.18-3.35). We found the BP threshold of 130/80 to have the greatest AUC (0.78) in the logistic prediction of non-readmission. Among proportions of post-partum readings below 130/80, we found 75% to have the highest Youden's Index (SE+SP-1) at 0.47, thus 75% of BPs needed to be below this threshold to minimize readmission risk.

CONCLUSION: Patients with greater than 25% of postpartum BPs > 130/80 have a higher risk for PPP readmission. Future studies should identify interventions to modify outcomes for patients above this threshold.

542 Association Between Maternal Hypoglycemia Using Continuous Glucose Monitoring and Adverse Pregnancy Outcomes

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OBJECTIVE: Several studies suggest a correlation between hypoglycemia and outcomes related to placental insufficiency or those related to elevated blood sugars. We aimed to examine the association between time below range (TBR) continuous glucose monitor (CGM) metrics and adverse perinatal outcomes among individuals using CGM during gestational diabetes (GDM) screening.

STUDY DESIGN: This was a secondary analysis of a prospective study (06/2020 to 01/2022) of individuals who underwent 2-step GDM screening at ≤ 30 weeks. Participants wore a blinded CGM (Dexcom G6 Pro) for ten days at time of 1-hour glucose challenge test (GCT). We evaluated TBR defined as the percentage of time less than 63 mg/dL. The primary outcome was a composite of adverse maternal and neonatal outcomes indicative of placental insufficiency, including preterm birth, placental abruption, hypertensive disorders of pregnancy, small for gestational age (defined as < 10th percentile on the Duryea et al nomogram), and neonatal death. Secondary outcomes

included other neonatal and maternal outcomes. TBR was expressed as a percentage of all CGM readings and mean glucose were analyzed. Pearson's Chi-squared and Fisher's exact test were calculated; p value of < 0.05 was considered as a statistically significant value.

RESULTS: Of the 92 individuals recruited, the total median time below range was 0.5% (IQR, 0.1, 1.2), with a median of 0.3% (IQR 0.0, 1.5) during daytime and 0.1% (0.0, 1.2) nocturnal TBR. CGM indicated 30 individuals (36.7%) had TBR $< 1\%$, and 63 individuals (67.4%) had TBR $>1\%$. Individuals with TBR >1 % did not have an increased risk of either adverse composite placental insufficiency outcome (p=0.59), or other neonatal adverse outcomes (Table).

CONCLUSION: In this prospective study using CGM we did not find an association between maternal TBR and adverse neonatal or maternal outcomes. Larger studies are needed to investigate whether hypoglycemia in pregnancy is associated with adverse perinatal outcomes.

Table 1: Composite Neonatal and Maternal Adverse Outcomes Associated with Time Below Range 1%.

Outcome	Time below range < 1% N = 30	Time elow range >= 1% N = 63	P-value
Placental insufficiency composite	19 (66)	37 (60)	0.59
Preterm birth*	7 (23)	14 (23)	0.94
Placental abruption	0 (0)	2 (3)	>0.99
Hypertensive disorders of pregnancy	16 (53)	34 (55)	0.89
Gestational hypertension	10 (33)	14 (23)	0.27
Preeclampsia	7 (23)	18 (29)	0.56
Preeclampsia with severe features	3 (10)	12 (19)	0.37
Chronic hypertension	0 (0)	1 (2)	>0.99
Super Imposed Preeclampsia with severe features	1 (3)	2 (3)	>0.99
SGA**	3 (10)	6 (10)	>0.99
Neonatal Death***	0	0	NC
Neonatal Outcomes			
Gestational age at delivery	39.0 (37.4-39.3)	38.1 (37.0-39.1)	0.2
Birth Weight (grams)	3,025 (2,830-3,380)	3,190 (2,697.5-3,425.0)	0.7
NICU admission	10 (34.5)	20 (32.3)	0.8
Need for IV glucose treatment^^	4 (13.8)	9 (14.5)	>0.9
Mechanical Ventilation	2 (6.9)	1 (1.6)	0.2
Respiratory distress syndrome^^^	4(13.8)	8 (12.9)	>0.9
Maternal Outcome			
Induction of labor	11 (37.9)	26 (44.1)	0.58
Cesarean Delivery	15 (51.7)	20 (33.9)	0.11
Estimated blood loss > 1000 (ml)	2 (6.5)	5 (8.2)	>0.99
Endometritis	1 (3.4)	2 (3.4)	>0.99
Wound infection/dehiscence	1 (3.4)	0 (0)	0.33
Postpartum readmission	0 (0)	1 (1.7)	>0.99

Data are presented as number (percentage), or median (interquartile range)
SGA, small for gestational age; NICU, neonatal intensive care unit; IV, intravenous; CPAP, continuous positive airway pressure; NC, not calculated.
*Preterm birth defined as < 37 weeks of gestation
**SGA defined as birthweight < 10th percentile using the nomogram by Duryea et al.
***Neonatal death defined as death within 28 days
^^Defined as blood glucose <40mg/dL in the first 24 hours of life or <50mg/dL after or requiring medical therapy
^^^Defined as the need for at least 4 hours of respiratory support with supplemental oxygen, CPAP, or ventilation at the first 24 hours of life)

543 Factors associated with successful elective induction of labor

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OBJECTIVE: To determine factors associated with vaginal delivery (VD) among patients undergoing elective labor induction (eIOL).

STUDY DESIGN: Retrospective cohort study of pregnancies undergoing eIOL from 2011-2022 at Kaiser Permanente Northern California. eIOL was defined as inductions between 39w0d-40w6d with no identifiable medical indications present per criteria derived from ACOG and the ARRIVE trial including maternal age < 15 or ≥ 40 years, gestational age >39 or ≥ 41 weeks, multiple gestation, rupture of membranes prior to hospital admission, maternal medical comorbidities, obstetric pathologies, or fetal pathologies. We evaluated the association of patient characteristics with vaginal delivery using multivariable regression analysis.

RESULTS: Among the 274,039 39w0d-40w6d deliveries occurring during this time, 53,668 (19.6%) were IOL and of those, 10,709 (20%) were eIOL. Characteristics associated with vaginal delivery were induction in the 39th compared to induction in the 40th week (aOR 1.15; 95% CI 1.02-1.30), multiparity (aOR 8.07; 95% CI 6.96-9.36), and height (Table). Increasing age and BMI (Table), and Black (aOR 0.58; 95% CI 0.45-0.73) or Asian (0.68 95% CI 0.58-0.80) race categories were associated with decreased likelihood of vaginal delivery, after adjustment for maternal characteristics, induction method and prior cesarean.

CONCLUSION: Conclusion: Among those undergoing eIOL, factors associated with vaginal delivery included induction earlier in the term period, multiparity, white race, and use of oxytocin alone. Among otherwise healthy term pregnancies eligible for elective labor induction, opportunities to better understand racial inequities in vaginal delivery rates should be investigated.

Table: Adjusted odds of vaginal delivery during elective labor induction by patient characteristics

Maternal Characteristic	Adjusted Odd Ratio*
Age at delivery (yrs)	0.94 (0.93-0.95)
BMI closest to delivery (kg/m^2)	0.94 (0.93-0.95)
Height (inches)	1.12 (1.10-1.15)
Race	
Non-Hispanic White	*Reference*
Hispanic	1.03 (0.88-1.22)
Asian	0.68 (0.58-0.80)
Black	0.58 (0.45-0.73)
Other/Unknown	0.84 (0.64-1.08)
Parity	
Nulliparous	*Reference*
Multiparous	8.07 (6.96-9.36)
Gestational week at induction	
39th week	1.15 (1.02-1.30)
40th week	*Reference*
Insurance payor	
Commercial	*Reference*
Public	1.16 (0.94-1.44)
IOL mode	
PGE/mechanical dilation + Oxytocin	Reference
Oxytocin alone	1.73 (1.38-2.17)
NDI	
Quartile 1 (least deprived)	*Reference*
Quartile 2	1.06 (0.90-1.26)
Quartile 3	1.06 (0.89-1.25)
Quartile 4 (most deprived)	1.03 (0.85-1.25)

* Adjusted for maternal age at delivery, antepartum body mass index (BMI) measured most proximal to delivery, maternal height, parity, gestational week, insurance payor, induction method (oxytocin alone versus at least one of prostaglandin or mechanical ripening (cervical catheter) +/- oxytocin), neighborhood deprivation index (NDI), prior cesarean delivery

544 Association between Patient-Provider Communication and Patients' Expectations versus Childbirth Experiences

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OBJECTIVE: Patient experience in relation to childbirth expectations is a crucial component of patient-centered care. Effective patient-provider communication may shape expectations and foster high-quality care. We aimed to test whether patient-provider communication is associated with concordance between patient expectations and birth experiences.

STUDY DESIGN: English-speaking individuals, ≥ 18 years of age who were pregnant or delivered a live infant from May 2020 to July 2023 and received obstetric care at a large academic center were eligible to participate in a longitudinal online survey. Prenatally, participants indicated what they expected to experience during childbirth; they reported actual experiences in the postpartum survey. We used a scoring system (1—20) to assess alignment between expectations and experiences. Participants were categorized into "High" and "Low" alignment groups based on a median score. Patient-provider communication was measured using the Kim Alliance Scale—Communication Subscale (KAS-CM). We used a linear regression model for continuous alignment scores and negative binomial regression model for "High" alignment to calculate risk ratios (RR) and 95% confidence intervals.

RESULTS: Of 407 participants who completed both surveys, the median alignment score was 15. Most participants were white (38%), college-educated (91%), had full-time employment (74%), and had private insurance (86%). An increase of 1 point on KAS-

CM was associated with an increase in alignment score of 0.1 points (CI 0.002, 0.18). There was no statistically significant association between KAS-CM score and "High" alignment (RR 1.04, 95% CI 0.99, 1.09). Factors associated with "High" alignment included older age, prior cesarean section and multi-parity.

CONCLUSION: Quality patient-provider communication was modestly associated with a higher degree of concordance between patient expectations and birth experiences in this study population. However, future research should assess similar relationships among diverse, non-English speaking populations.

545 Complement 4a (C4a) as a potential biomarker for dystocia in labour

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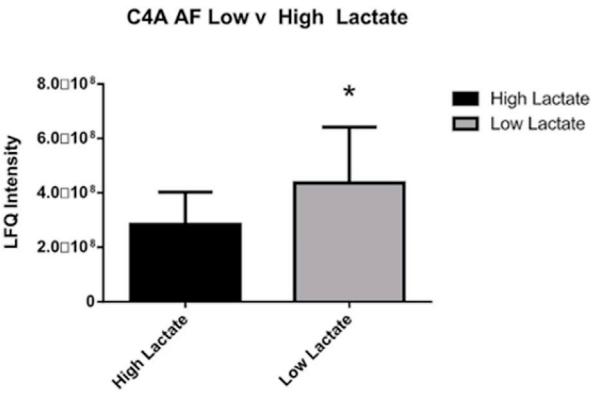
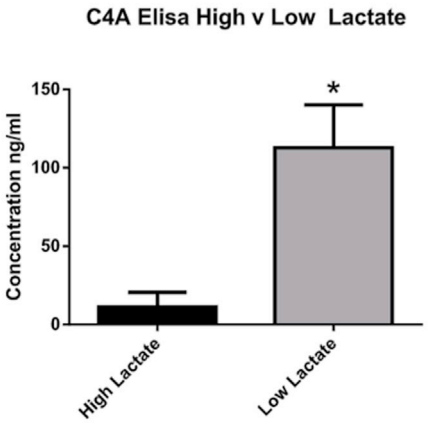
OBJECTIVE: To examine the proteome of the amniotic fluid (AF) in cases of labour dystocia. Previous research has shown high AF lactate to be associated with inefficient uterine action. We aimed to assess the proteome in those with high vs low AF lactate. The aim of this was to allow further insights into labour dystocia.

STUDY DESIGN: This was a prospective observational study. 25 patients were recruited with efficient uterine action (EUA), defined as cervical dilation ≥1cm/hour. 25 were recruited with inefficient uterine action (IUA), dilation < 1cm/hour. A sample of AF was collected at the time of caesarean delivery, and the lactate level in the AF was measured. The AF proteome was examined for those with IUA and high (n=4) lactate vs EUA and low (n=4) lactate. 28 differentially expressed proteins (DEPs) were identified using mass spectrometry, these underwent functional pathway analysis. Validation studies were completed using enzyme linked immunosorbent assay (ELISA).

RESULTS: C4a was identified as being a protein with high fold change (3.12) in low vs high lactate samples. It was also enriched in biological pathway and network analysis of DEPs using KEGG (Kyoto Encyclopaedia of Genes and Genomes). The concentration change in C4a was validated with ELISA, where a higher concentration of C4a was observed in AF with low lactate (p=.00).

CONCLUSION: C4a upregulation represents activation of the complement system and inflammation. Progress in labour is dependent on a balance between pro and anti-inflammatory factors. Upregulation of C4a has previously been linked with preterm labour onset. The decreased level of C4a in AF with IUA and high lactate may reflect an imbalance in inflammation. Our findings suggest future research into the role of C4a as a potential biomarker for labour dystocia in AF would be beneficial.





546 Examining the Impact of 1-Week Postpartum Mood Check

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OBJECTIVE: Postpartum(PP) mood disorders are prevalent and often go undetected and untreated. A 1-week mood check(MC) is a common early touchpoint to attempt to mitigate these risks. Little data exists exploring the efficacy of this visit to address postpartum mood disorders. We examined the rate of intervention at the 1-week postpartum MC among high-risk postpartum patients.

STUDY DESIGN: IRB approved retrospective cohort study of high-risk postpartum patients from a single academic health system between 4/1/2020-3/31/2022 attending a telehealth MC within 10 days of postpartum discharge. Primary outcome was the rate of intervention at MC. Intervention defined as change to care, including referrals, extra visits, medication change/start. Secondary outcomes included rate of emergent intervention, rate of mental health-related intervention, and risk factors for needing intervention at the mood check. Descriptive statistics used to analyze data; logistic regression used to identify factors associated with needing intervention at MC.

RESULTS: During the study period, 313 patients had a MC. Of those, 80(25.6%) required an intervention. Psych-related interventions occurred in 62(19.8%) patients. Nine patients(2.9%) were advised to seek urgent/emergent care, including for suicidal ideation(n=2), concern for preeclampsia(n=3), intractable headache(n=2), wound issues(n=1), and orthopnea(n=1). Other interventions in table.

Comparing patients who required intervention at MC vs those who did not, both history of anxiety(56.6%vs42.5%,p=0.03) and cocaine use(3%vs8.8%,p=0.03) were more common among those requiring intervention. Other demographics did not differ. In regression models, only cocaine remained associated with need for intervention at MC(aOR 3.56, 95%CI 1.17,10.80).

CONCLUSION: 1 in 4 patients who attended the one-week postpartum MC required intervention, with 3% requiring urgent/emergent care. These data emphasize the importance of this visit with a high-risk population. By identifying patients who require additional support, the MC may facilitate early intervention.

Interventions at Mood check	Overall n=313 (%)
Any intervention	80 (25.6)
Any psychiatric intervention	62 (19.8)
New diagnosis	4 (1.3)
Any medication adjustment[1]	42 (13.4)
Any new medication	26 (8.3)
New psychiatric medication	20 (6.4)
Medication refill or dose adjustment	16 (5.1)
Referral to lactation specialist / breastfeeding support	5 (1.6)
Referral to psychology / psychiatry	40 (12.8)
Scheduled additional follow up prior to PP visit	14 (4.5)
Patient advised to seek urgent/emergent medical care	9 (2.9)
Patient referred to another specialist*	3 (1.0)

547 Can need for intervention at 1 Week Mood Check Predict Postpartum Depression: A cohort study

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OBJECTIVE: Despite postpartum(PP) mood disorders affecting up to 20% of new mothers, these conditions are often undiagnosed and untreated. There is growing interest in determining a way to detect the emergence of these conditions earlier so intervention can be implemented to reduce the severity of these disorders. The objective of this study is to determine whether there are need for intervention at 1-wk mood check(MC) predicted the development of PP depression(PPD) by the postpartum visit.

STUDY DESIGN: Retrospective cohort study of high-risk postpartum patients at one tertiary center from 4/1/2020-3/31/2022 who had 1wk MC and attended PP visit. Patients who did not attend PP visit or who were missing EPDS at PP visit excluded. Demographic data, pregnancy characteristics, and labor/delivery information abstracted. The exposure of interest was PPD(EPDS≥13 at PP visit). Primary outcome was need for intervention at 1wk MC(defined as: new/change in medications or referrals). Secondary outcomes were need for psych intervention at MC, expression of sadness at MC and expression of anxiety at MC. Bivariate statistics used to analyze data. Regression models used to control for confounders.

RESULTS: Of the 240 patients who had mood checks, 40(16.7%) were diagnosed with PPD at PP visit. No demographic or obstetric variables other than pre-existing depression(p=0.02) and cocaine use during pregnancy(p=0.01) were significantly associated with PPD. No differences in need for intervention at MC, psych intervention, or expression of sadness or anxiety seen between those with and w/o PPD(Table). Controlling for pre-existing depression and cocaine use, expressing sadness at the mood check was associated with development of PPD(aOR 2.24, 95%CI 1.05, 4.678) while no type of intervention at MC or expression of anxiety were associated with PPD(Table 1).

CONCLUSION: The 1-week MC may be a beneficial checkpoint as an opportunity to provide interventions to address emerging postpartum depression.

	All patients N=240(%)	No PPD N=200(%)	PPD N=40(%)	p	aOR (95% CI)*
Intervention at Mood Check	65 (27.1)	50 (25.0)	15 (37.5)	0.10	1.68 (0.80,3.52)
Psych Intervention at Mood Check	51 (21.2)	39 (19.5)	12 (30.0)	0.14	1.67 (0.76, 3.67)
Urgent/Emergent Intervention at Mood Check	7 (2.9)	5 (2.5)	2 (5.0)	0.39	--
Expressed sadness at mood check	57 (23.8)	43 (21.5)	14 (35.0)	0.07	2.24 (1.05, 4.78)
Expressed anxiety at mood check	48 (20.0)	38 (19.0)	10 (25.0)	0.39	1.60 (0.70, 3.63)
Expressed stress at mood check	32 (13.3)	26 (13.0)	6 (15.0)	0.73	--
Expressed irritability at mood check	6 (2.5)	5 (2.5)	1 (2.5)	>0.99	--

*Controls for pre-existing depression and cocaine use

548 Fetal growth trajectories in women with chronic hypertension and superimposed pregnancy-associated hypertensive disorders

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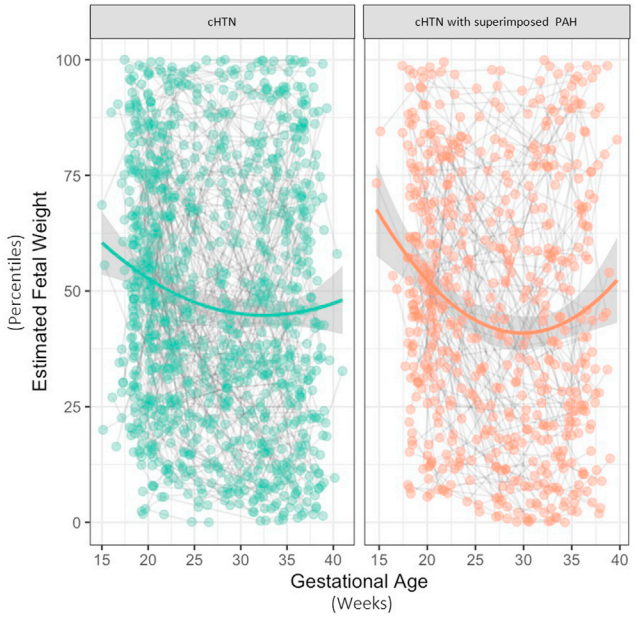
OBJECTIVE: To compare longitudinal fetal growth trajectories between those who develop superimposed pregnancy-associated hypertensive disorders (PAH) versus pregnant patients with only chronic hypertension (cHTN).

STUDY DESIGN: Retrospective cohort study from 2015-2021 comparing fetal growth patterns in cHTN vs cHTN with superimposed PAH (including preeclampsia and HELLP syndrome). Included patients were age ≥18 with singletons, had cHTN or superimposed PAH by 2020 ACOG guidelines and ≥3 ultrasounds with growth assessment. Pre-gestational diabetics and neonates with genetic disorders were excluded. Significant covariates were selected for linear mixed effects model with restricted maximum likelihood estimates for each group. EFW, BPD, HC, AC, and FL of absolute values and percentiles versus gestational age were plotted using locally estimated scatterplot smoothing (LOESS) curves. Mean and SD of biometric parameters were generated weekly from 17-39 weeks gestation with paired differences calculated. Maternal and neonatal outcomes were also compared.

RESULTS: 341 patients were analyzed: 219 (64%) had cHTN and 122 (36%) classified with cHTN with superimposed PAH. 1593 ultrasounds were used to generate growth trajectories. LOESS curves of biometry percentiles and measurements were not significantly different. There was no significant difference when comparing mean measurements in grams and millimeters of EFW, BPD, HC, AC, or FL, with week-to-week paired comparisons ranging from -178 -77 g for EFW and -10 to 6 mm for AC ($p > .05$). No difference in FGR or SGA infants ($p=0.451$). Superimposed PAH group were more likely to experience acute kidney injury, postpartum hemorrhage, have a longer hospital stay, and be on more antihypertensive at delivery and discharge, but there was no difference in delivery modality.

CONCLUSION: No significant patterns of fetal growth were observed in patients with cHTN versus those with cHTN and superimposed PAH in this cohort. This may be due to the heterogeneity in severity and diagnostic factors in types of hypertensive disorders that contribute to variability in fetal growth trajectory.

Figure 1. LOESS regression curves for EFW



549 FOX signaling mediates PLSCR1 and cytokine-induced inflammation of the lung in long-COVID

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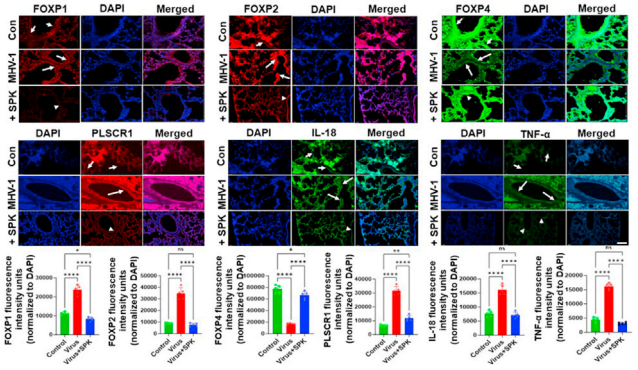
OBJECTIVE: We reported an increase in NMDA receptors 1/2 and pathological changes in the lungs post-acute and long-term infection of mice in our established murine hepatitis virus-1 (MHV-1) model of COVID-19 (AJOG, 2023). Since glutamatergic signaling is known to influence forkhead box (FOX) transcription factors and the FOX family of proteins and phospholipid scramblase 1 (PLSCR1) are known to stimulate inflammation in other lung pathologies, we examined whether: 1) MHV-1 impacts FOX signaling, and PLSCR1, which may lead to chronic inflammation in long-term post-infection; 2) SPIKENET (SPK), our COVID therapeutic invention, reverses inflammation (Front Pharmacol, 2022).

STUDY DESIGN: Female A/J mice (Jackson Laboratory, ME, USA) equivalent to human adult age (8-week-old) were divided into 3 groups (n=3/group): 1) control (CON; no infusion); 2) MHV-1 5000 PFU inoculation; and 3) MHV-1 + SPK 5mg/kg/d s.c. on days 2,4,6. Mice were sacrificed 12 months post-inoculation. Protein levels of FOXP1,2,3,4, PLSCR1, and cytokines IL-6, IL-1β, IL-10, IL-18 and TNF-α were measured by immunofluorescence. Data were analyzed by Tukey's multiple comparisons test using GraphPad 9.5.1 software and presented as % over control.

RESULTS: Alveolar FOXP1 and FOXP2 protein levels are increased (short arrows in CON, long arrows in MHV-1) 12 months post-MHV-1 infection (109.61% and 291.78%, resp., over CON; $p< 0.0001$) (Fig. 1) (Scale bar=35 μm). FOXP4 levels are decreased (78.4% reduction, as compared to CON; $p< 0.0001$ vs. CON) (Fig. 1). In MHV-1-infected mice, PLSCR1 levels are increased (384.4% over CON; $p< 0.0001$). IL-18 and TNF-α showed the greatest increase (110.30 and 274.12%, resp., over CON; $p< 0.0001$) (Fig. 1). SPK normalized all aberrant changes (arrowheads) (Fig.1).

CONCLUSION: Increased FOXP1, FOXP2, IL-18, and TNF-α, are associated with the development of chronic lung injury, and reduced FOXP4 levels might be the major driving factor. Moreover, the protective effect of SPK strongly suggests the potential therapeutic benefit of SPK in counteracting lung dysfunction in long COVID.



550 Fetoscopic Spina Bifida (fSB) repair with Human Umbilical Cord (HUC) Compared with Open In-Utero SB Repair (oSB)

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OBJECTIVE: After successfully testing fSB repair with HUC as a meningeal patch for small myelomeningocele cases, we expanded to include all spina bifida defects, aiming to compare fSB with oSB repair.

STUDY DESIGN: Under a single-arm interventional Food and Drug Administration investigational device exemption and Institutional Review Board approved protocol, we offered fSB-HUC to patients who were candidates for oSB with a fetal spina bifida. The surgical approach was laparotomy-assisted via 3 ports (5 mm, 16 Fr and 9 Fr), with anchored fetal membranes, and it was performed under heated-humified carbon dioxide at a gestational age of 24−25 $^{6/7}$ weeks. Following placode dissection, the HUC patch was sutured circumferentially using a 4-O Stratafix suture, followed by skin closure with or without HUC patch. Three independent pediatric neurosurgeons assessed the primary outcome of successful closure by image review. Outcomes were compared to our prospective cohort of oSB repair patients from the same center.

RESULTS: Overall, 50/53 consented to participate in the study, 49 underwent procedure (1 case excluded due to hypertonic uterus). There were no conversions to open repair. The primary outcome was successful in all 49 fSB-HUC repairs. Significant difference in variables in gestational at evaluation and myeloschis was higher in fSB repair(Table). The total operative time and fetal surgical time was 90 minutes longer in the fSB-HUC repair group compared to oSB repair. There was no difference in preterm premature rupture of membranes and gestational age at delivery. Fifty-eight percent of fSB-HUC repair cases delivered vaginally. At birth, there was no leakage of cerebrospinal fluid in the fSB-HUC group compared to 5% in the oSB group, but it did not reach statistical difference.

CONCLUSION: Fetoscopic myelomeningocele repair using the HUC as a meningeal patch is feasible, having comparable neonatal short-term outcomes when compared to open in-utero repair. Vaginal delivery was possible in the majority of fetoscopically repaired patients.

Table 1. Comparing preoperative, operative and clinical outcomes between fSB repair to oSB repair

	fSB-HUC repair	oSB repair	p-value
n	49	111	
GA at evaluation (wks)	23.7 ± 0.9	23.1 ± 1.2	**0.002**
Ventricle size	12.2 ± 3.5	12.1 ± 3.9	0.9
Myeloschisis	11 (22%)	49 (44%)	**<0.01**
GA at Surgery (wks)	25.3 ± 0.4	25.1 ± 0.5	**0.02**
Total operative time (mins)	249 ± 40	149 ± 28	**<0.001**
Fetal surgical time (mins)	136 ± 33	37 ± 11	**<0.001**
Skin patch closure	15 (31%)	38 (34%)	0.65
PPROM	7 (29%)	9 (15%)	0.14
GA at delivery (wks)	34.9 ± 2.4	34.9 ± 3	0.2
Vaginal delivery	25/47 (53%)	1 (1%)	**<0.001**
Leakage of CSF at birth	0/47 (0%)	5 (4.5%)	0.3
NICU Shunt placement	5/47 (20%)	11 (18%)	0.77
Neonatal demise	0/47 (0%)	3 (3%)	0.43
CSF Diversion at 12 months	10/23 (43%)	49/100 (49%)	0.6
Surgery for tethered cord at 12 months	0/23 (0%)	2/100 (2%)	0.9

Data presented as n(%), mean ± SD

551 Early Onset Neonatal Sepsis: Prevalence Of Bacterial Pathogens and Maternal Risk Factors

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OBJECTIVE: Early onset neonatal sepsis (EOS) is a rare yet life-threatening condition occurring in 1-2 neonates per 1000 live births. Diagnosis may be elusive, often leading to delay in treatment and, subsequently adverse neonatal consequences. This study aimed to describe risk factors, current pathogens, and outcomes associated with EOS.

STUDY DESIGN: This was a retrospective study of all live births (2013 to 2022) at a single tertiary center. EOS was diagnosed by a positive blood culture within 72 hours of delivery. Neonates with positive cultures of pathogens known to be contaminants were excluded (n=131). The rate of maternal, delivery risk factors, and outcomes associated with EOS, were evaluated.

RESULTS: Of 100,081 live births during the study period, EOS was diagnosed in 95 neonates (0.1%), with Escherichia Coli being the most common pathogen, followed by Viridans Streptococci and Group B Streptococci (n=29,30.5%; n=25,26.3%; n=11, 11.6%) respectively. There were no differences in maternal age, BMI, parity, induction rate between those with EOS compared to those without. Incidence of antenatal corticosteroids treatment, unknown GBS status, PPROM, prolonged rupture of membranes, intrapartum fever, and meconium-stained amniotic fluid were all more frequent in neonates with EOS. Of note 51% of individuals with neonatal EOS received antibiotics prior to delivery. As expected, neonates with EOS were more likely to be born via cesarean delivery, at an earlier gestational age and had a lower birth weight. However, 50% of EOS occurred at term, with 50% of neonates had a birthweight $\geq$ 2500g. Neonates with EOS were more prone to adverse neonatal outcome, with a median length of hospital stay of 25 days and a mortality rate of 7.4%. Mothers to neonates with EOS were more prone to postpartum hemorrhage, blood transfusion, and postpartum fever.

CONCLUSION: At a tertiary care center, EOS was uncommon but was associated with a high mortality rate. An improved understanding of modifiable risk factors and reassessment of preventative measures is warranted.

Table :Maternal Characteristics and neonatal outcomes associated with Early Neonatal Sepsis

Variable	Control N=99,986	Early Neonatal Sepsis, N=95	p-value
Maternal and Intrapartum Characteristic			
Maternal Age (years)	32.68 (5.23)	32.11 (5.89)	0.19
Nullipara	35,189 (35%)	33 (35%)	0.93
Body Mass Index BMI (Kg/m²)	28.29 (4.51)	27.77 (4.99)	0.12
GBS[1] negative	37,266 (37%)	17 (18%)	<0.001
GBS positive	11,503 (12%)	15 (16%)	0.19
GBS not tested	51,217 (51%)	63 (66%)	0.003
Antenatal Corticosteroids	8,898 (8.9%)	38 (40%)	<0.001
PPROM[2]	2,522 (2.5%)	25 (26%)	<0.001
ROM[3] > 18 hours	8,818 (8.8%)	23 (24%)	<0.001
Intrapartum Fever	412 (0.4%)	4 (4.2%)	<0.001
Abx[4] received 24 hours before delivery	21,750 (22%)	48 (51%)	<0.001
Cesarean Delivery	28,349 (28%)	40 (42%)	0.003
Meconium	11,765 (12%)	18 (19%)	0.03
Neonatal Outcomes			
Preterm Birth < 37 weeks	10,629 (11%)	49 (52%)	<0.001
Preterm Birth < 34 weeks	2,335 (2%)	38 (40%)	<0.001
Birth Weight (gr)	3,143 (551.43)	2,467 (999.10)	<0.001
NICU[5] Admission	539 (0.5%)	9 (10%)	<0.001
Mortality within 30 days	158 (0.2%)	7 (7.4%)	<0.001
Pathogen			
Escherichia Coli	NA[6]	29 (30.5%)	
Group B Streptococcus	NA	11 (12%)	
Non Hemolytic Streptococci & Enterococci	NA	34 (36%)	
Listeria Monocytogenes	NA	5 (5.3%)	
Staph Aureus & Lugdonensis	NA	8 (8.4%)	
Other Pathogenes	NA	8 (8.4%)	

[1] GBS – Group B Streptococcus/ Streptococcus Agalactiae
[2] PPROM – Preterm Premature Rupture Of Membranes
[3] ROM – Rupture Of Membranes
[4] Abx – Antibiotic treatment
[5] Neonatal Intensive Care Unit
[6] NA – Not Available
Data are presented in n (%) or mean (standard deviation)

552 Effect of Oral Furosemide Use on Postpartum Readmissions and Blood Pressure Trends

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OBJECTIVE: A hospital-wide, quality program aimed to improve postpartum care related to hypertensive disorders of pregnancy (HDP), called STAMPP HTN, was implemented at our institution and remote patient monitoring (RPM) was added to this program. Patients with a diagnosis of preeclampsia or gestational hypertension were started on oral furosemide (PO Lasix) as a prior study demonstrated that a five-day course of Lasix can help improve the time to hypertension resolution. The purpose of the present study was to compare blood pressure (BP) trends and readmissions amongst patients who did and did not receive Lasix.

STUDY DESIGN: Prospective cohort study of postpartum patients with HDP at the University of Chicago (UCM) between October 2021 and April 2022. Patients were enrolled into RPM program for BP monitoring and started on PO Lasix as standard of care. Data was obtained from the electronic medical record (EMR) for six weeks postpartum. The primary objective was readmission up to six weeks postpartum. The secondary objective was BP trends across six weeks.

RESULTS: There were 545 total patients in the RPM program during the study period, with 306 consenting to data collection. Of these, 203 eligible patients received PO Lasix who contributed to 6081 BP recordings in 6 weeks. 18.2% of patients who received Lasix were readmitted versus 21.8% of those who did not ($p = 0.55$). There was no difference in readmissions for hypertension (15.3% vs 20.0%, $p=0.40$) or rates of hypertension (BP $\geq$ 140/90) in the first week postpartum between those who did and did not receive Lasix (43.3% vs 35.4%, $p = 0.63$). Diastolic blood pressures at the six-week visit were lower in the Lasix group compared to those without (75 [70, 81] vs 81 [76, 97]; $p=0.04$).

CONCLUSION: The addition of Lasix in an already existing postpartum hypertension program did not result in fewer hospital readmissions or better blood pressure control in first week PP although diastolic blood pressures were lower at the six-week visit in patients who received Lasix. Larger studies need to be done to validate real world impact of routine use of Lasix postpartum.

553 Evaluating AI's Prediction of Time Until Delivery Across Trimesters with Consideration of Influential Factors

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OBJECTIVE: To examine the accuracy of artificial intelligence (AI) in predicting delivery timing as gestational age progresses with consideration of risk factors.

STUDY DESIGN: A proprietary AI software was trained and evaluated on 555,948 de-identified ultrasound images from 19,920 unique exams in 5,714 patients who delivered at the University of Kentucky from 2017-2021. Deidentified ultrasound images from 79% of this cohort (4,505 patients, 15,614 unique studies, 435,857 images) were used to train the AI. Clinical characteristics were excluded to blind the AI towards confounding demographics.

The remaining 21% (1,209 unique patients, 4,306 ultrasound studies, 120,091 total images) were used for derivation and validation of the AI's performance. Delivery outcomes were blinded from the AI analysis by independent 3rd party monitoring. The predicted number of days from exam until delivery were made for each patient after each unique ultrasound exam. R^2 values were generated to correlate the AI's predictions with the actual number of days until delivery.

The validation set was divided into subgroups based on GA at exam. The CI at each trimester were compared. The influence of potentially confounding variables on AI prediction within each trimester was examined by comparison to a reference subgroup.

RESULTS: 1,514 patient exams were evaluated to assess prediction, See Table. The Mean Absolute Error between the AI prediction vs actual time to delivery was 15.06 days (95% CI 12.13-17.98) in the 1st trimester, 14.25 days (95% CI 12.59-15.91) in the 2nd trimester, and 12.16 (95% CI 10.79-13.53) days in the third. The overlapping confidence intervals suggest the AI did not operate differently over time. Accuracy of prediction did not vary across most risk factors examined (Age, BMI, and Race) except those with a history of PTB in the mid-trimester.

CONCLUSION: AI can predict delivery timing from ultrasound images alone and the performance did not vary appreciably across trimesters nor was it influenced by most patient characteristics. Further improvement in prediction for patients with a prior preterm birth is ongoing.

Table 1. Correlation of Predicted versus Actual Gestational Age at Delivery per Trimester stratified by Factors that may impact AI performance.

	1st Trimester (11w0d-13w6d) n=327			2nd Trimester (18w6d-22w6d) n=791			3rd Trimester (28w0d-32w6d) n=596		
	Frequency (%)	Prediction Mean Absolute Error ± STD	P Value	Frequency (%)	Prediction Mean Absolute Error ± STD	P Value	Frequency (%)	Prediction Mean Absolute Error ± STD	P Value
Age	n=327			n=791			n=596		
<20 years	15 (4.6%)	29.78 ± 55.27	0.66	43 (5.5%)	14.46 ± 17.97	0.824	41 (6.9%)	10.30 ± 14.23	0.490
20-30 years	140 (42.8%)	14.49 ± 26.63	REF	350 (44.2%)	15.32 ± 24.50	REF	249 (41.8%)	12.26 ± 17.20	REF
>30	172 (52.6%)	14.24 ± 22.87	0.929	398 (50.3%)	13.30 ± 23.74	0.253	306 (51.3%)	12.33 ± 17.39	0.962
BMI	n=324			n=775			n=561		
<20	13 (3.8%)	19.98 ± 28.37	0.236	54 (7.0%)	16.77 ± 28.39	0.467	31(5.5%)	11.03 ± 14.17	0.986
20-30	196 (60.5%)	12.73 ± 20.77	REF	449 (57.9%)	13.33 ± 22.61	REF	285 (50.8%)	11.08 ± 15.17	REF
30-35	51 (15.7%)	15.20 ± 26.96	0.479	128 (16.5%)	14.64 ± 24.23	0.570	101 (18.0%)	13.22 ± 19.48	0.261
>35	64 (19.8%)	20.18 ± 39.44	0.053	144 (18.6%)	14.78 ± 24.63	0.513	144 (25.7%)	12.54 ± 17.37	0.486
History of PTB	n=327			n=791			n=595		
No	289 (88.4%)	14.88 ± 26.81	REF	675 (85.3%)	13.53 ± 23.15	REF	486 (81.7%)	12.18 ± 17.26	REF
Yes	38 (11.6%)	16.42 ± 22.72	0.735	116 (14.7%)	18.47 ± 26.01	0.038	109 (18.3%)	12.12 ± 16.42	0.974
Race / Ethnicity	n=327			n=791			n=596		
White	247 (75.5%)	14.64 ± 25.26	REF	617 (78%)	14.14 ± 23.58	REF	482 (80.9%)	12.01 ± 17.10	REF
Black	45 (13.8%)	20.91 ± 38.27	0.113	101 (12.8%)	17.90 ± 29.69	0.154	69 (11.6%)	13.81 ± 19.04	0.421
Asian	24 (7.3%)	12.53 ± 21.54	0.638	37 (4.7%)	8.08 ± 10.46	0.121	16 (2.7%)	10.08 ± 9.47	0.654
Hispanic	9 (2.8%)	14.29 ± 24.79	0.961	24 (3.0%)	13.95 ± 23.47	0.969	17 (2.9%)	12.00 ± 17.01	0.998

* REF: Reference subgroup was aged 20-30 yrs with BMI 20-30, no history of Preterm Birth and Caucasian.

554 Effect of COVID-19 variants on placental vascular pathology, with and without vaccination

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OBJECTIVE: Maternal COVID-19 infection during pregnancy has been associated with higher rates of placental pathology, preterm birth, and preeclampsia, but these studies were largely done during wild-type and delta periods and prior to vaccination. This study aims to characterize the effects of COVID-19 infection during pregnancy on placental pathology through periods of recent variants of interest, with and without vaccination.

STUDY DESIGN: This was a retrospective cohort study of patients with a diagnosis of COVID-19 infection during pregnancy who delivered in 2020-2021 (wild-type/delta variant) and 2022-2023 (omicron variant), with and without vaccination. The primary outcome was placental maternal vascular malperfusion (MVM) based on Amsterdam criteria. Multivariable regression analysis was performed, controlling for race, ethnicity, and BMI.

RESULTS: **384** patients were included: 249 controls, 60 COVID+ during 2020-2021, and 75 COVID+ during 2022-2023. Of the patients who tested positive during 2020-2021, 56 (93.3%) were unvaccinated, and during 2022-2023, 47 (62.7%) were vaccinated. There was a significant increase in the rate of MVM in the COVID+ 2020-2021 cohort compared to control, and although rates of MVM were higher in the COVID+ 2022-2023 cohort, this was not statistically significant (Table). Higher rates of MVM were seen in all COVID+ patients from 2020-2021 vs 2022-2023 (48.3% vs 24.0%, aOR 2.84 (1.33-6.05) and among unvaccinated COVID+ patients from 2020-2021 vs 2022-2023 (48.2% vs 17.9%, aOR 1.50 (1.01-2.21). Rates of preterm birth and preeclampsia were similar.

CONCLUSION: There were reduced rates of placental maternal vascular pathology in patients who were COVID+ during 2022-2023 compared to 2020-2021, which may be due to a combination of different strain and pre-existing immunity in later time periods. Reduced clinical virulence of recent strains (omicron) is reflected in reduced impact on placental vascular pathology.

Table: Rates of Placental Maternal Vascular Malperfusion in Pregnancies complicated by COVID-19 delivered in 2020-2021 (wild-type/delta) and 2022-2023 (omicron)

COVID Status & Year	MVM n (%)	Adjusted OR (95% CI)	p-value
COVID (+) 2020-2021 N = 60	29 (48.3%)	4.01 (2.12-7.59)	<0.001
COVID (+) 2022-2023 N = 75	18 (24.0%)	1.65 (0.87-3.12)	0.125
COVID (-) 2020-2021 N = 249	42 (16.9%)	REF	REF
COVID (+) 2020-2021 N = 60	29 (48.3%)	2.48 (1.15-5.32)	0.02
COVID (+) 2022-2023 N = 75	18 (24.0%)	REF	REF
COVID (+) Unvaccinated 2020-2021 N = 56	27 (48.2%)	3.90 (2.03-7.52)	<0.001
COVID (+) Unvaccinated 2022-2023 N = 28	5 (17.9%)	0.98 (0.34-2.78)	0.98
COVID (-) 2020-2021 N = 249	42 (16.9%)	REF	REF
COVID (+) Unvaccinated 2020-2021 N = 56	27 (48.2%)	4.27 (1.42-12.89)	0.01
COVID (+) Unvaccinated 2022-2023 N = 28	5 (17.9%)	REF	REF

MVM: maternal vascular malperfusion; OR: odds ratio; CI: Confidence interval

555 Does Amniotic Fluid Index Predict Adverse Pregnancy Outcomes in Preterm Prelabor Rupture of Membranes?

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OBJECTIVE: Preterm prelabor rupture of membranes (PPROM) is associated with increased maternal and fetal morbidity. Inpatient management of PPROM after viability is recommended, however, the optimal antenatal surveillance protocol is not well defined. While some providers measure the amniotic fluid index (AFI) weekly, the clinical utility of this practice is unclear. Our objective was to determine if there was an association between AFI and adverse perinatal outcomes in pregnancies with PPROM.

STUDY DESIGN: This was a retrospective study of singleton pregnancies over a six-year period admitted with PPROM between 23 to 33-6/7 weeks gestation that had measurements of amniotic fluid at admission. Patients with multiple gestation, chorioamnionitis, nonreassuring fetal status, or advanced labor at time of admission were excluded. Patients were stratified into two groups: AFI $<$ 5 cm and AFI $>$ /= 5 cm. Demographics were collected for both groups. The primary outcomes were latency until delivery, mode of delivery, and indication for delivery. Secondary outcomes included gestational

age at delivery, postpartum length of stay (LOS), Apgar scores, birthweight, NICU admission rate, perinatal death, and NICU LOS.
RESULTS: 109 cases met inclusion criteria. Of those patients, 39% were delivered via cesarean section (42/109). AFI was < 5 in 38 patients (34.9%) and > /=5 in 71 patients (65.1%). There was no statistically significant difference in demographics, latency until delivery, or mode of delivery between the two groups. Greater AFI measurement was associated with a higher fetal birthweight (p=0.0004), higher one minute Apgar scores (p=0.0201), and shorter NICU LOS (p=0.0138).
CONCLUSION: AFI assessment at time of admission for PPROM was not a predictor of pregnancy latency or mode of delivery, although a greater measurement was associated with increased birthweight and decreased LOS in the NICU. Further research is required to identify an optimal method of evaluation of these at-risk pregnancies.

556 Fetal effects of maternal exercise on pregnancies with fetal growth restriction

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OBJECTIVE: Exercise has been shown to be safe for uncomplicated pregnancies. Less is known about exercise in pregnancies with fetal growth restriction (FGR). We sought to evaluate the immediate fetal response to exercise in pregnancies with FGR.
STUDY DESIGN: In this single-institution, prospective cohort, 15 individuals between 28w0d and 36w6d gestation with a diagnosis of FGR (fetal weight estimate < 10%ile) were enrolled. Participants were excluded for BMI >40, tobacco or substance use, hypertension on medications, or other contraindications to exercise. Participants exercised on a treadmill at a moderate intensity (defined by rate of perceived exertion (RPE), Borg scale) for 30 minutes. Fetal umbilical artery (UA), middle cerebral artery (MCA) and aortic dopplers were sampled immediately before and after exercise. Vital signs and RPE were monitored throughout exercise. Doppler waveforms were reviewed by blinded study personnel. Cerebro-placental ratios (CPR) were calculated after sampling. Pre and post-exercise dopplers were compared using related samples Wilcoxon Signed Rank Sum tests after testing for normality.
RESULTS: Biophysical profiles and non-stress tests were reassuring after exercise. Pre-exercise UA dopplers were not different from post-exercise. Dopplers were recorded immediately after completion of exercise with a focus on UA dopplers first [mean time 1 min (SD 0.193)]. No differences were noted between pre- and post-exercise aortic or MCA dopplers or in CPR. (Table 1). Mean maximal maternal heart rate was 141.3 (SD 11.3) bpm. A single participant had hypoglycemia (BG 52) post-exercise.
CONCLUSION: Our preliminary data suggests no changes in fetal well-being among pregnancies with FGR after a single bout of moderate intensity exercise. Continued data collection is ongoing with the aim to support safety of moderate intensity exercise in the third trimester for FGR pregnancies. Future work to determine long-term effects of exercise in this population is needed.

Doppler site	n	Pre-exercise, median [IQR]	Post exercise, median [IQR]	*P value*
Umbilical artery (systolic/diastolic ratio)	15	2.62 [2.24 - 2.92]	2.62 [2.37 - 3.05]	*0.182*
Umbilical artery (pulsatility index)	15	0.95 [0.81 - 1.07]	0.95 [0.84 - 1.04]	*0.820*
Aortic (pulsatility index)	13	1.82 [1.57 - 2.32]	1.69 [1.42 - 2.02]	*0.169*
Middle cerebral artery (pulsatility index)	15	1.41 [1.30 - 1.79]	1.66 [1.41 - 2.14]	*0.666*
Cerebroplacental ratio (CPR)	15	1.64 [1.52-1.99]	1.75 [1.56-2.13]	*0.955*

Table 1: Doppler values pre- and post-exercise.

557 Evaluating the Validity of ChatGPT Responses on Common Obstetric Issues: Potential Clinical Applications and Implications

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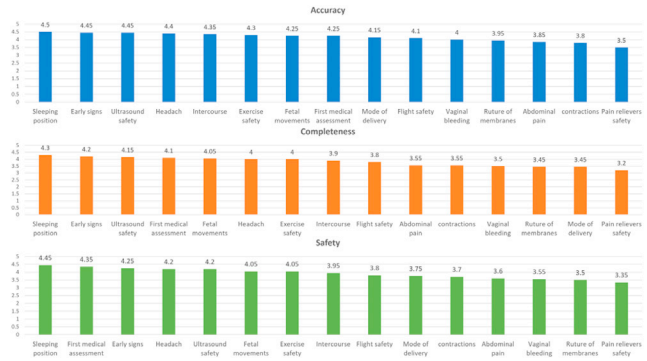
OBJECTIVE: To evaluate the quality of ChatGPT responses to common issues in obstetrics and assess its ability to provide reliable responses to pregnant individuals. The study aimed to examine the responses based on expert opinions using predetermined criteria, including accuracy, completeness, and safety.
STUDY DESIGN: We curated 15 common and potentially clinically significant questions that pregnant women are asking. Two native English-speaking women were asked to reframe the questions in their own words, and we employed the ChatGPT language model to generate responses to the questions. To evaluate the accuracy, completeness, and safety of the ChatGPT's generated responses we developed a questionnaire with a scale of one to five. that Obstetrics and Gynecology experts from different countries were invited to rate accordingly. The ratings were analyzed to evaluate the average level of agreement and percentage of positive ratings (four or above) for each criterion.
RESULTS: Out of the 42 experts invited, 20 responded to the questionnaire. The combined score for all responses yielded a mean rating of four, with 75% of responses receiving a positive rating (four or above). While examining specific criteria, the ChatGPT responses were better for the "accuracy" criterion, with a mean rating of 4.2 and 80% of the questions received a positive rating. The responses scored less for the "completeness" criterion, with a mean rating of 3.8 and 46.7% of questions received a positive rating. For "safety", the mean rating was 3.9 and 53.3% of questions received a positive rating. There was no response with an average negative rating below three.
CONCLUSION: This study demonstrates promising results regarding potential use of ChatGPT's in providing accurate responses to obstetric clinical questions posed by pregnant women. However, it is crucial to exercise caution when addressing inquiries concerning the safety of the fetus or the mother.



558 Defining "early AROM" during induction of labor after cervical ripening and neonatal outcomes

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OBJECTIVE: Early artificial rupture of membranes (eAROM) during induction of labor (IOL) is associated with shorter time to delivery with no difference in cesarean delivery (CD) or infectious morbidity. However, definitions of eAROM vary and were developed prior to contemporary labor management. We analyzed associations of varying definitions of eAROM at specific, incremental cutoffs by either time since completion of cervical ripening or by cervical dilation with neonatal outcomes.

STUDY DESIGN: This was a retrospective cohort study of patients who had IOL and cervical ripening with intact membranes, term, singleton pregnancy at a tertiary care hospital 2015-2022. For the time-based analysis, we grouped patients by timing of ROM after completion of first dose of cervical ripening. For the dilation-based analysis, we grouped patients by the cervical dilation at the time of or preceding ROM. The outcomes were neonatal intensive care unit (NICU) admission and 5-minute APGAR < 7. Descriptive statistics were performed using chi-squared tests. Log-binomial regression was performed to estimate risk ratios adjusted for mode of delivery, gestational age, and maternal fever.

RESULTS: Of the 4,562 patients who met inclusion criteria, 353 (7.7%) infants were admitted to the NICU and 75 (1.6%) had a 5-minute APGAR < 7. Time of ROM since completion of cervical ripening was associated with higher risk of NICU admission and 5-minute APGAR < 7 in the unadjusted analysis. However, in the adjusted analysis, only ROM ≥12 hours after completion of cervical ripening had significantly higher risk of 5 min APGAR < 7 (aRR [95% CI]: 2.61 [1.14-5.98]), but not NICU admission. For the dilation-based analysis, there was no association with increased risk of either outcome in unadjusted or adjusted analysis.

CONCLUSION: In examining neonatal outcomes by varied definitions of eAROM, ROM ≥12 hours after completion of cervical ripening is associated with increased risk of 5-minute APGAR < 7. There is no association of cervical dilation at ROM with adverse neonatal outcomes. Later, rather than eAROM, by time may increase neonatal risk.

Figure

Association of eAROM with NICU admission					
Time based analysis			Dilation based analysis		
Group	aRR* (95% CI)	p-value	Group	aRR* (95% CI)	p-value
0 to 4 hours	--	--	<2cm	--	--
4 to 8 hours	1.17 (0.85 to 1.61)	0.34	3cm	0.97 (0.72 to 1.30)	0.82
8 to 12 hours	1.29 (0.94 to 1.77)	0.11	4cm	1.20 (0.92 to 1.56)	0.19
> 12 hours	1.29 (0.94 to 1.77)	0.11	5cm	0.95 (0.70 to 1.30)	0.75
			≥6cm	0.97 (0.68 to 1.39)	0.88

Association of eAROM with 5-minute APGAR < 7					
Time based analysis			Dilation based analysis		
Group	aRR* (95% CI)	p-value	Group	aRR* (95% CI)	p-value
0 to 4 hours	--		<2cm	--	--
4 to 8 hours	1.71 (0.71 to 4.10)	0.23	3cm	1.35 (0.71 to 2.59)	0.36
8 to 12 hours	2.28 (0.98 to 5.30)	0.06	4cm	1.53 (0.83 to 2.81)	0.17
> 12 hours	2.61 (1.14 to 5.98)	0.02	5cm	0.69 (0.29 to 1.63)	0.4
			≥6cm	1.59 (0.76 to 3.33)	0.22

Table: Adjusted risk ratios for NICU admission and 5-minute APGAR < 7 in time and dilation based groups.
*Adjusted analysis is log-binomial regression addjusting for mode of delivery, gestational age, and maternal fever.

559 Associations between Endocannabinoids and Preoperative Pain in Patients Undergoing Cesarean Delivery: an Exploratory Study

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OBJECTIVE: Endocannabinoids (EC) are endogenous cannabinoid receptor agonists involved in multiple physiological processes including nociception, cognitive function, and mood. We explored the hypothesis that EC levels in cerebral spinal fluid (CSF) and plasma are associated with patients' preoperative pain and psychosocial phenotype prior to cesarean delivery.

STUDY DESIGN: Between 2021-2022, we enrolled pregnant patients without opioid use disorder or chronic pain and collected plasma and CSF during neuraxial anesthesia placement immediately prior to scheduled cesarean delivery. Preoperative patient phenotype was determined using pain and psychosocial measures including the McGill Pain Questionnaire 2 (MPQ-2) and PROMIS-29 profile. EC levels in CSF (2-AG) and plasma (2-AG and AEA) were assayed using liquid chromatography-mass spectrometry. Hierarchical linear regressions examined associations between preoperative EC levels and preoperative phenotype measures, controlling for confounding effects of age, body mass index (BMI) at delivery, and race.

RESULTS: Complete data were available for 136 patients — mean maternal age 31.1 years (SD 5.3), BMI 34.4 kg/m^2 (SD 8.6), 27.1% publicly insured, and 77.6% non-Hispanic White. Cannabis and tobacco use were uncommon (5.9% and 2.2%, respectively). Additionally, 22.0% had a current or history of psychiatric illness (e.g., depression), with half requiring pharmacotherapy (10.6%). Mean preoperative EC levels (in pmols/mL) were: CSF 2-AG: 2.1 (SD 1.1), plasma 2-AG: 52.4 (SD 28.3), and plasma AEA: 0.9 (SD 0.5). Elevated preoperative plasma 2-AG levels were significantly associated only with lower ability to engage in social roles prior to cesarean delivery; other ECs (CSF 2-AG and plasma AEA) were not associated with any pain or psychosocial measures (Table).

CONCLUSION: EC levels in CSF and plasma are unlikely to influence cesarean patients' preoperative pain and psychosocial phenotype. Significant associations found in this exploratory study were limited to measures reflecting patients' inability to engage in social roles.

Table . Adjusted coefficients for hierarchical linear regressions between preoperative endocannabinoids levels and preoperative pain and psychosocial phenotype measures

Endocannabinoids	Preoperative Measures*	Beta	Standard Error	p-value
CSF Levels				
2-AG	PROMIS Anxiety	-0.475	0.860	0.582
	PROMIS Depression	-0.191	0.624	0.761
	PROMIS Physical Function	-0.510	0.742	0.493
	PROMIS Social Roles	-1.032	0.768	0.181
	PROMIS Pain Interference	-0.579	0.805	0.473
	MPQ-2 Total	-0.040	0.138	0.677
Plasma Levels				
2-AG	PROMIS Anxiety	2.861	4.221	0.499
	PROMIS Depression	-0.550	3.102	0.860
	PROMIS Physical Function	-1.986	3.698	0.592
	PROMIS Social Roles	**-7.899**	**3.769**	**0.038**
	PROMIS Pain Interference	5.522	3.984	0.168
	MPQ-2 Total	-0.004	0.695	0. 964
AEA	PROMIS Anxiety	7.069	3.834	0.068
	PROMIS Depression	4.935	2.816	0.082
	PROMIS Physical Function	0.219	3.401	0.949
	PROMIS Social Roles	-0.099	3.521	0.978
	PROMIS Pain Interference	1.508	3.685	0.683
	MPQ-2 Total	0.047	0.638	0.610

AEA: anandamide; 2-AG: 2-arachidonoylglyerol; EC: Endocannabinoid; MPQ-2: McGill Pain Questionnaire-2, short form; PROMIS-29: Patient Reported Outcomes Measurement Information System (PROMIS) 29 Profile v1.0

Bold: statistically significant at p<0.05

Hierarchical linear regressions controlled for the potential confounding effects of maternal age, body mass index at delivery, and race.

*Pain and psychosocial measures and definitions:

PROMIS Physical Function - ability to engage in routine physical activity

PROMIS Social Roles - ability to engage in social roles

PROMIS Pain Interference - pain-related life interference

MPQ-2 Total - assesses both neuropathic and non-neuropathic pain by rating the extent to which participants experienced each of 22 pain descriptors in the past week, using an 11-point numeric rating scale, with the total score computed by averaging participant ratings across all 22 items.

560 Differences in fetal inflammatory markers among pregnancies treated with oral or intravenous iron supplementation

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OBJECTIVE: Little is known about the effects of iron supplementation during pregnancy on fetal markers of inflammation. The objective of this study was to assess whether there are differences in umbilical cord blood (UCB) inflammatory markers among iron-deficient pregnant individuals receiving oral or intravenous (IV) iron supplementation.

STUDY DESIGN: We performed a prospective non-randomized clinical trial comparing oral and IV iron supplementation in singleton, non-anomalous pregnancies (> 24 weeks gestation) with iron deficiency (ferritin < 30 ng/mL). Outcomes were UCB inflammatory markers: interferon (IFN) γ, interleukin (IL) 10, IL-13, IL-1β, IL-1α, IL-4, IL-6, and tumor necrosis factor (TNF) α. We compared UCB markers among oral and IV iron supplementation in the whole cohort and among pregnancies with female and male fetuses. Two-sample t-test or Wilcoxon rank sum tests were used for comparisons, when indicated.

RESULTS: Fifty-three individuals were included; 25 (47.2%) received oral iron and 28 (52.8%) received IV iron. We found no statistically significant differences in baseline demographics and UBC markers between treatment groups of oral and IV supplementation. Among pregnancies with female fetuses, IFNγ (1.63 $\pm$ 0.55 vs 1.27 $\pm$0.31; p=0.04) and TNFα (14.95 [13.84-16.82] vs 11.69 [9.60-13.84]; p=0.003) were higher in the IV iron group compared to the oral iron group. We found no statistically significant differences in UCB markers among pregnancies with male fetuses.

CONCLUSION: There are no differences in fetal inflammatory markers between pregnancies treated with oral and IV iron supplementation overall, however when stratified by fetal sex there are few differences (IFNγ and TNFα were higher in the IV iron group in pregnancies with female fetuses), suggesting that treatment modalities such as IV iron may impact male and female fetuses differently. More information is needed to better assess the long-term effects of iron supplementation on neonatal and child development and these studies should conduct sex stratified analyses.

Table 1. Comparisons of oral vs. IV iron supplementation in the entire cohort (n=53), pregnancies with female fetuses (n=30) and male fetuses (n=23)

UBC markers	Whole cohort (n=53)			Females (n=30)			Males (n=23)		
	Oral iron N=25	I/V iron N=28	P*	Oral iron N=14	I/V iron N=16	P*	Oral iron N=11	I/V iron N=12	P*
IFNγ	1.37 ± 0.42	1.51 ± 0.48	0.29	1.27 ± 0.31	1.63 ± 0.55	0.04	1.51 ± 0.52	1.35 ± 0.33	0.40
IL 10	132.82 ± 29.87	128.43 ± 26.18	0.57	130.04 ± 28.59	132.94 ± 34.39	0.80	136.35 ± 32.48	122.42 ± 0.61	0.15
IL 13	89.78 ± 26.88	87.97 ± 27.78	0.81	86.26 ± 24.45	97.29 ± 30.84	0.29	94.27 ± 30.29	75.55 ± 17.40	0.08
IL-1β	2.82 [2.28-4.74]	3.44 [2.28-5.60]	0.48	2.86 [2.28-4.08]	4.08 [2.86-5.95]	0.12	2.82 [2.28-6.12]	3.13 [2.28-4.43]	0.57
IL-4	0.83 ± 0.10	0.80 ± 0.08	0.38	0.84 ± 0.12	0.81 ± 0.10	0.52	0.81 ± 0.09	0.79 ± 0.05	0.52
IL 6	23.90 [11.96-51.92]	48.10 [11.27-100.17]	0.29	28.68 [11.96-79.38]	45.16 [11.27-102.78]	0.63	14.80 [11.96-50.22]	52.35 [11.97-93.24]	0.31
TNFα	12.40 [10.98-16.82]	15.32 [13.84-16.82]	0.06	11.69 [9.60-13.84]	14.95 [13.84-16.82]	0.003	15.32 [12.40-16.82]	15.32 [13.12-16.84]	0.73
IL-1α	20.64 [20.64-20.64]	20.64 [20.64-20.64]	0.91	20.64 [20.64-20.64]	20.64 [20.64-20.64]	0.58	20.64 [20.64-20.64]	20.64 [20.64-20.64]	0.46

*Two-sample t-test/Wilcoxon rank sum test, Mean ± Standard deviation/ Median [Interquartile range] presented

561 Characterization of glucose values in labor by continuous glucose monitoring in gravidas without diabetes mellitus

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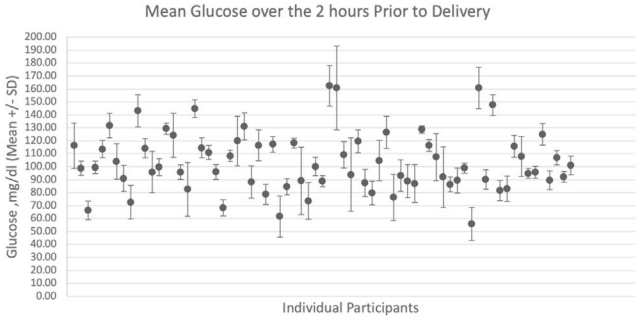
OBJECTIVE: Current recommendations for glycemic control during labor in those with diabetes mellitus (DM) are based upon expert opinion. Our objective was to characterize glucose values in labor using continuous glucose monitors (CGM) in term, laboring gravidas without DM to define normoglycemia.

STUDY DESIGN: Prospective observational cohort. CGM was placed in early labor. The following metrics were obtained: glucose at delivery, mean glucose over the 2 hours(hrs) prior to delivery, mean glucose in active and 2nd stage of labor, time in range (TIR) defined as 70-120 mg/dl, time above range (TAR) defined as >120mg/dL, and time below range (TBR) as < 70mg/dL. Neonatal outcomes were assessed. Python 3.10.4 was used for analysis of CGM data and SPSS was used for univariate analysis.

RESULTS: Seventy-two participants were included. Fifty-one (71%) delivered vaginally and 21 (29%) via cesarean. The mean glucose value at delivery was 109±27 mg/dL and over the 2hrs prior to delivery was 99±23 mg/dL. 26% of patients had a glucose >120mg/dL at time of delivery. Mean glucose in active labor was 101±25 mg/dL and in the 2nd stage was 99.5± 23mg/dL. Average TIR from CGM placement to delivery was 69.8% (10-90th percentile 33.8-95.8%) and in the 2hrs prior to delivery was 68.7% (10-90th percentile 0.8-100%). Average TAR for time in labor was 19.9% (10-90th percentile 0-66.2%) and 2hrs prior to delivery was 22.8% (10-90th percentile 0-99%). Average TBR for time in labor was 10.3% (10-90th percentile 0-66%) and 2hrs prior to delivery was 8.5%(10-90th percentile 0-36%). 23 infants had glucose checked for clinical indications and 6 (26%) required treatment for neonatal hypoglycemia.

CONCLUSION: Hyperglycemia was common in patients without DM, with a TAR in labor of nearly 20% and more than 25% of gravidas exceeding glucose of 120mg/dL at delivery. To our knowledge, this is the first study characterizing glucose patterns in women without DM in labor. This data challenges contemporary definitions of normoglycemia in labor. Further study is needed to better define normoglycemia in labor and identify risk factors for adverse outcomes.



562 Factors associated with non-adherence to ACOG guidelines for labor arrest disorders

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OBJECTIVE: The ACOG/SMFM Safe Prevention of Primary Cesarean Delivery guidelines provide minimum time criteria at which cesarean delivery (CD) should be performed for a labor arrest disorder. Despite these guidelines, national adherence remains inadequate. We sought to evaluate clinic factors associated with non-adherence to ACOG guidelines for labor arrest diagnoses.

STUDY DESIGN: This is a case-control study of patients who underwent CD for labor arrest disorders from 2018-2021 at a single center. Charts were reviewed for adherence to the *Safe Prevention of the Primary Cesarean Delivery* criteria for failed induction of labor, arrest in the active phase, and second stage arrest. Cases were patients who underwent CD prior to meeting minimum ACOG time criteria for labor arrest. Controls were patients who met ACOG criteria for diagnosis of labor arrest. Maternal, fetal, and unit-level factors were compared between cases and controls.

RESULTS: Of 376 patients with CD for arrest disorders, 206 (55%) met minimum ACOG criteria (controls) and 170 (45.2%) did not (cases). Non-adherence was significantly more common when the obstetrician managed labor remotely compared to in-house obstetricians (54% vs 28%, P= < 0.001). Non-adherence was also more common when Category II tracing was present and was associated with certain types of labor arrest; providers were more likely to adhere to guidelines for failed induction of labor and less likely to adhere to guidelines for second-stage arrest. Providers were more likely to adhere to guidelines for patients with obesity. Factors such as time of day, parity, and co-morbidities did not influence adherence.

CONCLUSION: Maternal, fetal, intrapartum, and unit-level factors influence adherence to ACOG guidelines for labor arrest disorders. Addressing modifiable factors such as provider location may improve adherence and potentially decrease cesarean section rates.

Table: Factors associated with lack of adherence to ACOG criteria for labor arrest disorders

Clinical Factor	ACOG criteria met (n=205)	ACOG criteria not met (n=170)	p-value
Maternal/labor factors			
Advanced maternal age	31 (15.1)	29 (17.1)	0.60
Obesity	**177 (85.9)**	**124 (72.9)**	**<0.01**
Nulliparity	141 (68.4)	122 (71.8)	0.49
Pregestational diabetes	19 (9.2)	10 (5.9)	0.28
Gestational diabetes	16 (7.8)	20 (11.8)	0.19
Chronic hypertension	34 (16.5)	22 (12.9)	0.33
Hypertensive disorder of pregnancy	59 (42.1)	35 (34.7)	0.24
Arrest Type			**<0.001**
Failed IOL	111 (62.4)	58 (36.5)	
Arrest of dilation	34 (19.1)	32 (20.1)	
Arrest of descent	33 (18.5)	69 (43.4)	
Fetal factors			
Category II fetal tracing	**39 (18.9)**	**57 (33.5)**	**0.001**
Large for gestational age fetus	22 (10.7)	23 (13.5)	0.41
Fetal growth restriction	6 (2.9)	4 (2.4)	0.74
Unit-level factors			
Provider in-house	**90 (71.4)**	**108 (46.0)**	**<0.001**
Cesarean decision during night shift	100 (52.6)	90 (47.4)	0.42

Data represent n (%)

563 Cell free DNA whole genome (cfDNA-WG) in clinical practice: a single center 6-year experience

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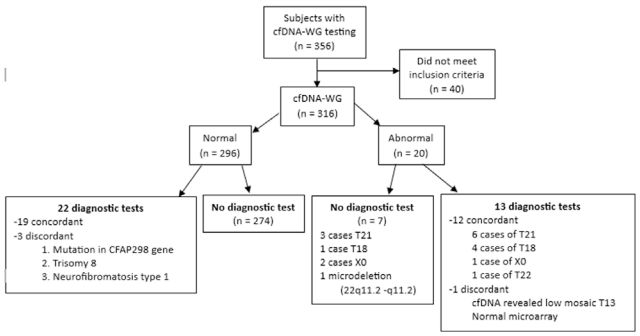
OBJECTIVE: At our institution, cell free DNA whole genome (cfDNA-WG) is offered to patients who decline diagnostic testing after genetic counseling for abnormal fetal ultrasound findings. cfDNA-WG detects > 7 MB duplications and deletions across the genome, whereas diagnostic testing considers any aberration > 1 MB abnormal. We describe cfDNA-WG test performance in our population.

STUDY DESIGN: We performed a retrospective analysis of subjects identified through our genetic counseling database. Our study group was subjects with abnormal fetal ultrasound findings in a singleton pregnancy. Descriptive data was abstracted via chart review. When diagnostic testing was also performed, this was compared to cfDNA-WG results.

RESULTS: We identified 356 subjects with cfDNA-WG results. 40 had normal sonographic exams and were excluded. In the 316 subjects remaining, ultrasound findings included multiple congenital anomalies (n = 107), isolated anomaly (n = 105), isolated soft marker (n = 48), thickened nuchal translucency (n = 46), fetal growth restriction (n = 6), and placental abnormalities (n = 3). cfDNA-WG results were abnormal in 20 cases (6.3%). Most abnormal results (90%) were whole-chromosome aneuploidies: T21 (n = 9), T18 (n = 5), T13 (n = 1), and monosomy X (n = 3). Two other abnormal results included one T22 and one microdeletion (22, q11.2-q11.2). Of the 316 subjects, 35 (11.1%) had diagnostic testing which revealed 4 discordant results where cfDNA-WG was not reflective of diagnostic results (Figure 1), including Trisomy 8 and two single gene disorders (neurofibromatosis 1, CFAP298 gene mutation). In addition, there was a case of low mosaicism for T13, not confirmed in the fetus.

CONCLUSION: In this cohort of subjects who had cfDNA-WG, 6.3% had abnormal testing, most of which could be identified on a standard cfDNA test. There were 3 cases with normal cfDNA-WG in fetuses with significant genetic disorders, giving patients false reassurance and limiting the value of normal results. Our data can aid in patient counseling on benefits and limitations of this test.

Figure 1. Flowchart of cfDNA-WG screening results and follow up.



564 Association between insulin resistance and pregnancy outcomes in obese pregnant individuals

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OBJECTIVE: In gestational diabetes (GDM), predominance of insulin resistance is associated with an increased risk of adverse pregnancy outcomes. The Homeostatic Model Assessment of Insulin Resistance (HOMA-IR) is a validated tool to estimate insulin resistance. Our objective was to determine if insulin resistance in early pregnancy, estimated by HOMA-IR, is associated with adverse pregnancy outcomes in obese pregnant individuals.

STUDY DESIGN: From September 2014 to September 2019, obese pregnant individuals, defined as body mass index (BMI) $\geq$ 30 kg/m2, were enrolled in a prospective cohort study. Plasma samples were collected between 14-20 weeks gestation and fasting insulin and glucose levels were measured. Insulin resistance was estimated using HOMA-IR. We assessed the association between HOMA-IR and adverse pregnancy outcomes. Participants were grouped based on low (HOMA-IR $\leq$ 3.8) or high (HOMA-IR $>$ 3.8) insulin resistance. We performed univariate analyses as well as adjusted analyses controlling for pre-pregnancy BMI, smoking and parity.

RESULTS: We analyzed data of 238 participants with a mean HOMA-IR of 4.2 $\pm$ 4.9 (IQR 2.2-4.4). High insulin resistance occurred in n=77 (32.4%) of the cohort. Demographics and pregnancy outcomes by HOMA-IR level are presented in the table. Individuals with high HOMA-IR had a higher pre-pregnancy BMI (42.6 $\pm$ 7.9 vs 38.5 $\pm$ 5.5, $p < 0.0001$) and a higher rate of GDM (16.9% vs 4.3%, $p < 0.0001$) and hypertensive disorders of pregnancy (16.9% vs 11.2%, $p < 0.0001$). Only the rate of GDM remained statistically significant in adjusted analyses (p=0.001). There was no difference in the rate of large for gestational age (LGA), birthweight, and birthweight percentile between individuals with high and low HOMA-IR. In sex-specific analyses, high HOMA-IR was associated with lower birthweight in female infants (p=0.04). This finding was no longer significant after controlling for pre-pregnancy BMI, smoking and GDM (p=0.08).

CONCLUSION: High insulin resistance is associated with a higher risk of GDM in obese pregnant individuals, but it was not related to birthweight or rate of LGA.

Table. Demographics and pregnancy outcomes for low and high insulin resistance

Demographics and outcomes	Low insulin resistance HOMA-IR ≤ 3.8 (n=161)	High insulin resistance HOMA-IR > 3.8 (n=77)	Unadjusted p-value	Adjusted p-value*
Demographics				
Black	113 (70.2%)	55 (71.4%)	0.98	
Hispanic/Latino	5 (3.1%)	2 (2.6%)	1.0	
Multiparity	133 (82.6%)	60 (77.9%)	0.38	
College education	17 (10.6%)	13 (16.9%)	0.32	
Smoking	31 (19.3%)	9 (11.7%)	0.36	
Pre-pregnancy body mass index (kg/m2)	38.5 (5.5)	42.6 (7.9)	<0.0001	
Outcomes				
Gestational age at delivery	38.5 (2.4)	37.5 (2.6)	0.005	0.13
Cesarean delivery	52 (32.3%)	35 (45.5%)	0.07	.010
Sex			0.67	0.62
Female	73 (49%)	32 (45.7%)		
Male	76 (51%)	38 (54.3%)		
Gestational diabetes mellitus	7 (4.3%)	13 (16.9%)	<0.0001	0.001
Hypertensive disorder of pregnancy	18 (11.2%)	13 (16.9%)	<0.0001	0.07
Birthweight (grams)	3258.9 (551.9)	3125 (576.0)	0.11	0.07
Length (centimeters)	50.3 (3.2)	49.4 (3.4)	0.07	0.06
Head circumference (centimeters)	34 (2.1)	33.7 (2.4)	0.31	0.11
Birthweight percentile	38.3 (27.7)	44.7 (28.33)	0.11	0.46
Large for gestational age	19 (11.8%)	13 (26.9%)	0.31	0.17
Birthweight ≥ 4000g	19 (11.8%)	10 (13%)	0.83	0.44

*Adjusted for pre-pregnancy BMI, smoking and parity

565 Association between neonatal abstinence syndrome and access to obstetric delivery facilities

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OBJECTIVE: A growing number of counties lack access to delivery facilities offering obstetric care (OBC) due to increasing rates of hospital closures across the country. Rates of neonatal abstinence syndrome (NAS) are often higher in counties with less access to maternal and substance use services. We sought to evaluate the association between diagnosis of NAS and access to a delivering facility with OBC.

STUDY DESIGN: A retrospective chart review involving opiate-exposed maternal-infant dyads who delivered at our safety net hospital from January 2015 to December 2022 was conducted. County of residence, use of prescribed and non-prescribed substances, and neonatal outcomes were collected. March of Dimes classifications for access to delivery facilities were applied by county (delineated as full, moderate, low, or no access). The primary outcome was a diagnosis of NAS as compared to OBC access in primary county of residence.

RESULTS: A total of 1301 dyads with substance exposure were identified and stratified by access to a delivery facility with OBC (n=575 (44.2%) resided in no; n=290 (22.3%) in low; and n=436 (33.5%) in moderate). Of note, none of the dyads included had full access to delivery facilities. Of the neonates, 93% displayed NAS symptoms and 7% did not. Multivariate regression was then performed on outcome variables including LOS, need for pharmacologic therapy, and NAS symptoms using no access as the base. Moderate access was associated with decreased odds of needing pharmacologic therapy (OR 0.588, SE 0.082, $p < 0.01$) and NAS (OR 0.549, SE 0.13, $p < 0.05$) when compared to no access.

CONCLUSION: Low or no access to delivery facilities was associated with increased odds of NAS and need for neonatal pharmacologic therapy. This finding continues to demonstrate the importance of increasing access to maternal, substance use, and mental health services for improvement of both maternal and neonatal outcomes. Further studies should investigate why residing in a county with moderate access to delivery facility with OBC improved neonatal outcomes in this population.

Table 1
Neonatal Outcomes Based on Level of Access to Care

	Level of Access	Odds Ratio (SE)	β Coefficient (SE)	Difference in LOS, d (SE)
Neonatal Pharmacologic Treatment	No Access	1	0	
	Low Access	1.247 (0.216)	0.04 (0.03)	
	Moderate Access	0.588 (0.082)***	-0.11 (0.03)***	
Neonatal Abstinence Symptoms	No Access	1	0	
	Low Access	1.134 (0.362)	0.01 (0.02)	
	Moderate Access	0.549 (0.13)**	-0.04 (0.02)***	
LOS	No Access			0
	Low Access			0.34 (0.93)
	Moderate Access			-1.15 (0.83)

*** p<.01; ** p<.05

566 Co-occurring Opioid and Stimulant Use Disorders: Is there an Incremental Impact on Adverse Pregnancy Outcomes?

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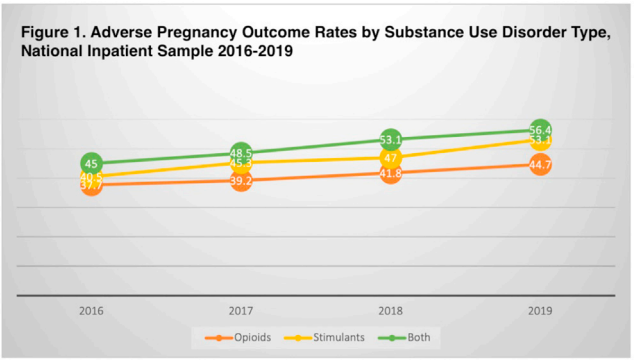
OBJECTIVE: To assess the impact of co-occurring opioid and stimulant use disorder on adverse pregnancy outcomes (APO) among inpatient delivery admissions.

STUDY DESIGN: We conducted a cross-sectional analysis of delivery admissions from the Healthcare Cost and Utilization Project (HCUP) National Inpatient Sample (NIS) from 2016 to 2019. ICD-10 codes were used to identify admissions with opioid and stimulant use disorder and APOs. Diagnosis Related Group codes were used to identify delivery admissions. APO was defined as a composite to include hypertensive disorders, antepartum hemorrhage, postpartum hemorrhage, preterm birth, and fetal growth restriction. Multivariable logistic regression analyses were undertaken to predict the likelihood of APOs among admissions with opioid use, stimulant use, or co-occurring (opioid + stimulant) use disorders while adjusting for sociodemographic characteristics including age, race and/or ethnicity, insurance payer and income level.

RESULTS: 25,243 delivery hospitalizations including 16,526 (65.5%) with opioid use disorder, 7,241 (28.7%) with stimulant use disorder and 1,476 (5.8%) with co-occurring (opioid + stimulant) use disorder were identified. The prevalence of APOs was highest among delivery hospitalizations with co-occurring use disorder (767/1,476, 52.0%, p< .001), as compared with opioid use disorder (6,772/16,526, 41.0%) or stimulant use disorder alone (3,424/7,241, 47.3%). Rates of APO increased significantly in consequent years for all cohorts (Figure 1) (p < .001). Adjusting for relevant sociodemographic covariates, co-occurring use disorder was identified as the strongest predictor of APOs [aOR 3.495 (CI 95%, 3.14-3.89)] as compared to opioid [aOR 2.34 (CI 95%, 2.17-2.31)] or stimulant use disorder [aOR 2.87 (CI 95%, 2.73-3.01)] alone.

CONCLUSION: Co-occurring opioid and stimulant use disorders represent the highest magnitude of risk for APOs, beyond the risk attributable to stimulants or opioids alone. This underscores the need for bolstering substance use recovery services in pregnancy given the recent increases in stimulant use and co-occurring use disorders.



567 Cutaneous scar characteristics and their association with abdominal adhesions during repeat CD: a prospective study

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OBJECTIVE: Cesarean delivery (CD) poses a risk of intra-abdominal adhesions, leading to various complications. We aimed to investigate the association between skin scar characteristics and subcutaneous and intra-abdominal adhesions in order to improve preoperative assessment.

STUDY DESIGN: Consecutive consenting pregnant women scheduled for elective repeat CD were prospectively recruited between February and July 2023. Detailed demographic, medical, obstetric, and gynecological information was collected, along with information of previous and current CD. Skin scar appearance was evaluated on admission using the validated Vancouver and Stony Brook Scar Scales. Intra-abdominal adhesions were assessed intraoperatively using the Modified Nair's scoring system. We analyzed the correlation between cutaneous scar scoring, subcutaneous/intra-abdominal adhesion scores and surgery length.

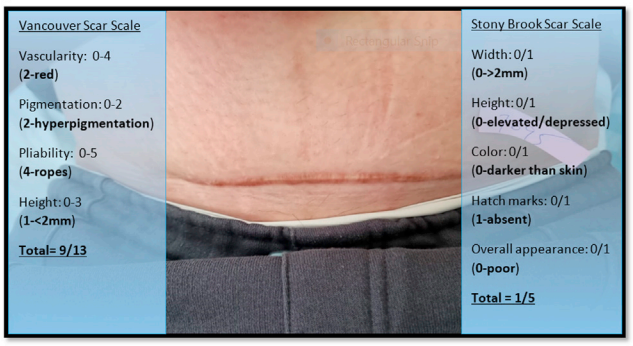
RESULTS: One hundred and eleven women were recruited. Participants had one (41.4%), two (42.3%) or 3 and more (16.2%) previous CDs. Mean maternal age was 35.6±5.1, median body mass index (BMI) was 24.5 (16.9-60.2) kg/m^2 and median gestational age at surgery was 38+3 (36+3-41+0) weeks. The average surgery length was 49.1±15.1 minutes.

The mean Vancouver Scar Scale and Stony Brook Scar Scale scores were 4.12 (±3.15) and 3.02 (±1.77), respectively. These scores showed weak but significant correlations with both intra-abdominal adhesion score (Spearman's rho = 0.24, p= 0.012 and Spearman's rho = - 0.23, p= 0.015, respectively) and subcutaneous adhesion score (Spearman's rho = 0.24, p= 0.012 and Spearman's rho = -0.22, p = 0.018, respectively). No significant correlation was found between these scar scales and surgery length.

CONCLUSION: This prospective study highlights the importance of cutaneous scar characteristics in predicting subcutaneous and intra-abdominal adhesions during repeat CDs. We found weak but significant correlation between scar characteristics and subcutaneous

and intra-abdominal adhesions. Healthcare professionals can use this knowledge to tailor surgical approaches, particularly in cases with limited surgical history.

Figure 1: Application of the Vancouver and Stony Brook scar scales



568 Association Between Maternal Care Deserts and Adverse Maternal Outcomes in Term Pregnancies Across US Counties

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OBJECTIVE: Maternal care access (MCA) continues to decline in the United States (US) with maternal care deserts expanding. Lower maternal care is a known risk factor for maternal morbidity but the association between maternal care deserts and adverse maternal outcomes has been inadequately studied at the county level.

STUDY DESIGN: This was a retrospective cohort study using CDC birth certificate data from 2019-2021. Singleton, non-anomalous, live births from 37- 42 weeks were included. Using 2020 March of Dimes Maternal Care Access Report county data, MCA was classified as full, moderate, low or a desert based on county level access to hospitals providing obstetric care, number of obstetric providers per 10,000 births and percent of women without health insurance. The primary outcome was a composite maternal adverse outcome (CMAO) that included transfusion, unplanned hysterectomy, ruptured uterus and admission to the intensive care unit (ICU). Multivariable logistic regression models were used to estimate the association between MCA level and the CMAO and adjusted for both clinical risk factors and county level access to resources using the CDC's Social Vulnerability Index.

RESULTS: There were 3,137 counties and 1,099 (35%) were in maternal care deserts. Of the 9,226,640 pregnancies that met inclusion criteria 1,108,385 (12.0%) were in counties without full MCA, including 372,216 (4.0%) in maternal care deserts. The CMAO was elevated in maternal care deserts even after controlling for individual and county level factors (aRR 1.71: 95% CI 1.63-1.79) when compared to counties with full MCA. This was driven by increased rates of transfusion (aRR 2.26: 95% CI 2.14-2.39) and unplanned hysterectomy (aRR 1.32: 95%CI 1.09-1.58). There was no difference in uterine rupture (aRR 0.86: 95% CI 0.70 -1.06) or ICU admission (aRR 0.92: 95% CI 0.82-1.03).

CONCLUSION: One in 25 pregnancies are delivered in maternal care deserts and these births are associated with increased rates of maternal morbidity. This suggests that further reduction in MCA may be associated with increased risk of maternal morbidity and mortality.

Table 1. Crude and Adjusted Relative Risk of Maternal Adverse Outcomes by Maternal Care Access Level at the US County Level from 2019-2021 (N= 9,226,640)

	RR (95% CI)	*p*-value	aRR (95% CI)†	*p*-value
Composite MAO = Yes				
Maternal care desert	1.67 (1.59 , 1.74)	<0.001	1.71 (1.63 , 1.79)	<0.001
Low access to maternal care	1.30 (1.25 , 1.36)	<0.001	1.33 (1.27 , 1.39)	<0.001
Moderate access to maternal care	1.34 (1.27 , 1.43)	<0.001	1.37 (1.29 , 1.46)	<0.001
Full access to maternal care	*Referent*	*Referent*	*Referent*	*Referent*
Maternal transfusion = Yes				
Maternal care desert	2.24 (2.13 , 2.36)	<0.001	2.26 (2.14 , 2.39)	<0.001
Low access to maternal care	1.61 (1.54 , 1.71)	<0.001	1.63 (1.54 , 1.72)	<0.001
Moderate access to maternal care	1.45 (1.35 , 1.57)	<0.001	1.46 (1.35 , 1.58)	<0.001
Full access to maternal care	*Referent*	*Referent*	*Referent*	*Referent*
Ruptured uterus = Yes				
Maternal care desert	0.89 (0.73 , 1.09)	0.26	0.86 (0.70 , 1.06)	0.16
Low access to maternal care	0.96 (0.81 , 1.14)	0.68	0.95 (0.79 , 1.13)	0.58
Moderate access to maternal care	1.30 (1.07 , 1.59)	0.009	1.26 (1.03 , 1.54)	0.03
Full access to maternal care	*Referent*	*Referent*	*Referent*	*Referent*
Unplanned hysterectomy = Yes				
Maternal care desert	1.12 (0.94 , 1.33)	0.22	1.32 (1.09 , 1.58)	0.003
Low access to maternal care	0.88 (0.74 , 1.05)	0.16	0.99 (0.83 , 1.19)	0.92
Moderate access to maternal care	1.55 (1.29 , 1.86)	<0.001	1.79 (1.48 , 2.15)	<0.001
Full access to maternal care	*Referent*	*Referent*	*Referent*	*Referent*
Admission to ICU = Yes				
Maternal care desert	0.85 (0.76 , 0.94)	0.003	0.92 (0.82 , 1.03)	0.17
Low access to maternal care	0.83 (0.75 , 0.91)	<0.001	0.88 (0.79 , 0.97)	0.01
Moderate access to maternal care	1.14 (1.02 , 1.28)	0.02	1.20 (1.07 , 1.36)	0.003
Full access to maternal care	*Referent*	*Referent*	*Referent*	*Referent*

†adjusted for maternal age, Body Mass Index, nulliparity, initiation of prenatal care, chronic hypertension, pre-existing diabetes, and Social Vulnerability Index
MAO=maternal adverse outcome

569 Associations between Malaria in Pregnancy and Variation in Fetal Growth Restriction by Fetal Growth Curves

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OBJECTIVE: Intergrowth-21(IG21) and World Health Organization (WHO) growth curves are designed to establish international standards for fetal growth. However, much of these data were not collected from malaria endemic countries, where malaria in pregnancy is a major risk factor for fetal growth restriction (FGR) and small-for-gestational age (SGA). We assessed the relationship between malaria and FGR using these two growth curves.

STUDY DESIGN: Data were collected from 751 women with singleton pregnancies enrolled between 12-20 weeks gestational age in a malaria chemoprevention trial. Fetal biometry data at 32 weeks was used to calculate estimated fetal weight (EFW) and percentiles according to IG21 and WHO fetal growth curves. FGR and SGA were defined as EFW and birthweight $< 10^{th}$ percentile for gestational age, respectively. Malaria status was assessed in two ways: (1) clinical malaria (fever and microscopic parasitemia) and (2) placental malaria (parasites and/or hemozoin pigment by histopathology). Multiple logistic regression was used to estimate associations between malaria and FGR and SGA risk, adjusted for gravidity and bednet use.

RESULTS: Among women with no evidence of malaria during pregnancy (n=87), the risk of FGR varied between growth standards (IG21=13.8%, WHO=22.9%). 97 women (12.9%) were diagnosed with at least 1 episode of clinical malaria and 17 (2.3%) had 2 or more episodes. 238 women (31.7%) had evidence of placental malaria, with a majority of these only having pigment detected. Neither clinical nor placental malaria were associated with increased risk of

FGR at 32 weeks by either growth curve, but was associated with increased risk of SGA, though no associations reached statistical significance (See Table).

CONCLUSION: In our study, FGR prevalence varied between IG21 and WHO standards, warranting future research to determine which metric should be used in malaria-endemic settings. Malaria was a predictor of risk of SGA, but not FGR at 32 weeks, although analyses were limited by low sample size. Our results suggest that malaria may impact fetal growth towards the end of pregnancy.

	FGR by IG21	FGR by WHO	SGA
Total (N=751) *	72/751 (9.6%)	145/751 (19.3%)	179/751 (23.8%)
No evidence of malaria (n=87)	12/87 (13.8%)	20/87 (22.9%)	14/87 (16.9%)
Clinical Malaria			
Absent (n=654)	64 (9.7%)	125 (19.1%)	158 (24.1%)
Present (n=97)	8 (8.2%)	20 (20.6%)	21 (21.6%)
1 episode (n=80)	7 (8.7%)	16 (20.0%)	17 (21.2%)
2 or more episodes (n=17)	1 (5.8%)	4 (23.3%)	4 (23.0%)
Placental Malaria			
Absent (n=513)	56 (10.9%)	102 (19.8%)	111 (21.6%)
Present (n=238)	16 (6.7%)	43 (18%)	68 (28.5%)
parasite and pigment (n=15)	1 (6.6%)	1 (6.6%)	6 (40.0%)
pigment only (n=223)	15 (6.7%)	42 (18.8%)	62 (27.8%)
Adjusted Odds Ratios (Confidence Interval) **			
Clinical Malaria (ref: clinical malaria absent)	0.79 (0.36-1.73)	0.96 (0.56-1.66)	0.87 (0.51-1.48)
Multiple clinical malaria episodes (ref: one episode)	0.72 (0.78-6.6)	1.18 (0.32-4.3)	1.28 (0.35-4.71)
Any Placental Malaria (ref: placental malaria absent)	0.69 (0.37-1.31)	0.91 (0.58-1.42)	1.08 (0.73-1.61)
parasite and pigment (ref: placental malaria absent)	0.61 (0.7-4.9)	0.25 (0.03-2.03)	1.75 (0.59-5.20)
pigment only (ref: placental malaria absent)	0.70 (0.36-1.34)	0.96 (0.61-1.51)	1.40 (0.7-1.59)

IG21 (intergrowth-21 curve adjusted with Hadlock Formula for EFW); WHO (World Health Organization); SGA (Small for Gestational Age); All percentages are expressed as row percentages.
*Women with evidence of parasitemia by microscopy or PCR after 32 weeks were excluded from analyses to ensure it was not the determinant for any past or active placental malaria. No evidence of malaria defined as negative for clinical malaria, parasitemia by microscopy and PCR and no evidence of placental malaria.
**Adjusted for maternal age, gravidity, and bed net use

570 Birth Morbidity and Readmissions in Autistic People and People With Intellectual and Developmental Disabilities

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OBJECTIVE: Emerging research suggests people with intellectual and developmental disabilities (IDD) have fertility rates similar to the general population. However, studies have highlighted riskier delivery outcomes, including premature delivery and cesarean section, in this group. The objective of this study was to establish prevalence of adverse delivery outcomes, including hospital readmission, in people with autism, other IDDs, and without autism or IDD.

STUDY DESIGN: We used the National Readmission Database (NRD), an all-payer collection of inpatient hospital records, from 2019 and 2020 to examine deliveries. NRD (from the Healthcare Cost and Utilization Project) is sampled from 97% of all hospital discharges in the U.S. We compared people with autism, other IDD, and all other deliveries along antepartum (gestational diabetes), intrapartum (mode of delivery (vaginal, assisted vaginal, cesarean), hemorrhage, preeclampsia and eclampsia), and postpartum (prolonged hospital stay during delivery, readmission within 7 and 30 days of discharge) outcomes. We also examined patient characteristics including Medicaid insurance.

RESULTS: Some outcomes were more common in people with autism and IDD, including preeclampsia (12% autism, 14% IDD, 7% other), instrumental delivery (39% autism, 47% IDD, 36% other), and stays longer than 5 days (7% autism, 9% IDD, 3% other). All-cause readmission within 30 days was also more common (3% autism, 6% IDD, 1% other). There was no difference in rate of cesarean section. Medicaid coverage was common in autistic people (59%) and people with IDD (52%), compared to 41% of other deliveries.

CONCLUSION: This study highlights disparities in delivery outcomes of a demographic that is largely missing from pregnancy care and research. These disparities are likely further exacerbated by other social determinants of health, including race and ethnicity. Individual and structural factors including patient, clinician, and health system factors are all at play and need to be examined to better understand and adapt care delivery to this population.

571 Assessment of provider knowledge and recommendations for spinal muscular atrophy carrier testing

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OBJECTIVE: ACOG recommends that carrier screening (CS) for spinal muscular atrophy (SMA) be offered to women who are pregnant or considering pregnancy. Despite this, SMA CS practices are varied. The increasing number of conditions and variety of available CS panels has raised concerns regarding provider knowledge and proficiency in educating patients regarding CS options and test results. We sought to determine baseline provider knowledge of SMA and SMA CS patterns in a large academic OBGYN department.

STUDY DESIGN: Cross-sectional study of obstetric care providers at an urban tertiary care health system. Providers were invited to complete an anonymous validated 20-item web-based survey to test knowledge regarding SMA screening, practice patterns, and comfort in interpretation and counseling regarding results. Data was categorized and summarized with descriptive statistics.

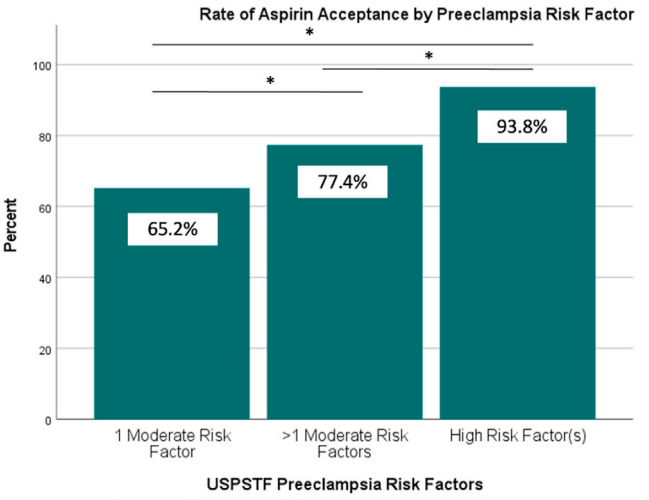
RESULTS: The response rate was 75% (112/150) with a survey completion rate of 64.6% (97/150). Survey participants varied in role and years of clinical experience (Table). The mean score on the knowledge portion of the survey was 3.8±1.8 out of 8 (47.5%) with 20.6% of respondents scoring ≥75% and 51.6% scoring ≥50%. Maternal fetal medicine providers had the greatest fund of knowledge. Test performance did not vary with years in practice. Although 91.3% of providers offer SMA screening at the first prenatal visit, less than 25% reported complete comfort discussing SMA screening and results. Comfort discussing screening and test results correlated with clinical role and years in practice. Providers who felt completely comfortable discussing SMA screening were more likely to score ≥75% or ≥50% on SMA knowledge ($p < 0.005$). Comfort discussing results, however, was only correlated to score ≥50% on SMA knowledge ($p = 0.007$).

CONCLUSION: Although the majority of providers offer SMA CS, provider knowledge regarding SMA is low, and most providers are not comfortable discussing SMA screening and test results. Educational measures should be undertaken to improve provider, and by proxy, patient understanding of available CS options.

Table: Spinal muscular atrophy disease: screening knowledge and clinical practice

	Provider Role N(%)						p-value	Years of Experience N(%)				p-value
	MFM[a] attending (n=17)	MFM[a] fellow (n=4)	OB/Gyn[b] Generalist (n=30)	OB/Gyn[b] Resident (n=33)	CNM[c] (n=7)	Other (incl. NP[d]) (n=6)		1-4 (n=37)	5-10 (n=25)	11-15 (n=9)	16+ (n=26)	
Clinical Knowledge								**Clinical Knowledge**				
Total Score[e]	5.5 (1.4)	4.3 (0.5)	3.7 (1.7)	3.3 (1.7)	1.9 (0.7)	4.2 (2.3)	<0.001	3.4 (1.7)	4.2 (1.7)	4.1 (2.0)	4.0 (2.1)	0.31
Total knowledge score ≥ 75%	10 (58.8)	0 (0)	4 (13.3)	4 (12.1)	0 (0)	2 (33.3)	0.001	5 (13.5)	4 (16)	3 (33.3)	8 (30.8)	0.26
Total knowledge score ≥ 50%	16 (94.1)	4 (100)	14 (46.7)	13 (39.4)	0 (0)	3 (50)	<0.001	15 (40.5)	18 (72.0)	5 (55.6)	12 (46.2)	0.1
Clinical Practice								**Clinical Practice**				
Comfort discussing screening[f,g]	13 (86.7)	1 (25)	21 (72.4)	15 (48.3)	4 (57.1)	6 (100)	0.003	16 (46)	21 (87.5)	7/9 (77.8)	16 (66.7)	0.005
Comfort discussing results[f,g]	12 (80)	0 (0)	22 (75.9)	10 (32.2)	5 (71.4)	6 (100)	0.001	12 (34.2)	18 (75)	8 (88.9)	17 (70.8)	0.011

Data n(%) unless otherwise specified
[a]Maternal Fetal Medicine
[b]Obstetrician-Gynecologist
[c]Certified Nurse Midwife
[d]Nurse Practioner
[e]Mean (Standard deviation)
[f,g] Defined as completely or somewhat comfortable. Data available for 92 subjects



572 Evaluation of implementation of an EMR-based screening tool for initiation of low-dose aspirin in pregnancy

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OBJECTIVE: Low-dose aspirin in pregnancy has been shown to decrease preeclampsia and history based screening has historically poor compliance. In 2021 USPSTF endorsed consideration of aspirin with even a single moderate risk factor. We aimed to assess implementation of a new EMR-based screening tool for aspirin, as well patient acceptance of aspirin in the presence of moderate or high risk factor(s) for preeclampsia.

STUDY DESIGN: We performed a retrospective cohort study of patients presenting to obstetric intake visits after implementation of an EMR-based screening tool in 2022. Patients were offered low-dose aspirin in the presence of only one moderate risk factor and recommended aspirin with more than one moderate or at least one high risk factor. The number of patients screened for aspirin at the first prenatal visit was evaluated. The relationship between moderate versus high risk factors and patient acceptance of aspirin therapy was also assessed with logistic regression. Descriptive statistics were performed.

RESULTS: Among 586 patients presenting to initial obstetric visits, 531 patients (90.6%) were screened for preeclampsia risk with the EMR-based screening tool. In our patient population, 558 (95.2%) had at least one moderate or high risk factor with 120 patients (20.5%) with a single moderate risk factor, 340 (58.0%) with more than one moderate risk factor, and 98 (16.7%) with high risk factor(s). Patient acceptance of aspirin with one moderate, more than one moderate, and high risk factor(s) was 65.2%, 77.4%, and 93.8%, respectively ($p< 0.05$, Figure).

CONCLUSION: Incorporation of an EMR-based tool during obstetric intake visits led to >90% compliance with screening for preeclampsia risk factors. Of importance, >95% of patients had at least one moderate risk factor posing further consideration of universal aspirin use. We saw increased patient acceptance of aspirin therapy with increasing risk of preeclampsia. Future directions include examining the relationship between this clinical tool and pregnancy outcomes, as well as cost effective analyses and randomized trials of universal aspirin use.

573 Does the addition of MRI in antenatal management of suspected PAS impact maternal surgical outcome?

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OBJECTIVE: Antenatal diagnosis of placenta accreta spectrum (PAS) is difficult and sometimes uncertain. In the United States, up to 50% of patients with PAS are never diagnosed until the time of delivery. Diagnosis of PAS at the time of delivery can result in poor maternal outcomes. The objective of this study was to assess if the addition of an MRI in antenatally suspected PAS resulted in improved surgical outcomes.

STUDY DESIGN: Multicenter retrospective cohort study of histopathologically confirmed PAS cases 1/1/2013 - 6/30/2022 at four New York academic institutions. All patients with antenatal suspicion of PAS were included and subdivided into those with and without MRI. Primary outcome was composite maternal surgical morbidity (CMSM) (transfusion of >4u PRBC, >1 vasopressors, mechanical ventilation, ICU admission and injury to surrounding organs). Outcomes were analyzed using univariate and multivariate logistic regression adjusting for confounders.

RESULTS: 291 patients were included, 134 (46.0%) and 157 (54.0%) with and without MRI, respectively. MRI usage was associated with low placentation (60% vs. 40%, $p< 0.001$) and those with an interdisciplinary meeting (83% vs. 17%, $p< 0.001$). 184 (63%) patients had grade 1 PAS, 59 (20%) had grade 2 and 48 (16%) had grade 3. There was a significant difference in CMSM in patients who underwent an antenatal MRI evaluation (OR 11.5, 4.0-48.92, $p< 0.001$); however, after multivariate analysis, there was no significant

difference in CMSM with the addition of MRI even when controlling for grade of PAS (aOR 2.80, 0.54-18.35, p=0.24) (Table 1).

CONCLUSION: There was no significant difference in composite maternal surgical morbidity outcomes for patients with sonographically suspected PAS with the addition of MRI. Our data supports prior studies that reflect antenatal MRI does not appear to impact surgical outcomes which is true even when controlling for degree of invasion with PAS. Further prospective studies are needed to support the best use of MRI as an adjunct to ultrasound for antenatal diagnosis.

Table 1: Composite maternal surgical morbidity comparing MRI vs. No MRI using logistic regression

			Univariate Logistic Regression		Multivariate Logistic Regression*	
	MRI (n=134)	No MRI (n=157)	OR (95% CL)	p-Value	aOR (95% CL)	Adjusted p-value
	No. (%)	No. (%)				
Composite Maternal Morbidity	131 (52.0)	121 (48.0)	11.55 (4.00, 48.92)	< 0.001	2.80 (0.54, 18.35)	0.24
Transfusion of >4 units packed red blood cells	57 (54.3)	48 (45.7)	1.68 (1.04, 2.73)	0.03	1.66 (0.80, 3.49)	0.17
>1 Vasopressor use	71 (58.2)	51 (41.8)	2.34 (1.46, 3.79)	< 0.001	2.49 (1.18, 5.39)	0.02
Mechanical ventilation or intubation	63 (45.0)	77 (55.0)	0.92 (0.58, 1.46)	0.73	0.82 (0.39, 1.73)	0.61
Admission to ICU	61 (59.8)	41 (40.2)	2.34 (1.44, 3.86)	< 0.001	2.57 (1.24, 5.43)	0.01
Surgical injury to organ	27 (81.8)	6 (18.2)	6.35 (2.70, 17.49)	< 0.001	5.72 (1.48, 25.85)	0.02
Gyn Onc Involvement	123 (60.6)	80 (39.4)	10.34 (5.37, 21.71)	< 0.001	2.46 (0.84, 7.47)	0.10
Maternal mortality	--	--	--	--	--	--

*Controlling for age, race, ethnicity, insurance, pre-pregnancy BMI, gravidity, parity, history of cesarean delivery, in vitro fertilization, history of myomectomy, history of dilation and curettage, smoking, placental location, inter-disciplinary meeting, health care institution, PAS Grade

574 Cost-effectiveness of exome sequencing with major central nervous system structural anomalies

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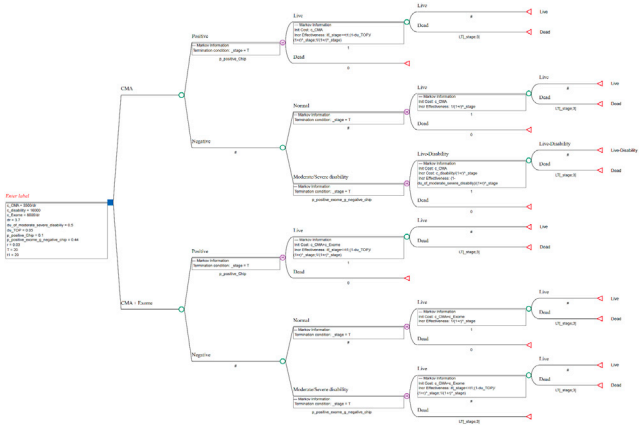
OBJECTIVE: The central nervous system (CNS) is affected in 9% of fetal malformations but accounts for as much as one-third of all pregnancy terminations due to fetal anomaly. When applying Chromosomal microarray (CMA) to the diagnosis of fetal CNS anomalies, the estimated diagnostic yield remains low.demonstrated that Recent study in fetuses with major CNS anomalies, Exome sequencing (ES) has an additional diagnostic yield of 44% over the 10% provided by CMA only. We aimed to determine the cost-effectiveness of ES in major CNS anomalies.

STUDY DESIGN: We modeled costs, utility and quality adjusted life years (QALYs) for CMA versus CMA+ES in prenatal testing. Two strategies were compared using Markovian process decision analysis model: (1) CMA only, abnormal result culminating in termination of pregnancy (TOP) (2) ES after a negative CMA, for positive result a TOP is conducted .The outcomes included health quality of life after TOP or having a disabled child, the cost of CMA test, ES test and the health expenses of a disabled child. The time horizon of the model was 20 years. Sensitivity analysis including probabilistic sensitivity analysis of all parameters was conducted.

RESULTS: In the base model the cost was $91,059 for CMA test and the average health expansion for disable child and $3,101 for CMA+ES. The QALY with time horizon of 20 years were 11.84 and 13.84 for CMA and CMA+ES strategies respectively, thus the strategy CMA+ES dominates the strategy CMA alone, higher QALY value and cost saving. Sensitivity analysis revealed that the results are robust and for all sensitivity analysis CMA+ES dominated the CMA with cost saving.

CONCLUSION: We suggest that Exome sequencing has the potential to be cost-effective and should be considered as a first-tier test in the prenatal diagnosis of major CNS anomalies. The substantial increase in diagnostic yield offered by ES not only provides valuable information for the current pregnancy but also holds significant relevance for future pregnancies. These findings are pivotal in facilitating timely and evidence-based decision-making.



575 Doppler Reference Charts in the Management of Impaired Fetal Growth Fetuses — Need for Standardization

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OBJECTIVE: Doppler studies play a crucial role in evaluating fetuses with impaired fetal growth. We aimed to assess the clinical variability of various published Doppler reference ranges for umbilical artery (UA), middle cerebral artery (MCA) pulsatility index (PI), and cerebroplacental ratio (CPR) in pregnancies complicated by impaired fetal growth, and their association with adverse perinatal outcomes.

STUDY DESIGN: This case control study included all singleton pregnancies without known genetic/structural anomalies and EFW and/or AC < 10th centile (Hadlock(for gestational age (2017-2022). Only cases with concurrent sampling of UA-PI, MCA-PI and CPR within 14 days of birth were considered. Abnormal fetal doppler was defined using clinically relevant cut-offs for gestational age: UA-PI > 95th centile, MCA-PI < 5th centile, and CPR < 5th centile. The primary outcome was a composite of adverse neonatal outcomes,

including any one of the following: antenatal fetal death, cesarean section for suspected fetal distress, 5-minute Apgar score < 7, arterial cord pH < 7.1, need for intubation, sepsis, necrotizing enterocolitis, and prolonged NICU admission (> 7 days). Multivariable logistic regression analysis was performed.

RESULTS: The cohort included 947 patients, of whom 438 (46.3%) experienced adverse perinatal outcomes, while 509 (53.7%) had normal outcomes. The predictive performance for adverse perinatal outcomes of various published Doppler reference values showed variability. Sensitivity ranged from 58.5% to 67.4% for UA, 55.4% to 61.4% for MCA, and 52.1% to 58.8% for CPR. Corresponding specificities ranged from 56.0% to 60.0%, 58.0% to 60.7%, and 61.4% to 61.9%, respectively (Table). After multivariate analysis, which controlled for relevant covariates, a range of association between clinically relevant cut-offs and adverse perinatal outcomes was demonstrated, with MCA-PI and CPR showing stronger associations with adverse outcomes.

CONCLUSION: Choosing a Doppler reference chart may result in significant variation in the clinical management of pregnancies complicated by impaired fetal growth.

Predictive values of Doppler studies for adverse perinatal outcome

N=947	Ref	Sensitivity	Specificity	PPV	NPV	+LR	-LR	Adjusted OR*
Umbilical artery	Acharya	59.0 (53.3-64.5)	60.0 (56.1-63.8)	42.0 (37.3-46.8)	74.8 (70.9-78.6)	1.47 (1.29-1.68)	0.68 (0.59-0.79)	1.31 (0.95-1.82)
	Arudini	67.4 (56.8-76.8)	56.0 (52.6-59.4)	14.2 (11.0-17.8)	94.1 (91.7-96.0)	1.53 (1.30-1.80)	0.58 (0.43-0.79)	1.43 (0.84-2.43)
	Ciobanu	58.5 (52.8-64.0)	59.7 (55.8-63.6)	41.6 (36.9-46.3)	74.7 (70.6-78.4)	1.45 (1.27-1.66)	0.69 (0.60-0.80)	1.23 (0.92-1.76)
	Baschat	58.8 (52.8-64.6)	59.1 (55.3-62.9)	38.1 (33.6-42.9)	77.0 (73.1-80.6)	1.44 (1.26-1.64)	0.70 (0.60-0.81)	1.20 (0.86-1.69)
Middle cerebral artery	Arudini	54.9 (49.9-59.8)	60.1 (55.8-64.2)	50.2 (45.4-55.0)	64.4 (60.1-68.6)	1.37 (1.20-1.57)	0.75 (0.66-0.85)	**1.48 (1.10-1.99)**
	Bahlaman	61.4 (54.4-68.0)	58.0 (54.3-61.6)	21.9 (24.8-33.5)	84.3 (55.5-61.9)	1.46 (1.27-1.67)	0.67 (0.56-0.80)	1.21 (0.83-1.75)
	Ciobanu	59.4 (53.7-64.9)	60.1 (56.2-64.0)	42.0 (37.3-35.8)	75.3 (71.3-78.9)	1.49 (1.30-1.70)	0.68 (0.58-0.78)	**1.57 (1.14-2.16)**
	Ebbing	55.4 (50.4-60.3)	60.7 (56.4-64.9)	51.8 (47.0-56.6)	64.0 (59.7-68.2)	1.41 (1.23-1.62)	0.74 (0.65-0.84)	**1.36 (1.01-1.83)**
	Baschat	60.6 (54.7-66.2)	60.0 (56.2-63.8)	39.9 (35.3-44.7)	77.6 (73.7-81.2)	1.51 (1.33-1.73)	0.66 (0.56-0.77)	**1.65 (1.19-2.29)**
CPR	Ciobanu	57.1 (52.2-62.0)	61.9 (57.7-66.0)	42.9 (39.7-46.1)	53.0 (48.2-57.7)	1.50 (1.31-1.72)	0.69 (0.61-0.79)	**1.37 (1.01-1.88)**
	Ebbing	52.1 (47.8-56.5)	61.4 (56.5-66.1)	63.7 (59.0-68.2)	49.7 (45.3-54.1)	1.35 (1.17-1.56)	0.78 (0.69-0.88)	1.13 (0.84-1.54)
	Baschat	58.8 (53.6-63.8)	61.8 (57.7-65.8)	49.7 (45.0-54.6)	69.7 (65.7-73.9)	1.54 (1.34-1.76)	0.67 (0.58-0.77)	**1.44 (1.05-1.98)**

Data is presented as value (95% confidence interval).
Bold value represent significance
NPV – negative predictive value; PPV – positive predictive value; +LR – positive likelihood ratio; -LR – negative predictive value; OR Odds Ratio
*The analysis is controlled for parity, preeclampsia, obesity, ultrasound to delivery interval, oligohydramnios, gestational age at delivery, labor induction, mode of delivery, and birthweight.

576 Exploring the Possible Link between Gestational Diabetes and Offspring Autism: A Comprehensive Study

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OBJECTIVE: While several environmental and perinatal factors have been associated with the development of autism spectrum disorder (ASD), there is still much to uncover. In this study, we investigated the association between GDM (gestational diabetes mellitus), a condition that is becoming more widespread worldwide, and ASD in childhood.

STUDY DESIGN: A population-based cohort analysis using data from community clinics and a tertiary referral hospital was conducted. The analysis focused on deliveries that occurred between the years 2015 and 2017. We chose this specific year limit based as individuals born after that year may be too young to have received a diagnosis of ASD. The incidence of offspring ASD was compared between mothers with and without gestational diabetes mellitus diagnosis. To assess the cumulative ASD incidence, a Kaplan-Meier survival curve was utilized. Additionally, a Cox proportional hazards model was employed to account for potential confounding factors.

RESULTS: Out of 165,689 deliveries included in our study, 4,971 (3.0%) were complicated with diet-controlled gestational diabetes and 1,829 (1.1%) with gestational diabetes requiring medication. Parturients who had GDMA1 or GDMA2 were compared to those without gestational diabetes. Within this cohort, 862 offspring were diagnosed with ASD during childhood. Univariate analysis showed a significant association between GDM and its severity and the risk of ASD diagnosis (1.2% vs. 0.8% vs. 0.5% for GDMA2, GDMA1, and no GDM, respectively; p< 0.001; table). However, the cumulative morbidity observed in the Kaplan-Meier survival curve was comparable between the groups (Log-rank p-value = 0.111; figure). Moreover, when controlling for factors such as gestational age, maternal age, and cesarean section, using a Cox proportional hazards model, no association was found between any type of GDM and the risk of ASD (as seen in the table).

CONCLUSION: Although the long-term effects of gestational diabetes mellitus on offspring are a matter of concern, our study indicates that there is no significant link between this condition and ASD in children.

	No GDM (n= 158087)	GDMA1 (n= 4933)	GDMA2 (n= 1807)	P-value
	Obstetrical outcomes			
Maternal age (mean ± SD)	28.3 ± 5.7	32.1 ± 5.7	33.5 ± 5.7	<0.001
Cesarean section (%)	14.7	30.4	47.5	<0.001
Preterm delivery (<37 weeks)	6.7	8.0	13.6	<0.001
	Autism spectrum disorder			
ASD (cases, %)	802 (0.5)	38 (0.8)	22 (1.2)	<0.001
Adjusted HR [a]	1 (reference)	0.7 (95% CI 0.53-1.03, p=0.075)	1.2 (95% CI 0.82-1.94, p=0.295)	

[a] adjusted for ethnicity, gestational age, maternal age, cesarean section, offspring gender and fertility treatments.

577 Caffeine Intake and Adverse Pregnancy Outcomes Among Live Births: Results from the nuMoM2b Cohort

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OBJECTIVE: Studies of caffeine intake and adverse pregnancy outcomes (APO) have had mixed results and there is insufficient data to guide patients. We sought to determine the association between caffeine consumption and APO in a large prospective cohort.

STUDY DESIGN: This was a secondary analysis of live births in the Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-be (nuMoM2b). Caffeine intake was assessed by the self-reported Food Frequency Questionnaire in the first trimester. High caffeine was defined as ≥200 mg/day per existing literature. APO was defined as a composite of hypertensive disorders of pregnancy, preterm birth, and small for gestational age infant. Logistic models assessed associations between high caffeine intake, APO, and individual APOs, adjusted for confounders. As a secondary analysis, we grouped caffeine intake in 50 mg increments and tested whether consumption was associated with increased odds of APO.

RESULTS: The analysis included 7,320 pregnant people, for whom the average daily caffeine intake was 87.69mg(SD 89.39). 837(11.4%) of patients had high caffeine intake and 2,506(34.2%) had APO. When adjusted for confounders, high caffeine intake was not associated with a composite of APO (aOR 1.00, 95% CI 0.85-1.17), nor was it associated with any individual APO (Table 1). This finding persisted in a secondary analysis which found no statistically significant increased odds of APO (aOR 1.01, 95% CI .98-1.04, p=0.58) per 50 mg increase in caffeine intake.

CONCLUSION: Our study found no association between early pregnancy high caffeine intake and APO among livebirths in a large cohort of nulliparous low risk pregnant patients.

Association between Caffeine Intake and Adverse Pregnancy Outcomes					
	Prevalence(%)	OR (95% CI)	p-value	aOR[1] (95% CI)	p-value
Any APO					
Low Caffeine[2]	2210(34.1)	1 [Reference]	*0.46*	1 [Reference]	*0.97*
High Caffeine	296(35.4)	1.06(0.91-1.23)		1.00(0.85-1.17)	
Hypertensive Disorders of Pregnancy[3]					
Low Caffeine	1498(23.1)	1 [Reference]	*0.30*	1 [Reference]	*0.86*
High Caffeine	207(24.7)	1.09(0.93-1.29)		1.02(0.85-1.22)	
Preterm Birth					
Low Caffeine	502(7.7)	1 [Reference]	*0.89*	1 [Reference]	*0.85*
High Caffeine	66(7.9)	1.02(0.78-1.33)		0.97(0.74-1.28)	
Small for Gestational Age					
Low Caffeine	621(9.6)	1 [Reference]	*0.18*	1 [Reference]	*0.45*
High Caffeine	68(8.1)	0.83(0.64-1.08)		0.90(0.69-1.18)	

aOR: adjusted odds ratio; CI: Confidence Interval
[1]Model adjusted for age, race, smoking status, and educational background
[2]Low caffeine defined as <200 mg/day; high caffeine defined as 200 mg/day or greater
[3]Hypertensive disorders of pregnancy include any diagnosis of: gestational hypertension, preeclampsia (with or without severe features), chronic hypertension with superimposed preeclampsia, and eclampsia

578 Dilapan-S versus Standard Methods for Cervical Ripening in Term Pregnancies: An Individual Patient Data Meta-Analysis

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OBJECTIVE: Dilapan-S is a cervical ripening agent approved by the FDA that has been found to be just as effective as other agents. It can be utilized for outpatient ripening, but there have not been any large-scale studies conducted to compare its cesarean delivery rate. Our objective was to combine these trials to compare cesarean delivery rates for Dilapan-S compared with other cervical ripening methods, overall and in sub-groups.

STUDY DESIGN: This was a systematic review and meta-analysis of individual patient data (IPD) from randomized controlled trials comparing Dilapan-S to mechanical or pharmacologic cervical ripening methods for labor induction in singleton gestations. Ovid MEDLINE, Embase via Ovid, Ovid Emcare, CINAHL Plus, ClinicalTrials.gov, euclinicaltrialsregister.eu, and Scopus were searched. The primary outcome measure was cesarean delivery (CD) rates. Two reviewers independently selected studies, assessed the risk of bias, and extracted the data. Pre-specified subgroup analyses were performed for parity. Pooled odds ratios (ORs) adjusted for maternal age and parity with 95% confidence intervals (CI) were calculated using the frequentist and Bayesian approaches.

RESULTS: Four randomized controlled trials were identified, with 1731 women included (1036 allocated to Dilapan-S; 695 to alternative cervical ripening methods). CD rates were 28% and 30% with Dilapan-S and other methods, respectively. There was no difference in age and parity-adjusted analyses of CD rates between Dilapan-S and other methods (OR 1.03, 95% CI 0.8-1.3). Bayesian inference indicated a 95% probability of being non-inferior (5% margin) and a 4.5% probability of being inferior to other methods (Figure). Subgroup analysis demonstrated significant interaction with parity with a 99% probability of lowering cesarean rates among multiparous women treated with Dilapan-S (RR 0.63, 95% CI 0.4-0.9; Table).

CONCLUSION: Dilapan-S was at least non-inferior and marginally superior in lowering cesarean rates compared to other pre-induction cervical ripening agents. Parity impacted efficacy, with multiparous women benefiting the most.

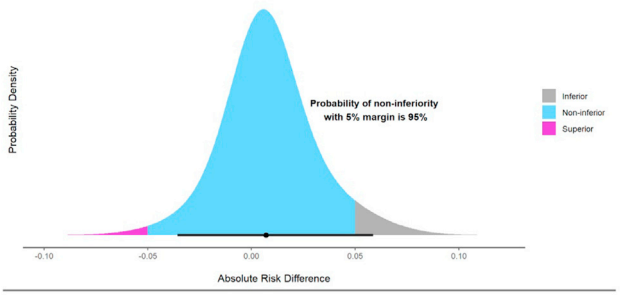

Table. Bayesian subgroup analysis of cesarean delivery by nulliparity comparing Dilapan-S to other methods.

Outcome	Dilapan-S (N=1030) n/N (%)	Other methods (N=692) n/N (%)	Bayesian adjusted RR (95% CrI)	Bayesian Posterior Probability (%) of RR <1 with Dilapan-S
Cesarean delivery				
Multiparous	43/435 (9.9)	41/246 (17)	0.63 (0.43, 0.91)	99
Nulliparous	248/595 (42)	166/446 (37)	1.15 (0.99, 1.35)	4

579 Effect of metformin on basal insulin dose change in pregnant patients with type 1 diabetes

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OBJECTIVE: Type 1 diabetes mellitus (T1D) is primarily an insulin deficient state, but superimposed insulin resistance is increasingly seen. In the setting of pregnancy some patients can require high doses of insulin, and achieving euglycemia can be difficult. We have historically used metformin in such patients. The purpose of this study is to determine if the use of metformin in pregnant patients with T1D alters the rate of basal dose increase.

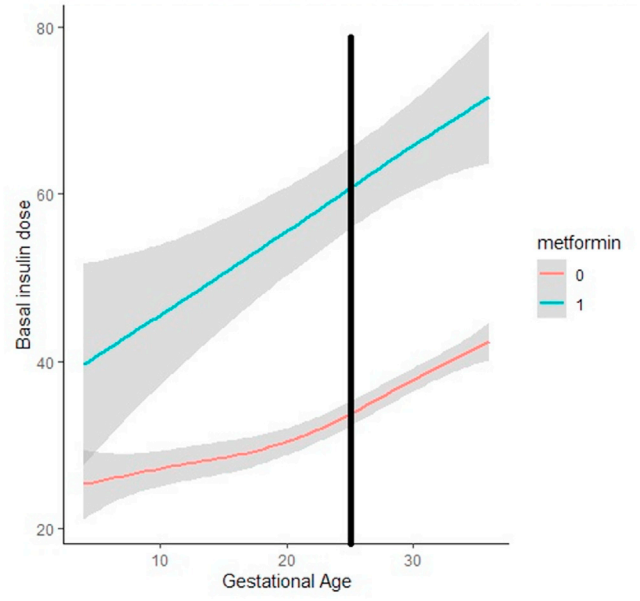
STUDY DESIGN: A retrospective cohort study was conducted. Patients were included if they had T1D diagnosed prior to pregnancy, more than one documented prenatal visit with recorded basal insulin dose, and available delivery records. Demographic data included age, parity, hypertensive disorders, gestational age (GA) at delivery, mode and indication for delivery, birthweight, and NICU admission. T-test and chi square were used for demographic analysis. Basal insulin doses at initial prenatal visit, as well as 20, 24, 28, 32, and 36 weeks were collected. A difference-in-difference analysis was conducted in R to determine if basal insulin dose trend changed in patients prescribed metformin compared to those not prescribed metformin.

RESULTS: 284 patients were eligible, of whom 29 were prescribed metformin. No difference was found between groups in age, parity, GA at delivery, mode or indication for delivery, hypertensive disorders, birthweight, or NICU admission. Starting basal insulin was 44u/d in metformin treated patients and 28u/d in non-treated patients ($p< 0.01$). Mean GA for starting metformin was 25 weeks. A difference-in-difference analysis using 25 weeks as the inflection point showed that metformin statistically significantly altered the trend of basal insulin dose compared to no medication (Figure 1, $p=0.03$).

CONCLUSION: T1D patients prescribed metformin had higher baseline insulin requirements. Treatment was initiated at a mean GA of 25

weeks, significantly altering the trajectory for basal insulin dose. No differences in pregnancy outcomes were seen between patients who were treated with metformin and those who were not, suggesting safety of this intervention.

Figure 1: Basal insulin dose by gestational age in pregnant patients with type 1 diabetes



580 Evaluating the Benefit of Obstetrical Interventions on Neonatal Survival in Periviable Twin Pregnancies

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OBJECTIVE: Evaluate the benefit of obstetrical interventions on neonatal survival in twin pregnancies at the threshold of viability.

STUDY DESIGN: This is a retrospective multi-center study of twin gestations delivered between 22 0/7 and 24 6/7 weeks gestation from January 2010 to July 2020 across 16 geographically distinct and diverse institutions. The primary objective was to assess the impact of obstetrical interventions on neonatal survival from delivery room. Secondary outcomes included assessing maternal demographic characteristics and mode of delivery on survival. Statistical analysis employed independent t-tests for continuous variables, chi square for categorical variables and generalized linear models to explore intervention differences.

RESULTS: **377** mothers met the inclusion criteria. Overall survival was 91.7% and was not impacted by maternal characteristics (age, parity, race/ethnicity, or insurance). Neonates who survived had a higher birth weight than those that died (595g ± 120 vs. 466g ± 113, p< 0.01). Obstetrics inventions including: antenatal corticosteroids (96% vs 83.2%, p< 0.01), magnesium sulfate (97.7% vs 83.6%, p< 0.01), tocolytic therapy (97.4% vs 88.8%, p< 0.01) and GBS prophylaxis (97.3% vs 88.2%, p< 0.01) demonstrated a significant increase in overall survival. Vaginal delivery was associated with increased survival compared to cesarean delivery (95.4% vs 88.7%, p=0.02). A stratified analysis of survival and obstetrical intervention by weeks of gestation is shown in Table 1. There was no difference in survival based on obstetrical intervention at 24wk. Antenatal corticosteroids were associated with increased survival at 22wk. Magnesium sulfate and tocolytic therapy were associated with increased survival at 23wk.

CONCLUSION: Receipt of obstetrical interventions and vaginal delivery increased overall survival from delivery room for twin neonates born in the periviable period.

Table 1 – Survival outcomes stratified by obstetrical intervention and weeks of gestation

		22 weeks n=97 n survived (%)		23 weeks n=136 n survived(%)		24 weeks n=143 n survived(%)		All n=377^ n survived (%)	
Survival	Survived	79 (81.4)		126 (92.6)		140 (97.9)		346 (91.8)	
	Died	18 (18.6)		10 (7.4)		3 (2.1)		31 (8.2)	
Antenatal Steroids	Yes	**23 (95.8)**	**p=0.04**	98 (94.2)	p=0.25	121 (97.6)	p=0.49	**242 (96)**	**p<0.01**
	No	**56 (76.7)**		28 (87.5)		19 (100)		**104 (83.2)**	
Magnesium Sulfate	Yes	19 (95)	p=0.11	**83 (98.8)**	**p<0.01**	110 (97.4)	p=0.37	**212 (97.7)**	**p<0.01**
	No	60 (77.9)		**43 (82.7)**		29 (100)		**133 (83.6)**	
Tocolytics	Yes	20 (87)	p=0.76	**58 (98.3)**	**p=0.04**	69 (100)	p=0.17	**147 (97.4)**	**p<0.01**
	No	59 (80.8)		**67 (88.2)**		71 (97.3)		**198 (88.8)**	
GBS Prophylaxis	Yes	18 (94.7)	p=0.18	60 (96.8)	p=0.11	65 (98.5)	p=0.65	**143 (97.3)**	**p<0.01**
	No	61 (78.2)		65 (89)		75 (97.4)		**202 (88.2)**	
Mode of delivery	VD	6 (75)	p=0.64	58 (95.1)	p=0.35	100 (97.1)	p=0.28	**164 (95.4)**	**p=0.02**
	CS	73 (82)		66 (90.4)		40 (100)		**180 (88.7)**	

^Data stratification missing for 1 participant
VD = vaginal delivery; CS = cesarean section

581 Earlier diagnosis of cholestasis is associated with adverse pregnancy outcomes

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OBJECTIVE: Intrahepatic cholestasis of pregnancy (IHCP) is associated with adverse pregnancy outcomes including fetal demise, spontaneous preterm labor, and meconium stained amniotic fluid. Studies have yet to determine if IHCP diagnosis earlier in pregnancy is associated with higher rates of adverse outcomes.

STUDY DESIGN: Retrospective cohort study of singleton, non-anomalous live gestations complicated by IHCP at Elmhurst Hospital Center from 2005-2019. We compared rates of adverse outcomes in pregnancies complicated by early (< 32 week gestational age) versus late (≥ 32 week gestational age) diagnosis of IHCP. Primary outcome of interest was rates of spontaneous preterm labor resulting in preterm delivery. Our secondary outcomes included rates of iatrogenic preterm birth, meconium stained amniotic fluid, cesarean delivery (CD) for non-reassuring fetal heart tracing (NRFHT), umbilical artery pH < 7.20, and neonatal intensive care unit (NICU) admission. Chi-square and multivariate regression tests determined the strength of association. In all analyses, a p-value < 0.05 and 95% CI not crossing 1.00 indicated statistical significance.

RESULTS: Of the 1247 pregnancies complicated by IHCP, 241 (19.3%) had early diagnosis and 1006 (80.7%) had late diagnosis of IHCP. Pregnancies with early diagnosis of IHCP had higher peak total bile acid levels, higher rates of prior preterm birth, higher incidence of ursodeoxycholic acid treatment, and were delivered at

an earlier gestational age. Earlier diagnosis of IHCP was associated with spontaneous preterm labor, iatrogenic preterm birth, and NICU admission. After adjusting for confounders and baseline differences including peak total bile acid levels, earlier diagnosis of IHCP remained associated with spontaneous preterm labor (OR 1.81; 95% CI 1.11-2.95), iatrogenic preterm birth, (OR 1.59; 95% CI 1.12-2.67), and NICU admission (OR 1.43; 95% CI 1.04-1.95).

CONCLUSION: Findings suggests that earlier diagnosis of IHCP is associated with adverse outcomes and that this is not entirely driven by peak total bile acid levels.

Univariate Analysis of Early vs Late IHCP diagnosis and adverse neonatal outcomes

	Early IHCP (n=241)	Late IHCP (n=1006)	p-value
Spontaneous Preterm Labor, n (%)	35 (14.52)	60 (5.96)	<0.01
Umbilical Arterial pH <7.20, n(%)	14 (5.81)	82 (8.15)	0.22
Iatrogenic Preterm Birth, n (%)	77 (31.95)	149 (14.81)	<0.01
Cesarean Delivery for NRFHT, n (%)	23 (9.54)	68 (6.76)	0.14
Meconium-stained fluid, n (%)	27 (11.20)	116 (11.53)	0.89
NICU admission, n (%)	116 (50.66)	358 (37.02)	<0.01

Multivariate logistic regression adjusted for peak total bile acid level, history of preterm birth, and ursodeoxycholic treatment

	Unadjusted Odds Ratio OR (95% CI)	Adjusted Odds Ratio OR (95% CI)
Spontaneous Preterm labor	2.68 (1.72-4.17)	1.81 (1.11-2.95)
Umbilical Arterial pH <7.20	0.69 (0.39-1.25)	0.68 (0.36-1.26)
Iatrogenic Preterm Birth	2.70 (1.96-3.73)	1.59 (1.12-2.67)
Cesarean Delivery for NRFHT	1.46 (0.89-2.39)	1.47 (0.85-2.54)
Meconium-stained fluid	0..97 (0.63-1.51)	0.74 (0.46-1.21)
NICU admission	1.75 (1.31-2.33)	1.43 (1.04-1.95)

582 Earlier diagnosis of severe cholestasis is associated with adverse pregnancy outcomes

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OBJECTIVE: Intrahepatic cholestasis of pregnancy (IHCP) has a severity associated relationship with adverse pregnancy outcomes including intrauterine fetal demise, spontaneous preterm labor, and meconium stained amniotic fluid. Studies have yet to determine if severe IHCP diagnosis earlier in pregnancy is associated with more adverse outcomes.

STUDY DESIGN: Retrospective cohort study of singleton, non-anomalous live gestations complicated by severe IHCP (peak total bile acids $\geq$ 40 μmol/L) from 2005-2019. We compared rates of adverse outcomes in pregnancies complicated by early severe ($<$ 32 week gestational age) versus late severe ($\geq$ 32 week gestational age) IHCP diagnosis. Primary outcome of interest was rates of spontaneous preterm labor resulting in preterm delivery. Secondary outcomes included rates of iatrogenic preterm birth, meconium stained amniotic fluid, cesarean delivery (CD) for non-reassuring fetal heart tracing (NRFHT), umbilical artery pH $<$ 7.20, and neonatal intensive care unit (NICU) admission. Chi-square and multivariate regression tests determined the strength of association. In all analyses, a p-value $<$ 0.05 and 95% CI not crossing 1.00 indicated statistical significance.

RESULTS: Of the 1247 pregnancies complicated by IHCP during the study period, 455 (36.5%) were complicated by severe IHCP. Among severe IHCP cases, 108 (23.7%) had early diagnosis and 347 (76.3%) had late diagnosis. Pregnancies with early severe IHCP had higher rates of prior preterm birth, higher incidence of ursodeoxycholic acid treatment, and were delivered at an earlier gestational age. Early severe IHCP was associated with spontaneous preterm labor, iatrogenic preterm birth, and NICU admission. After adjusting for confounders and baseline differences, early severe IHCP remained associated with spontaneous preterm labor (OR 2.41; 95% CI 1.34-4.34), iatrogenic preterm birth, (OR 1.67; 95% CI 1.05-2.67), and NICU admission (OR 1.66; 95% CI 1.06-2.61).

CONCLUSION: Early severe IHCP is associated with adverse outcomes. Findings suggest increased duration of exposure to bile acids may contribute to adverse outcomes.

Univariate Analysis of Early vs Late Severe IHCP diagnosis and adverse neonatal outcomes

	Early Severe IHCP (n=108)	Late Severe IHCP (n=347)	p-value
Spontaneous Preterm Labor, n (%)	24 (22.22)	35 (10.09)	<0.01
Umbilical Arterial pH <7.20, n(%)	7 (6.48)	28 (8.07)	0.59
Iatrogenic Preterm Birth, n (%)	41 (37.96)	87 (25.07)	<0.01
Cesarean Delivery for NRFHT, n (%)	9 (8.33)	22 (6.34)	0.47
Meconium-stained fluid, n (%)	16 (14.81)	64 (18.44)	0.39
NICU admission, n (%)	61 (57.55)	148 (43.92)	0.01

Multivariate logistic regression adjusted for peak total bile acid level and history of preterm birth

	Unadjusted Odds Ratio OR (95% CI)	Adjusted Odds Ratio OR (95% CI)
Spontaneous Preterm labor	2.55 (1.44-4.52)	2.41 (1.34-4.34)
Umbilical Arterial pH <7.20	0.79 (0.33-1.86)	0.72 (0.30-1.71)
Iatrogenic Preterm Birth	1.83 (1.16-2.89)	1.67 (1.05-2.67)
Cesarean Delivery for NRFHT	1.34 (0.60-3.01)	1.22 (0.54-2.76)
Meconium-stained fluid	0.77 (0.42-1.40)	0.70 (0.38-1.29)
NICU admission	1.73 (1.11-2.69)	1.66 (1.06-2.61)

583 Earlier intervention for acute post-neuraxial hypotension in pregnancies with obesity may improve fetal acidemia

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OBJECTIVE: Prior studies have demonstrated an association between obesity and fetal acidemia. We aimed to determine if pregnancies with obesity that experienced acute post-neuraxial hypotension were associated with fetal acidemia and if earlier intervention may be indicated.

STUDY DESIGN: Retrospective cohort study of non-labor, non-anomalous, term, singleton births via cesarean delivery under neuraxial from 2013-2019 that experienced acute post-neuraxial hypotension (systolic blood pressure (BP) $<$ 100 mmHg recorded prior to delivery). We compared rates of adverse outcomes in pregnancies with obesity (BMI $>$ 30 kg/m^2) or without (BMI $<$ 30 kg/m^2). Primary outcome was umbilical artery (UA) pH $<$ 7.1. Chi-square and multivariate regression tests determined the strength of association.

RESULTS: Of 2851 patients with acute post-neuraxial hypotension, 1432 (50.23%) had obesity while 1432 (49.77%) did not. Pregnancies with obesity were more likely to have diabetes and hypertensive disorders, and more often received combined spinal-epidural analgesia. After adjusting for confounders including maternal BMI, type of neuraxial anesthesia, and hypertensive disorders, an acute post-neuraxial hypotension in pregnancies complicated by obesity was associated with UA pH $<$ 7.1 (aOR 2.07 [1.25-3.42]) and umbilical cord base deficit $>$ 12 (aOR 2.52 [1.18-5.35]). When assessing the relationship between post-neuraxial systolic BP nadir and UA pH, pregnancies without obesity have decreased probability of UA pH $>$ 7.1 at a systolic BP of 100 mg Hg whereas pregnancies with obesity have a decreased probability of UA pH $>$ 7.1 at a systolic BP of 120 mm Hg. (Figure 1, p $<$ 0.01)

CONCLUSION: Findings suggest that in the setting of maternal obesity, acute post-neuraxial hypotension is associated with a greater odds of UA pH < 7.1. Earlier intervention for acute post-neuraxial hypotension in pregnancies with obesity may be warranted.

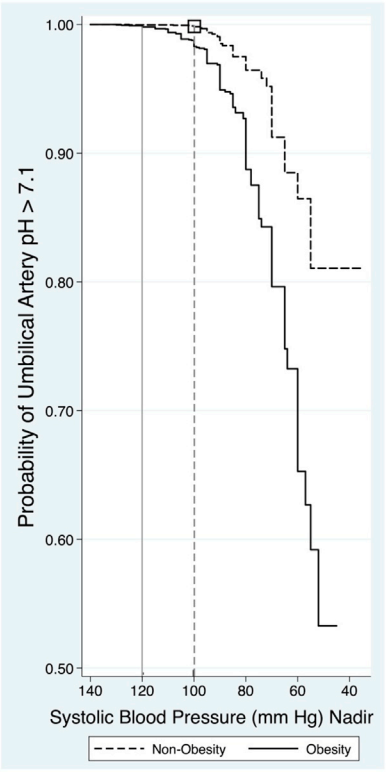

Figure 1. Relationship of post-neuraxial systolic BP nadir and probability of UA pH > 7.1 at time of delivery among pregnancies with and without obesity (BMI > 30 kg/m^2). Pregnancies without obesity begin to have a decrease in probability of UA pH > 7.1 starting at post-neuraxial systolic BP nadir of 100 mm Hg (label A) while pregnancies with obesity begin to have a decrease in probability of UA pH > 7.1 at a BP of 120 mm Hg (label B) (p < 0.01).

584 External validation and comparison of three prediction scores for severe maternal morbidity

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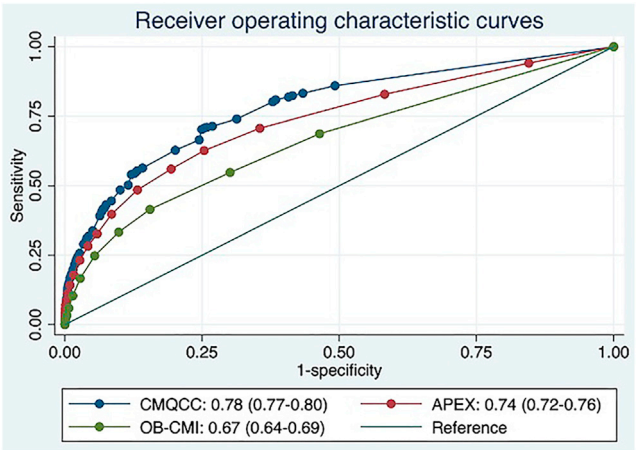
OBJECTIVE: A number of tools and scores have been proposed to assess individual risk of severe maternal morbidity. We sought to examine and compare the validity of three scoring systems.

STUDY DESIGN: This was a retrospective cohort study of all individuals in the Consortium on Safe Labor dataset, which was conducted from 2002 to 2008. Individuals were excluded if they had missing information on risk factors. Severe maternal morbidity was defined based on the Centers for Disease Control and Prevention excluding blood transfusion. Risk scores were calculated for each participant using the California Maternal Quality Care Collaborative (CMQCC) scoring system, the Assessment of Perinatal Excellence (APEX) scoring system and the obstetric comorbidity index (OB-CMI). We calculated the probability of severe maternal morbidity according to the risk scores. The discriminative performance of the prediction score was examined by the receiver operating characteristic area under the curves (ROCAUCs) and their 95% confidence intervals (95% CI). ROCAUC for each score were compared using the DeLong test. Calibration plots were developed for each score to examine the goodness-of-fit.

RESULTS: Of 117, 332 individuals, 811 (0.7%) had severe maternal morbidity. The CMQCC scoring system had a significantly higher ROCAUC compared to the APEX and OB-CMI scoring systems (0.78 [95%CI 0.77-0.80] vs. 0.74 [95%CI 0.72-0.76] vs. 0.67 [95%CI 0.64-0.69]; P < 0.001). Calibration plots showed excellent concordance between the predicted and actual SMM for the APEX scoring system and OB-CMI (both Hosmer–Lemeshow test P-values = 1.00, suggesting goodness-of-fit). However, CMQCC scoring system underestimated the probability of severe maternal morbidity if the predicted probability was more than 25%.

CONCLUSION: Both CMQCC and APEX scoring systems had good discrimination to predict severe maternal morbidity. APEX scoring systems and OB-CMI had goodness-of-fit.



585 Association of Hospital Volume with Mode of Delivery and Neonatal Outcome Among Periviable Births

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OBJECTIVE: Delivery of a pregnancy in the periviable period should ideally occur at a center with a level III-IV neonatal intensive care unit, level III-IV maternal care designation, or both. Transfer before delivery has been associated with improved neonatal outcomes compared to postnatal transport[1]; however, antenatal transport is not always feasible depending on the clinical scenario. The purpose of this study is to determine the association between hospital delivery volume and neonatal outcomes with periviable deliveries.

STUDY DESIGN: Retrospective cohort study using a maternal-infant linked database of live births in the state of Florida from 2006 to 2019. Singleton deliveries of infants born at 22w0d to 25w6d in which neonatal resuscitation was attempted were included. We compared neonatal mortality and morbidity between deliveries occurring at lower-volume hospitals (defined as less than 2,000 deliveries per year) and higher-volume hospitals (greater than or equal to 2,000 deliveries per year).

RESULTS: We identified a total of 6,958 periviable live births who had resuscitation during the study period. As expected, the majority of periviable deliveries occured at higher-volume delivery hospitals (n=5,585, 84.2%). Infants born during the periviable period at lower-volume hospitals had higher mortality rates, with 13.5%, 26.9%, 35.7%, and 42.2% mortality at 24-hour, 7-day, 28-day, and 1-year of life respectively. Higher-volume hospitals exhibited mortality of 8.6%, 19.6%, 29.3%, and 36.7% at the same time intervals.

Overall, neonatal morbidity outcomes were clinically similar between the two groups (Table 1).

CONCLUSION: The majority of periviable deliveries occur at higher-volume hospitals, with lower rates of neonatal mortality across multiple time points when compared to lower-volume hospitals. Further research is needed to optimize support for neonates born in the periviable period at lower-volume centers when antenatal transfer is logistically challenging.

Table 1: Neonatal Outcomes by Hospital Volume

	Lower-Volume Hospital n (%) 1,100 (15.8)	Higher-Volume Hospital n (%) 5,858 (84.2)	p-value
Death			
24 hours	147 (13.5)	501 (8.6)	<0.001
7 days	293 (26.9)	1,147 (19.6)	<0.001
28 days	389 (35.7)	1,718 (29.3)	<0.001
1 year	460 (42.2)	2,150 (36.7)	<0.001
Death Prior to Discharge	351 (32.2)	2,008 (34.3)	0.184
Sepsis	600 (60.6)	3,415 (58.3)	0.165
Intraventricular Hemorrhage Grade III-IV	332 (30.5)	2,008 (34.3)	0.014
Necrotizing Enterocolitis	117 (10.7)	791 (13.5)	0.013
Respiratory Distress Syndrome	836 (76.7)	4,537 (77.4)	0.586
Retinopathy of Prematurity	331 (30.4)	2,427 (41.4)	<0.001
Bronchopulmonary Dysplasia	212 (19.4)	1,564 (26.7)	<0.001
Seizures	100 (9.2)	473 (8.1)	0.226
Asphyxia, Hypoxia, Acidemia	267 (24.5)	1,647 (28.1)	0.014
Chest Tube Placement	78 (7.2)	430 (7.3)	0.830
Gastric Tube Placement	67 (6.1)	536 (9.1)	0.001
Cesarean Delivery	649 (59.5)	3,619 (61.8)	0.164

586 Association of Mode of Delivery for Periviable Birth with Neonatal Outcomes

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OBJECTIVE: To determine the association between mode of delivery for periviable infants with neonatal survival and morbidity.

STUDY DESIGN: Retrospective cohort study using a maternal-infant linked database of live births in the state of Florida from 2006 to 2019. Singleton deliveries of infants born at 22w0d to 25w6d in which neonatal resuscitation was attempted were included.

RESULTS: A total of 6,948 periviable deliveries were identified during the study period. Of those, 2,680 (38.6%) were vaginal births and 4,268 (61.4%) were cesarean births. Those delivering by cesarean were more likely to have medical complications such as hypertension, diabetes, autoimmune disease, preeclampsia, and fetal growth restriction; they were less likely to be in spontaneous labor. Rates of chorioamnionitis were similar between the two groups, as was mean birthweight. Among vaginal deliveries, 14.1% (n=377) of neonates died by 24 hours of life, as compared to 6.3% (n=271) of neonates delivered by cesarean. At one year, 42.5% (n=1,138) of neonates born vaginally had died, as compared to 34.5% (n=1,472) of those born via cesarean. Survival increased with each advancing gestational age week regardless of mode of delivery; however, survival among neonates delivered by cesarean remained higher in each gestational week category. Rates of sepsis, intraventricular hemorrhage, necrotizing enterocolitis, respiratory distress syndrome, retinopathy of prematurity, bronchopulmonary dysplasia, seizures, hypoxic ischemic encephalopathy, asphyxia, hypoxia, acidemia, chest tube placement, and gastric tube placements were similar among the two groups.

CONCLUSION: Our study indicates improved short- and long-term survival among periviable neonates delivered via cesarean section with similar rates of neonatal morbidity compared to those delivered vaginally. Further study is needed to understand the clinical situations in which cesarean is most likely to improve neonatal outcome in order to balance this against the maternal complications associated with cesarean during the periviable period.

Neonatal Outcomes Among Periviable Deliveries

	Vaginal Delivery n (%) 2,680 (38.6)	Cesarean Delivery n (%) 4,268 (61.4%)	p-value
Death			
24 hours	377 (14.1)	271 (6.3)	<0.001
7 days	652 (24.3)	788 (18.5)	<0.001
28 days	941 (35.1)	1,166 (27.3)	<0.001
1 year	1,138 (42.5)	1,472 (34.5)	<0.001
Death Prior to Discharge	1,031 (38.5)	1,328 (31.1)	<0.001
Sepsis	1,531 (57.1)	2,544 (59.6)	0.041
Intraventricular Hemorrhage Grade III-IV	975 (36.4)	1,365 (32.0)	<0.001
Necrotizing Enterocolitis	326 (12.2)	582 (13.6)	0.076
Respiratory Distress Syndrome	1,956 (73.0)	3,417 (80.1)	<0.001
Retinopathy of Prematurity	970 (36.2)	1,788 (41.9)	<0.001
Bronchopulmonary Dysplasia	626 (23.4)	1,150 (26.9)	<0.001
Seizures	223 (8.3)	350 (8.2)	0.859
Asphyxia, hypoxia, acidemia	657 (24.5)	1,257 (29.5)	<0.001
Chest Tube	179 (6.7)	329 (7.7)	0.109
Gastric Tube	213 (7.9)	390 (9.1)	0.086

[a]Gestational age 22w0d to 25w6d

587 Does sFlt1/PlGF predict superimposed preeclampsia in women with chronic hypertension during pregnancy? A meta-analysis

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OBJECTIVE: To identify the accuracy of the sFlt-1/PlGF ratio in predicting the occurrence of superimposed preeclampsia over chronic hypertension (CHTN).

STUDY DESIGN: We identified clinical studies in Embase, PubMed, ClinicalTrials.gov, and Cochrane library assessing the efficacy of the sFlt-1/PlGF ratio in the maternal sera to predict the occurrence of superimposed preeclampsia over CHTN. Using the meta-analytic method, we generated a forest plot for standardized mean differences (SMDs) with their respective 95% confidence intervals (CIs). We performed a subgroup analysis according to the gestational age at blood collection: before 27 weeks of gestation, and after 27 weeks of gestation. If the patients had more than one blood collection during gestation, we considered them as different patients for the purpose of the analysis. A p value < 0.05 was considered statistically significant.

RESULTS: Four articles were included in our final analysis. In two studies, the same patients had repeated blood collection during gestation. The total number of patients with CHTN was 775, of which 251 had superimposed preeclampsia and 524 did not. The gestational ages at blood collection in the four studies ranged from 12 to 30 weeks. Two studies had blood collected before 27 weeks of gestation, while four studies (the first two studies plus two others) had blood collected after 27 weeks of gestation. We found a statistically significant difference regarding the sFlt-1/PlGF ratio in CHTN

patients at ≥ 27 weeks of gestation who later developed superimposed preeclampsia vs. those who did not (SMD of 0.43; CI of 0.17 - 0.69) (Figure 1). The quality in prognostic studies tool (QUIPS) and the funnel plot symmetry revealed an overall low risk of bias. The heterogeneity of the studies was high (I2 = 61%).

CONCLUSION: The sFlt-1/PlGF ratio was significantly associated with the development of superimposed preeclampsia in patients with CHTN when measured after 27 weeks of gestation, but not before. Our findings are limited by the high heterogeneity and the small number of included studies.

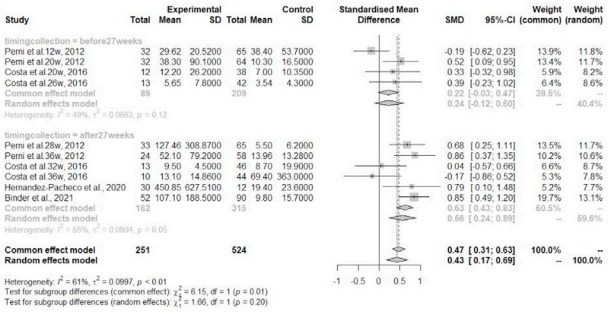

Figure 1. Forest plot of included studies. SD: standard deviation. SMD: standardized mean difference. CI: confidence interval.

588 Characterizing migraine headaches in pregnancy

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OBJECTIVE: To evaluate the frequency and characteristics of headaches in pregnancy.

STUDY DESIGN: This is a single-site, prospective observational study of pregnant patients evaluated for recurrent headaches during prenatal visits between 12/2020 and 9/2022. Patients were evaluated using standardized questions regarding their specific headache symptoms and medications used. Headaches were treated using a sequential medication algorithm, escalating therapy prior to referral to neurology. The frequency and characteristics of headaches across pregnancy as well as obstetric and neonatal outcomes were recorded. Statistical analyses included logistical regression and repeated-measures ANOVA tests.

RESULTS: During the study period, 963 pregnant patients were evaluated for recurrent headaches through 2956 clinic encounters. Of these, 342 (36.54%) patients were diagnosed with only tension-type headaches versus 594 (63.46%) with at least one migraine headache. Patients with tension headaches experienced consistent headache frequency across gestation whereas patients with migraine headaches experienced peak headache frequency in the second trimester (Table 1). Nausea, vomiting and photophobia were the most common symptoms associated with migraine headaches and all 3 decreased in frequency with advancing gestation. Eighty four percent of patients achieved adequate symptom control without escalation of the treatment algorithm beyond treatment using Tylenol with caffeine (Table 1). Only 41 (6.9%) patients required referral to neurology for management of their headaches.

CONCLUSION: Migraine headaches are more common in pregnancy when compared to recurrent tension-type headaches. The majority of migraine headaches can be adequately controlled with a sequential medication algorithm, with only 6.9% requiring referral to neurology.

Table 1: Characteristics of migraine headaches in pregnancy

	Trimester				
	1st	2nd	3rd	Total	p-value
Frequency of tension headache (#Ha/trimester)	4.6 ± 4.1	4.4 ± 4.6	4.1 ± 4.6	4.3 ± 4.5	<0.0001
Frequency of migraine headache (#Ha/trimester)	6.2 ± 5.2	8.4 ± 8.5	7.8 ± 7.8	7.8 ± 7.8	
Migraine-associated symptoms					
Nausea	97 (57.8)	251 (59.6)	190 (49.9)		0.0137
Vomiting	52 (31.3)	108 (25.7)	67 (17.6)		0.0002
Photophobia	98 (59.0)	230 (54.6)	181 (47.5)		0.0049
Phonophobia	13 (7.8)	46 (10.9)	32 (12.7)		0.8895
Aura	18 (10.9)	57 (13.5)	48 (26.5)		0.8277
Maximum medication required*					0.0015
No Treatment	22 (13.3)	26 (6.2)	43 (11.3)	37 (6.2)	
Tylenol	96 (57.8)	162 (38.5)	112 (29.4)	200 (33.7)	
Tylenol with caffeine	35 (21.1)	179 (42.5)	167 (43.8)	262 (44.1)	
Tylenol/caffeine/Reglan/Benadryl	0	27 (6.4)	40 (10.5)	47 (7.9)	
T/c/R/B with Sumatriptan	0	3 (0.7)	12 (3.2)	7 (1.2)	
Neurology referral	13 (7.8)	24 (5.7)	7 (1.8)	41 (6.9)	

Data are presented as n (%) or mean ± stdev
T/c/R/B: Tylenol/caffeine/Reglan/Benadryl
Ha, headache
*Treatment was escalated sequentially according to the following algorithm: Tylenol > Tylenol with caffeine > T/c/R/B > T/c/R/B with sumatriptan > neurology referral

589 Cost-Effectiveness Analysis of a Novel Fetal Vesicoamniotic Shunt - The Vortex Shunt

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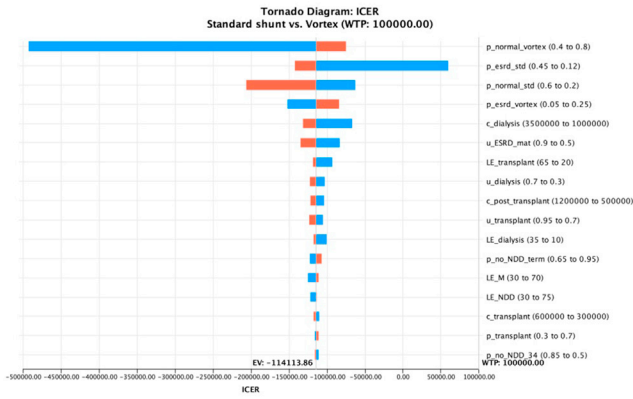
OBJECTIVE: The Vortex shunt, a novel fetal vesico-amniotic shunt (VAS), has shown improved dislodgement characteristics compared to current shunts in in-vitro and pre-clinical studies. We aimed to evaluate the Vortex shunt's potential cost-effectiveness compared to standard shunts.

STUDY DESIGN: We designed a decision-analytic model using TreeAge to compare outcomes and costs in fetuses undergoing VAS for fetal LUTO using the Vortex shunt compared to current shunts. We assumed a 50% dislodgement risk and 36% probability of end-stage renal disease (ESRD) for current shunts per published literature, and compared that to the Vortex shunt's expected 10% dislodgement risk and 18% ESRD rate. We used a theoretical cohort of 1,000 neonates, the number of annual U.S. LUTO cases. Outcomes included ESRD, neurodevelopmental disability (NDD), neonatal death, direct/indirect costs, and quality-adjusted life years (QALYs). A societal perspective with a lifetime horizon was used to determine cost in 2022 U.S. dollars. Maternal and neonatal QALYs were considered and took into account a standard 3% discount rate. The incremental cost-effectiveness ratio (ICER) was determined with a $100,000/QALY willingness to pay threshold. Model inputs were derived from literature, and sensitivity analyses were conducted to assess robustness and account for data uncertainty.

RESULTS: Of 1,000 LUTO pregnancies, the Vortex shunt resulted in 60 fewer cases of ESRD and 10 fewer children with NDD. The Vortex shunt was the dominant strategy indicating lower costs and higher QALYs compared to available shunts. Estimated lifetime savings totaled $132,976 for each fetus undergoing VAS. There were no differences in neonatal death. Sensitivity analyses suggest the Vortex

shunt is more cost effective across a wide range of model inputs and remains the dominant strategy when varying Vortex theoretical shunt dislodgement rate from 10% to 40%.

CONCLUSION: Our model suggests the Vortex shunt may be significantly more cost effective compared to current shunts. The Vortex shunt's actual dislodgement rate and renal outcomes must be validated in future studies.



590 Does Documentation of Postpartum Hemorrhage Risk Stratification Affect Maternal Outcomes?

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OBJECTIVE: Postpartum hemorrhage risk stratification (RS) at admission to labor and delivery is increasingly used as a quality metric. However, a reduction in adverse outcomes with risk stratification has not yet been established. We hypothesized that documented RS by RN or MD as compared to no RS is associated with a significant reduction in composite adverse maternal hemorrhagic outcomes (CAMHO).

STUDY DESIGN: This was a retrospective cohort study of all singleton gestations who delivered at a single-level IV center within a year. Cases were categorized into one of 3 groups: i) no RS (control); ii) RS by RN only, or; iii) RS by MD / RN. The CAMHO included the following: blood loss $\geq$ 1,000 mL, use of uterotonics, mechanical tamponade, surgical management of atony, blood transfusion, hysterectomy, thromboembolism, admission to intensive care unit, and maternal death. Multivariable Poisson regression models were used to calculate relative risks (aRR) adjusted for possible confounders along with 95% confidence intervals (CI).

RESULTS: Of the 4,544 total deliveries, 4,404 (96.9%) were included and among them 783 (18%) had no RS documented, 2,141 (49%) had RS by RN only, and 1,480 (33%) had RS by MD/RN. Overall, 941 (21.5%) of participants had CAMHO with the rate being similar among the groups: 21.5% in no RS group, 20.7% in RN only group, and 22.4% in MD/RN group. Compared to controls, the aRR for CAMHO was 1.01 (95% CI 0.84-1.12 when RS was done by RN and 1.06 (95% CI 0.97-1.18), when RS was done by MD/RN). None of the components of CAMHO, including the administration of uterotonics, differed between the 3 groups.

CONCLUSION: Compared to those who did not have risk stratification prior to delivery, patients who had RS performed in labor by RN alone or by MD/RN had no reduction in adverse maternal hemorrhagic outcomes. Further trials are needed to determine if risk stratification affects behavior and outcomes in labor and delivery.

Table 4: Composite Adverse Maternal Hemorrhagic Outcome (CAMHO)

	No RS (reference) N=783	RS by RN only N=2,141	No RS vs. RN only Adjusted RR	RS by MD N=1,480	No RS vs. MD Adjusted RR
CAMHO	168 (21.5)	442 (20.7)	1.01 (0.84 – 1.21)	331 (22.4)	1.06 (0.97 – 1.18)
EBL or QBL ≥1000 mL	62 (7.9)	149 (7.0)	0.94 (0.70 – 1.28)	108 (7.3)	0.99 (0.84 – 1.18)
Uterotonic use	117 (14.9)	315 (14.7)	1.06 (0.85 – 1.31)	229 (15.5)	1.05 (0.94 – 1.20)
Transfusion	30 (3.8)	78 (3.6)	1.13 (0.73 – 1.75)	62 (4.2)	1.21 (0.95 - 1.54)
Mechanical tamponade	5 (0.6)	9 (0.4)	-	6 (0.4)	-
Surgical intervention	2 (0.3)	10 (0.5)	-	13 (0.9)	-
DVT/PE	3 (0.4)	3 (0.1)	-	1 (0.1)	-
ICU admission	6 (0.8)	9 (0.4)	-	8 (0.5)	-
Hysterectomy	3 (0.4)	10 (0.5)	-	9 (0.6)	-
Maternal death	2 (0.3)	1 (0.1)	-	0	-

Risk ratio not calculated for infrequent events (<5)

*Adjusted for maternal age, race/ethnicity, insurance status, prenatal care, marital status, mode of delivery, and gestational age

** Surgical intervention includes uterine artery ligation, B-lynch sutures, uterine artery embolization

RS, risk stratification; RR, risk ratio; EBL, estimated blood loss; QBL, quantitative blood loss; VTE, venous thromboembolism: ICU, intensive care unit

591 Association of SARS-CoV-2 variant type and placental pathology changes

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OBJECTIVE: Pregnant people infected with SARS CoV-2 are at risk for increased disease severity and complications with level of risk varying across genotypic viral variants (pre-delta, delta, omicron). We sought to investigate the association between viral variant and placental pathology changes in pregnant patients with SARS CoV-2.

STUDY DESIGN: This was a retrospective cohort study of pregnant patients diagnosed with PCR-confirmed SARS CoV-2 (3/2020-4/2022) who delivered at a single institution. Variant type was based on genotypic sequencing data at our institution: pre-delta 3/2020-6/2021, delta 7/2021-12/15/2021, and omicron 12/16/21-4/2022. Primary outcomes were placental pathology findings characteristic of SARS CoV-2 placentitis: chronic histiocytic intervillositis, massive perivillous fibrinoid deposition, and trophoblast necrosis. Secondary outcomes included additional descriptors of placental pathology and infant variables.

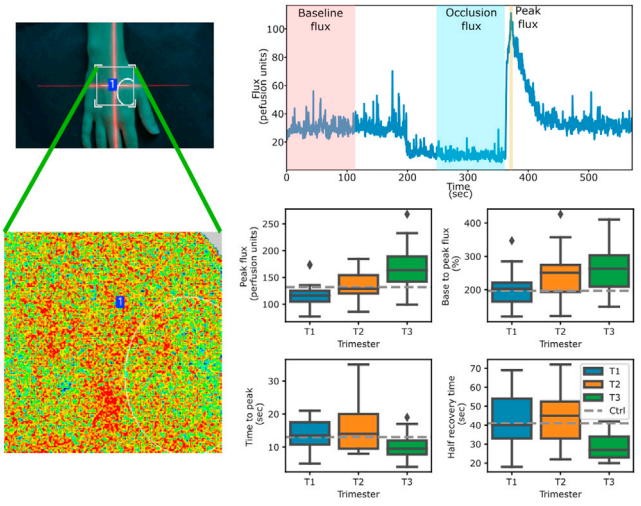
RESULTS: A total of 530 women were included in the study and 406 (76%) had placental pathology available. Among these 406, 37% were admitted with a PCR-confirmed SARS CoV-2 test during the pre-delta period, 26% during delta, and 37% during omicron variant waves. Pregnant women admitted during the omicron wave were more likely to be vaccinated, and had milder disease severity (all $p<0.01$). We found no difference in placental pathology by variant wave. Chorionic villous ischemic changes were the only findings that were significantly different across variant waves, with higher rates seen in pre-delta and delta compared to omicron ($p<0.01$). Infant birthweight $< 10^{th}$ percentile ($p=0.04$) and infant head circumferences $< 10^{th}$ percentile ($p=0.01$) were also significantly different with the highest rates seen in the pre-delta wave.

CONCLUSION: The majority of placental pathology features were similar across SARS CoV-2 variant types. SARS CoV-2 placentitis

overall is a rare occurrence, and in our cohort appeared confined to the pre-delta and delta waves.

	All (n=406)	Pre-delta (n=149)	Delta (n=106)	Omicron (n=151)	P-value
Primary outcome					
SARS-CoV-2 Placentitis	4 (1.0)	1 (0.7)	3 (2.8)	0 (0.0)	0.07
Secondary outcomes					
Placental Weight (adjusted for GA) Low	103 (26.1)	33 (22.9)	32 (31.1)	38 (25.7)	0.57
Expected	239 (60.5)	88 (61.1)	59 (57.3)	92 (62.2)	
High	53 (13.4)	23 (16.0)	12 (11.7)	18 (12.2)	
Chorionic villitis of unknown etiology	34 (8.4)	15 (10.1)	8 (7.6)	11 (7.3)	0.64
Abruption	19 (4.7)	10 (6.7)	4 (3.8)	5 (3.3)	0.33
Maternal vascular malperfusion features					
Chorionic villous ischemic changes	121 (29.8)	59 (39.6)	34 (32.1)	28 (18.5)	<0.01
Decidual arteriopathy or vasculopathy	10 (2.5)	6 (4.0)	3 (2.8)	1 (0.7)	0.16
Chorionic villous infarctions	65 (16.0)	22 (14.8)	16 (15.1)	27 (17.9)	0.73
Fetal vascular malperfusion lesions	27 (6.7)	6 (4.0)	7 (6.6)	14 (9.3)	0.19
Acute chorionic vasculitis	44 (10.8)	14 (9.4)	11 (10.4)	19 (12.6)	0.66
Infant variables					
Birthweight (%tile) mean	44.8±26.4	43.4±25.7	45.4±25.8	45.6±27.6	0.75
Birthweight (<10th %tile)	40 (10.1)	22 (15.1)	6 (5.9)	12 (8.1)	0.04
Head circumference (%tile) mean	49.7±27.8	47.4±28.7	49.5±27.4	51.9±27.1	0.39
Head circumference (<10th %tile)	45 (11.4)	26 (17.8)	8 (7.9)	11 (7.4)	0.01
Length (%tile) mean	52.6±26.3	50.2±25.7	52.1±26.3	55.3±26.8	0.25
Length (<10th %tile)	28 (7.1)	14 (9.6)	6 (5.9)	8 (5.4)	0.33

CONCLUSION: Microvascular reactivity improves from the first to the third trimester of pregnancy, and in pregnant compared to non-pregnant women. Using LSCI, we have, for the first time, presented objective measures of microvascular function in each trimester of pregnancy. These measures can be used to investigate deviations from normal microvascular response in pathologic conditions, such as preeclampsia, a disorder involving widespread endothelial dysfunction.



592 Assessment of skin microvascular response changes throughout pregnancy using laser speckle contrast imaging

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OBJECTIVE: To evaluate changes in skin microvascular response throughout pregnancy using laser speckle contrast imaging (LSCI), a novel non-invasive tool for the *in vivo* assessment of endothelial function, combined with post-occlusive reactive hyperemia (PORH), and to compare measurements with those of non-pregnant healthy subjects.

STUDY DESIGN: Twenty women with a singleton gestation were prospectively enrolled in the first trimester of pregnancy. Microvascular skin blood flow at the dorsal face of the hand was recorded using LSCI coupled with PORH at each trimester of pregnancy (T1, T2 and T3). Skin perfusion was recorded before (baseline flux), during (occlusion flux) and after (peak flux) a 3-min occlusion obtained with an inflated pneumatic cuff. Variations in the parameters of microvascular reactivity across gestation were assessed. Recordings from the third trimester were then compared with parameters obtained in 20 age-matched non-pregnant female controls.

RESULTS: The peak flux after occlusion release and the percentage increase of flux from baseline to the peak significantly increased from T1 to T3 (median change 40.9 Perfusion Units, 95% CI 19.3 - 59.5, p< 0.0001 and mean change 58.2%, 95%CI 24.57-91.84, p=0.005, respectively), and both parameters were higher in T3 compared to controls (p=0.03 and < 0.0001, respectively). The time to reach peak perfusion since cuff release and the half recovery time decreased from T1 to T3 (mean change -3.75 s, 95%CI -6.74 - -0.76, p=0.03, and mean change -12.65 s, 95%CI -19.19 - -6.11, p=0.001) and were lower in pregnant women at T3 compared to controls (p=0.006 and p< 0.0001, respectively).

593 Differences in Neonatal Outcomes Among Isolated and Non-isolated Prenatally Detected Omphaloceles

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OBJECTIVE: An estimated 35-80% of pregnancies with prenatally detected omphaloceles (PDO) have additional anatomic anomalies, referred to as non-isolated omphaloceles. The true prevalence of isolated vs non-isolated omphaloceles remains unclear, as does the risk of perinatal and neonatal death in pregnancies with PDO. This study aimed to evaluate the rate of additional prenatally detected anomalies in pregnancies with PDO and compare neonatal outcomes among isolated and non-isolated PDO, in a modern cohort from a large academic center.

STUDY DESIGN: This was a retrospective cohort study at a large academic referral center from 2007-2023. All pregnancies with confirmed PDO were included. Maternal demographics & comorbidities, and fetal, perinatal, neonatal, & childhood outcomes were obtained. Pregnancies with isolated omphaloceles were compared to those with non-isolated omphaloceles with isolated defined as having no other major fetal structural abnormalities. The primary outcome was survival at 1 year of age. Bivariate analyses were performed, and logistic regression was used to assess the association of isolated omphalocele with the primary outcome.

RESULTS: 102 pregnancies were included, with n=42 (41.1%) isolated omphaloceles and n=60(58.9%) non-isolated. Baseline demographics and medical histories were similar between the groups. Isolated and non-isolated defect sizes were similar (2.9 ± 1.9 cm vs. 3.8 ± 3.3 cm, p=0.17) (Table). Birthweights and mode of delivery were similar between the groups. Isolated omphaloceles were associated with a significantly lower rate of neonatal death within one year (4.8% vs. 26.7%, aOR (95%CI) 0.17 (0.03-0.88)). Neonates

with an isolated omphalocele were also less likely to require intubation (38.1% vs 61.4%, aOR 0.37 (0.15-0.91)).

CONCLUSION: In a cohort of prenatally diagnosed omphaloceles, isolated omphaloceles had 5-fold reduced odds of death by 1 year compared to non-isolated omphaloceles. Isolated omphaloceles were also associated with decreased rate of intubation. These data can aid in counseling families with prenatally detected omphaloceles.

Table - Antenatal, perinatal, and neonatal outcomes compared between pregnancies with isolated and non-isolated omphaloceles. Statistical significance denoted by **bold** type. Data reported as n (%) unless otherwise noted. SD: Standard deviation. GA: gestational age. NICU: Neonatal intensive care unit. IQR: Interquartile range. OR: Odds ratio. CI: Confidence interval. aOR: Adjusted Odds ratio. #Adjusted for gestational age at delivery, aneuploidy, and omphalocele rupture.

Antenatal & Perinatal Outcomes	Isolated Omphalocele (n=42)	Non-isolated Omphalocele (n=60)	*p*
Omphalocele size at detection (cm), mean ± SD	2.9 ± 1.9	3.8 ± 3.3	0.17
Aneuploidy	0 (0%)	5 (8.3%)	0.08
Termination of pregnancy	0 (0%)	0 (0%)	1.00
Liveborn neonate	42 (100%)	60 (100%)	1.00
GA at delivery (weeks), mean ± SD	35.9 ± 3.5	35.9 ± 3.2	0.58
Mode of delivery Cesarean Vaginal	 36 (85.7%) 6 (14.3%)	 49 (81.7%) 11 (18.3%)	0.68
Neonatal birth weight (g), mean ± SD	2673 ± 910	2472 ± 859	0.99
Omphalocele sac ruptured at delivery	2 (4.8%)	5 (8.3%)	0.44
Neonatal Outcomes	**Isolated Omphalocele (n=42)**	**Non-isolated Omphalocele (n=60)**	***p***
NICU admission	42 (100.0%)	56 (95.6%)	0.23
Length of birth hospital admission (days), median [IQR]	29.0 [14.50-69.25]	68.0 [15.0-121.0]	0.093
Overall neonatal & childhood mortality **Death in first 30 days of life** **Death first year of life**	4 (9.5%) 0 (0%) 2 (4.8%)	17 (28.3%) 12 (20.0%) 16 (26.7%)	0.02 <0.01 <0.01
Required intubation	16 (38.1%)	35 (61.4%)	0.02
Intubated at 30 days of life	7 (16.7)	17 (35.4%)	<0.01
Neonatal sepsis	5 (11.9%)	15 (25.0%)	0.13
Pulmonary hypertension	5 (13.5%)	17 (29.3%)	0.07
	OR [95% CI] of Neonatal Death within One Year	**aOR# [95% CI] of Neonatal Death within One Year**	***p* for aOR**
Isolated Omphalocele	0.14 [0.03-0.64]	0.17 [0.03-0.88]	0.03

594 Does Adding Abdominal Circumference to Estimated Fetal Weight Predict Neonatal Morbidity in Growth Restriction?

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OBJECTIVE: SMFM and ACOG diagnostic criteria for fetal growth restriction (FGR) recently added abdominal circumference (AC) < 10th %ile as an additional criterion to traditional estimated fetal weight (EFW) < 10th %ile; however, how well this addition predicts neonatal morbidity (NNM) is unknown. We compared AC or EFW (EFW+AC) to EFW alone in the prediction of composite NNM (CNNM) and small-for-gestational-age (SGA) at birth.

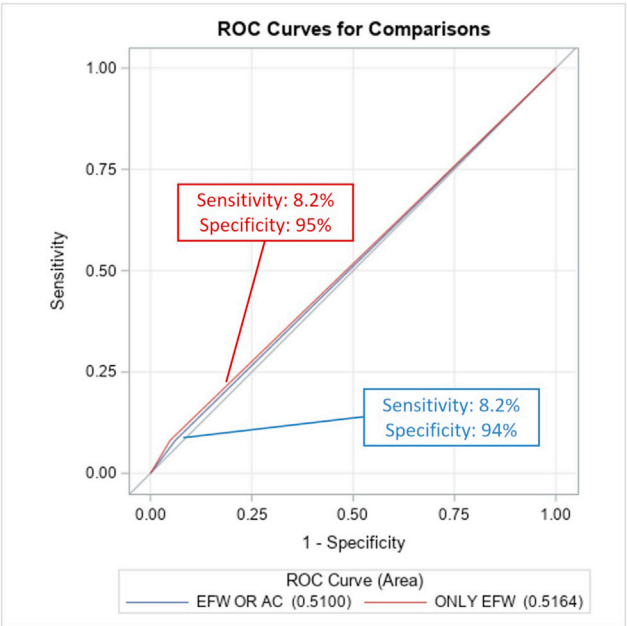
STUDY DESIGN: Secondary analysis of the NICHD Fetal Growth Study-Singletons with research quality ultrasounds from 2,802 low-risk patients at 12 US sites, 2009-2013. The last 3rd trimester ultrasound scan (mean gestational age 36.6 +/- 2.3 wks) was included from non-anomalous fetuses with known neonatal outcomes. Both EFW & AC were evaluated using NICHD charts. Outcomes were: 1) CNNM (see Figure footnote), and 2) SGA, defined as birthweight < 10th %ile by Fenton charts. Logistic regression assessed association of each FGR definition with outcomes and receiver operator characteristic area under the curve (AUC) assessed comparative predictive ability.

RESULTS: Of the 2,397 patients included, 7.4% were SGA at birth and 5.6% of neonates had CNNM; 6.3% of patients met criteria for FGR by EFW+AC vs 5.1% by EFW alone (p< 0.0001). Although both FGR definitions had acceptable discrimination of SGA- EFW+AC: AUC 0.72 [95% CI, 0.68-0.75], EFW alone: AUC 0.69 [95% CI, 0.66-0.73], risk of CNNM was not associated with either definition- EFW+AC: RR 0.75 [95% CI, 0.42-1.4], EFW alone: RR 0.60 [95%CI 0.33-1.1], and both were poor predictors of CNNM- EFW+AC: AUC 0.51 [95% CI, 0.49-0.53], EFW alone: AUC 0.52 [95% CI, 0.49-0.54] (Figure).

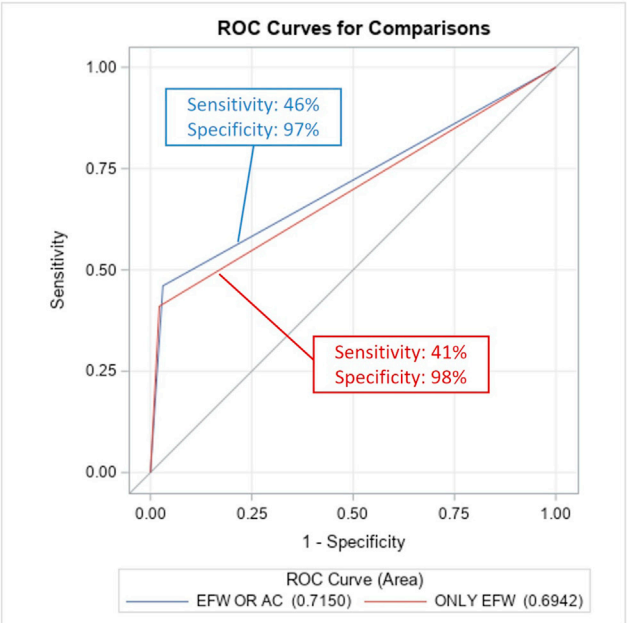
CONCLUSION: The addition of AC < 10th %ile to the traditional definition of FGR significantly increased the incidence of FGR, but it did not improve the prediction of CNNM compared to EFW alone in a low-risk population. Given the use of prenatal resources and risks associated with the diagnosis of FGR, future studies should evaluate whether the new definition is superior in prediction of NNM and so confirm its clinical utility.

Figure. Receiver operator characteristic area under the curves

Composite Neonatal Morbidity*



Small-for-Gestational-Age at Birth



*Composite neonatal morbidity includes any one of the following: acidemia, NICU >3 days, seizures, serious respiratory complications, exchange transfusion, intrapartum aspiration, necrotizing enterocolitis, hypoglycemia, sepsis, retinopathy, encephalopathy, or death.

595 Examining the Relationship between Maternal Preeclampsia and Autism Spectrum Disorder in Childhood: A Cohort Analysis

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OBJECTIVE: Autism spectrum disorder (ASD) is of multifactorial origin, with some factors thought to be related to the prenatal period. Preeclampsia (PET) is a prevalent and serious pregnancy complication that is considered a disease with multiple contributing factors. This study was aimed to investigate the potential association between these two morbidities within our diverse population.

STUDY DESIGN: A population-based cohort analysis using data from community clinics and a tertiary referral hospital was conducted. The analysis specifically focused on deliveries that took place between 2005 and 2017, considering that individuals born after this period might be too young to receive an ASD diagnosis. The aim was to compare the incidence of ASD in offspring based on whether their mothers had been diagnosed with PET of varying severities, or not. To evaluate the cumulative incidence of ASD, we employed a Kaplan-Meier survival curve. Additionally, a Cox proportional hazards model was utilized to account for potential confounding factors.

RESULTS: Out of 165,689 parturient in the study, 4,268 (2.6%) were diagnosed with PET and 1,351 (0.8%) with PET with severe features (severe PET). PET, especially the severe form, was associated with adverse obstetrical outcomes, including intrauterine growth restriction, non-reassuring fetal heart rate tracing, earlier delivery, cesarean delivery, and lower birth weight ($p< 0.001$ for all;table). Out of 862 offspring diagnosed with ASD during childhood, the prevalence was higher in the PET group (0.5% for no PET, 0.8% for PET, and 0.7% for severe PET; $p=0.009$;table). However, the cumulative ASD morbidity derived from the Kaplan-Meier survival curve showed no significant difference among the groups (p-value=0.901; figure). Following adjustment for factors such as gestational age, maternal age, mode of delivery, and gender, the association between PET and ASD was no longer statistically significant.

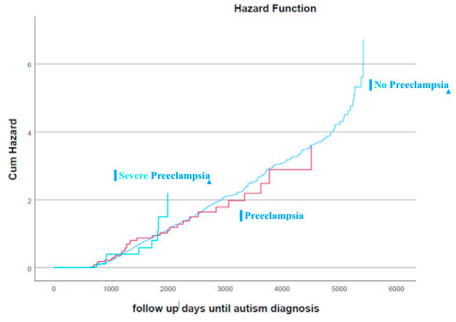
CONCLUSION: In the endeavour to gain a deeper understanding of the obstetrical aspects related to the development of ASD, our findings indicate that PET does not play a contributory role.

Table. Preeclampsia severity, obstetrical characteristics, and childhood autism spectrum disorder prevalence.

	No preeclampsia (n= 160,070)	Preeclampsia (n= 4,268)	Severe preeclampsia (n= 1,351)	P-value
	Obstetrical outcomes			
Maternal age (mean ± SD)	28.5 ± 5.8	29.3 ± 6.4	29.3 ± 7.0	<0.001
Intrauterine growth restriction (%)	1.7	3.8	17.2	<0.001
Cesarean delivery (%)	14.9	24.5	57.8	<0.001
Preterm delivery (<37 weeks)	6.3	10.4	48.9	<0.001
	Autism spectrum disorder			
ASD (cases, %)	817 (0.5)	36 (0.8)	9 (0.7)	0.009
Adjusted HR [a]	1 (reference)	1.02 (95% CI 0.73-1.43, p=0.9)	1.22 (95% CI 0.61-2.44, p=0.57)	

[a] Adjusted for ethnicity, gestational age, maternal age, cesarean section, offspring gender, and fertility treatments.

Figure. Cumulative incidence of offspring ASD diagnoses according to preeclampsia exposure (Log Rank P-value = 0.901).



596 Delivery Outcomes in Triplet and Twin versus Singleton Pregnancies with Short Cervix

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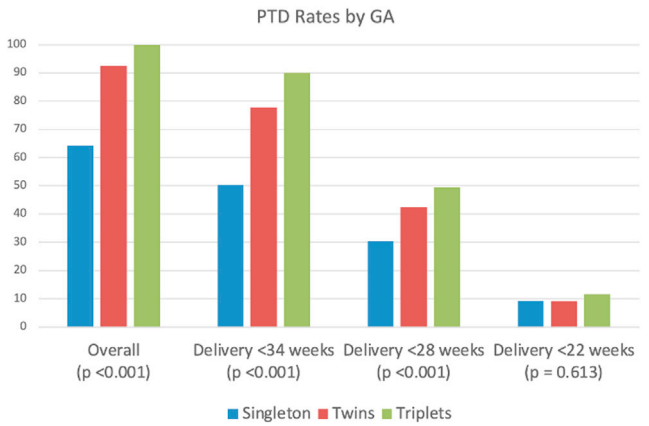
OBJECTIVE: Short cervix and multi-fetal gestation are independent risk factors for spontaneous preterm delivery (PTD). Our study aims to identify the impact of short cervix on delivery timing in triplet and twin pregnancies vs singleton pregnancies.

STUDY DESIGN: This is a retrospective cohort study of pregnant subjects from the National Inpatient Sample Database from 2017-2019 with a delivery encounter diagnosis of short cervix or cervical incompetence. Exclusion criteria were quadruplet or higher order multiple pregnancies and delivery at < 14 weeks. Subjects with singleton, twin, and triplet pregnancies were separated into three groups for comparison. Primary outcome was delivery gestational age (GA)< 22 weeks, < 28 weeks, and < 34 weeks. ANOVA, chi-squared, and logistic and linear regression were used for statistical analysis; p-value < 0.05 was considered statistically significant.

RESULTS: 18,232 singleton, 2,160 twin, and 125 triplet pregnancies with short cervix were identified for analysis. Average GA at delivery for pregnancies with short cervix was lower in triplets (27.3 +/- 4.6 weeks) and twins (28.7 +/- 5.3 weeks) vs singletons (31.7 +/- 6.7 weeks). Rates of PTD < 22 weeks were similar across groups — 11.6% in triplets vs 9.0% in twins vs 9.2% in singleton (p=0.613). At GA < 28 weeks, PTD was higher with triplets (49.6%) and twins (42.5%) vs singleton (30.5%) (p< 0.001). PTD rates at GA < 34 weeks were 89.9% for triplets, 77.7% for twins, and 50.3% for singleton (p< 0.001). These findings persisted when controlling for confounders. PTD was higher in triplets at GA < 28 weeks (aOR 2.16, 95%CI 1.50-3.10) and < 34 weeks (aOR 8.74, 95%CI 4.80-15.93). There remained no association with triplet pregnancy and delivery < 22 weeks in those with short cervix (aOR 1.30, 95%CI 0.76-2.23).

CONCLUSION: Triplet and twin pregnancies with short cervix are associated with increased rates of PTD compared to singleton pregnancies. The difference in PTD rates between triplet, twin, and singleton pregnancies with short cervix is insignificant at GA < 22 weeks, however becomes more salient with advancing gestational age.



597 De novo hypertension in the late postpartum period: a case for extending postpartum care

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OBJECTIVE: To better inform efforts to improve and extend postpartum (PP) care, we sought to determine the incidence of de novo hypertension (HTN) up to 6 months PP in patients without evidence of HTN during pregnancy or immediately PP.

STUDY DESIGN: This retrospective cohort study included all patients delivering within an academic healthcare system. All blood pressures (BPs) from conception to 6 months PP were obtained from the electronic medical record (EMR) and used to construct a variable identifying patients with ≥ 2 systolic BPs ≥ 140 mm Hg or ≥ 2 diastolic BPs ≥ 90 mm Hg from conception to delivery encounter discharge. We excluded patients with an ICD code for chronic HTN or HDP hypertensive disorders of pregnancy in the EMR *or* evidence of HTN by our constructed variable. All BPs from the early PP period (delivery discharge to 6 weeks; EPP) and the late PP period (6 weeks to 6 months; LPP) were used to classify patients into one of four HTN stages per American College of Cardiology definitions (normotensive, elevated, stage 1 and stage 2). HTN stages in the LPP for the subset of patients who were also normotensive in the EPP were then examined to assess the risk of late-onset de novo HTN that would not otherwise be captured during standard postpartum care. We evaluated patient attributes associated with a new diagnosis of HTN in the LPP using X^2 tests.

RESULTS: In total, 18,270 patients were included. Despite normotensive pregnancies, 12.6% were elevated, 11.7% were stage 1, and 1.3% were stage 2 in the LPP (Table). Traditional risk factors for HTN (smoking, diabetes, age ≥ 35, and obesity) were observed more frequently in those who developed de novo HTN. Of the 7,872 patients who were normotensive in the EPP, 9.6% were subsequently classified as elevated, 7.7% as stage 1, and 0.5% as stage 2 HTN.

CONCLUSION: Even in the absence of evidence of HTN during pregnancy and early PP, many patients remain at risk for development of de novo HTN up to 6 months PP. Expansion of postpartum care may provide an opportunity to identify these patients and triage appropriate clinical care.

Blood pressure in the late postpartum period among patients with no evidence of hypertension during pregnancy
Frequency (%)

	Normotensive	Elevated	Stage 1 HTN	Stage 2 HTN	p-value
Total	13,603 (74.5)	2,298 (12.6)	2,133 (11.7)	236 (1.3)	
Age ≥ 35 years	3,184 (72.9)	533 (12.2)	571 (13.1)	77 (1.8)	< 0.001
Public insurance	5,628 (72.5)	1,084 (14.0)	927 (12.0)	127 (1.6)	< 0.001
Race/ethnicity					< 0.001
Hispanic	3,847 (76.7)	643 (12.8)	482 (9.6)	44 (0.9)	
Black, non-Hispanic	1,698 (61.0)	483 (17.4)	507 (18.2)	94 (3.4)	
White, non-Hispanic	6,608 (75.8)	1,032 (11.8)	987 (11.3)	87 (1.0)	
Asian, non-Hispanic	964 (84.5)	77 (6.8)	94 (8.3)	5 (0.4)	
Other, non-Hispanic	486 (78.6)	63 (10.2)	63 (10.2)	6 (1.0)	
Multiparous	8,479 (73.2)	1,503 (13.0)	1,400 (12.1)	182 (1.6)	< 0.001
BMI* ≥30 kg/m²	6,323 (67.0)	1,521 (16.1)	1,424 (15.1)	171 (1.8)	< 0.001
Smoker**	774 (64.3)	199 (16.5)	199 (16.5)	35 (2.9)	< 0.001
Pre-gestational diabetes	298 (66.7)	58 (13.0)	78 (17.5)	13 (2.9)	< 0.001

*Body Mass Index (BMI) as documented at time of delivery admission, in kilograms per meter squared.
**Includes patients who reported current smoking or who quit during pregnancy.

598 Disrupted SERPINA1 Expression in Trophoblast of Patients with Adherent Placentation

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OBJECTIVE: Alpha 1 Antitrypsin (A1AT) is a protease inhibitor encoded by SERPINA1 gene and may contribute to abnormal placentation as demonstrated by increased syncytialization following knockout in cytotrophoblast as previously published from primary trophoblast research. This study aims to assess SERPINA1 expression by immunohistochemistry (IHC) on placental samples from histologically confirmed cases of placenta accreta spectrum (PAS).

STUDY DESIGN: Archived placental specimens in paraffin-embedded blocks were studied. The specimens were from patients without PAS, adherent (Stage 2 basal plate myometrial fibers [BPMF] and Grade 1) placentation and severely adherent (Grade 2 and 3) placentation. Specimens were studied with IHC to assess SERPINA1 expression and localization. Immunostained slides were scanned using a Zeiss Axioscan and semiquantitative scoring (−, +, ++, +++) was performed in the following cell types: extravillous trophoblast, syncytiotrophoblast, cytotrophoblast, villous fibroblast, and endothelium. ANOVA and Fischer's exact test were used to compare patient characteristics. Linear regressions were used to model the relation between placentation (no PAS, adherent or severely adherent), cell count and SERPINA1 expression.

RESULTS: SERPINA1 expression in cytotrophoblast cytoplasm correlated negatively with adherent placenta (coefficient=-0.31 (0.15); 95% confidence interval=0.62, -0.01; p= .001). There was no such relationship for syncytiotrophoblast, extravillous trophoblast, villous fibroblast or endothelium.

CONCLUSION: Current theories for PAS etiology differ, one implies an invasive trophoblast etiology while the other implies maternal disease typically attributed to prior uterine scarring. Our findings suggest A1AT downregulation in the cytoplasm of cytotrophoblasts is associated with adherent placentation. This is consistent with previous observation that A1AT dysfunction is linked with abnormal placental formation and may result in increased syncytialization of the cytotrophoblast, increase in placental mass, and expression of inflammatory cytokines.

599 Differing clinical management for postpartum hemorrhage and associated risk for intensive care unit admission

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OBJECTIVE: Examine the risk of intensive care unit (ICU) admission associated with differing levels of care for postpartum hemorrhage (PPH) at 4 hospitals within 1 healthcare system.

STUDY DESIGN: Retrospective study of patients with PPH from 2013-2023 without placenta accreta spectrum disorders. A unified EHR database was used with standardized definitions and diagnosis codes. PPH was defined by ≥1 of 3 criteria: ICD codes, estimated blood loss ≥1L, or postpartum blood transfusion. PPH treatment was examined in 2 ways as the exposure: (1) dichotomous variable comparing usual care (including oxytocin infusion and uterine massage) vs. additional treatment (carboprost, methylergonovine, misoprostol, tranexamic acid ± procedures) and (2) 4-way comparison between usual care vs. additional treatment further categorized into 3 groups: less aggressive medication (2 types with < 2 doses of either or 1 type with < 3 doses), more aggressive medication (≥3 types, 2 type with ≥2 doses of either, or 1 type with ≥3 doses), and procedures (intrauterine balloon, curettage, O'Leary or B-lynch sutures, uterine artery embolization, and/or hysterectomy ± medications). The outcome was ICU admission. Bivariable and multivariable logistic regression analyses were performed.

RESULTS: Of 10,394 patients with PPH, 5047 (48.6%) had usual care and 5347 (51.4%) had additional treatment (3073 less aggressive medication use, 1347 more aggressive medication use, and 927 with procedures) (Table). In the dichotomous comparison, ICU admission risk was increased >2-fold with additional treatment vs. usual care. In the 4-way comparison, ICU admission risk increased with more aggressive treatment, with >7-fold increased risk with procedures vs. usual care. These increased odds persisted after adjusting for potential confounders. There was significant hospital-level variation in treatment patterns and risk for ICU admission.

CONCLUSION: Increasingly aggressive PPH treatment was associated with higher risks for ICU admission. Whether treatment differences indicate variability in quality of care or associate with other morbidities should be explored.

Table: Risk of ICU admission associated with type of postpartum hemorrhage (PPH) management

	Total	ICU Admission		
PPH Management	n (%)	n (%)	OR (95% CI)	aOR (95% CI)
Usual care	5047 (48.6)	64 (1.3)	Referent	Referent
Additional medications and/or procedures	5347 (51.4)	162 (3.0)	2.43 (1.82-3.26)	3.21 (2.30-4.50)
Less aggressive medication treatment	3073 (29.6)	48 (1.6)	1.23 (0.85-1.80)	1.44 (0.94-2.21)
More aggressive medication treatment	1347 (13.0)	36 (2.7)	2.14 (1.41-3.23)	3.45 (2.12-5.63)
Procedural intervention +/- medications	927 (8.9)	78 (8.4)	7.15 (5.10-10.03)	9.87 (6.48-15.03)

600 Does Mild Gestational Diabetes Increase Risk for Adverse Maternal Pregnancy Outcome?

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OBJECTIVE: Pregnancies complicated by gestational diabetes (GDM) are at a higher risk for adverse maternal pregnancy outcomes (APO). If mild GDM (MGDM), the diagnosis of having an abnormal screening but normal diagnostic oral glucose tolerance test (OGTT), is associated with increased risks of APO is less clear. Using the large multi-site prospective cohort Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-be (nuMoM2b), we investigated if MGDM associates with APO (composite including one or more of the following: hypertensive disorders of pregnancy, cesarean section, preterm premature rupture of membranes, or preterm birth).

STUDY DESIGN: This is a secondary analysis of nuMoM2b. MGDM included 1-hour (hr) screening OGTT >135 mg/dL & < 2 elevated values on the 3-hr diagnostic OGTT (Carpenter-Coustan cutoffs). MGDM was subclassified into 3 groups: no abnormal values on 3-hr (GDM1), only abnormal fasting value on 3-hr (GDM2), & only abnormal post-glucose load value on 3-hr (GDM3). No GDM (NGDM) included normal 1-hr screening test. Wilcoxon Rank-Sum & Chi-square tests compared continuous and categorical variables respectively. Multivariable logistic regression calculating adjusted odds ratio (AOR) controlling for maternal age, race & body mass index were performed.

RESULTS: Of N=9289 subjects, 68.4% (n=6352) had NGDM, 7% (n=651) MGDM, 3% (n=280) GDM1, 0.4% (n=37) GDM2, & 3.6% (n=334) had GDM3 respectively (Table 1a). 39.8% of NGDM, 43.2% MGDM, 40.4% of GDM1, 54% of GDM2, & 44.3% GDM3 had an APO. When controlling for confounders, those with MGDM (AOR 1.4, 95% CI 1.1-1.9, p=0.02) & GDM1 (AOR 1.6, 95% CI 1.1-2.2, p< 0.02) had significantly higher odds of experiencing an APO.

CONCLUSION: It is unequivocal that GDM is associated with APOs. Innovatively, our data demonstrate that those with *no elevated values* on a 3-hr OGTT (theoretically the lowest risk group) had the highest odds of developing an APO. Further studies investigating the mechanistic underpinnings connecting the phenotypes of MGDM and APO development are imperative.

Table 1: Patient demographics and adverse maternal outcomes

1a: Demographics	No GDM[a] n (%) (n= 6352)	GDM1[b], n (%) (n= 280)	GDM2[c] n (%) (n=37)	GDM3[d] n (%) (n=334)	GDM[e] n (%) (n=282)	P-Value
Maternal Age, years Mean ± (SD)	26.43 (5.55)	27.94 (5.38)	28.79 (5.96)	28.73 (5.25)	28.85 (5.58)	<0.001
Race: n (%)	-	-	-	-	-	<0.001
Non-Hispanic White	3869 (60.91%)	171 (61.07%)	19 (51.35%)	212 (63.47%)	179 (53.59%)	
Non-Hispanic Black	895 (14.09%)	15 (5.36%)	4 (10.81%)	25 (7.49%)	27 (8.08%)	
Hispanic	1084 (17.07%)	54 (19.29%)	7 (18.92%)	59 (17.66%)	37 (11.08%)	
Asian	188 (2.96%)	21 (7.50%)	4 (10.81%)	24 (7.19%)	27 (8.08%)	
Other	314 (4.94%)	19 (6.79%)	3 (8.11%)	14 (4.19%)	12 (3.59%)	
1st Trimester Systolic Blood Pressure Mean ± (SD)	109.52 (10.65)	110.46 (11.34)	114.14 (11.79)	110.92 (11.23)	112.29 (12.2)	<0.001
First Trimester Diastolic Blood Pressure Mean ± (SD)	66.12 (8.2)	67.54 (8.5)	69.14 (10.12)	67.14 (8.53)	67.88 (9.15)	<0.001
Assisted Reproductive Technology: n (%)	220 (3.46%)	12 (4.29%)	3 (8.11%)	22 (6.59%)	16 (4.79%)	<0.01
Pre-pregnancy BMI[f] Mean ± (SD)	26.11 (6.18)	26.81 (6.29)	33.12 (7.85)	27.65 (6.93)	28.23 (7.37)	<0.001
Pre-pregnancy BMI: n (%)	-	-	-	-	-	<0.001
< 18.5 (underweight)	142 (2.24%)	9 (3.21%)	1 (2.70%)	2 (0.60%)	7 (2.10%)	
18.5 - <25 (normal weight)	3237 (50.96%)	129 (46.07%)	3 (8.11%)	151 (45.21%)	111 (33.23%)	
25 - <30 (overweight)	1554 (24.46%)	61 (21.79%)	11 (29.73%)	86 (25.75%)	60 (17.96%)	
30 - <35 (obese)	702 (11.05%)	49 (17.50%)	11 (29.73%)	40 (11.98%)	49 (14.67%)	
≥35 (morbidly obese)	581 (9.15%)	28 (10.00%)	11 (29.73%)	50 (14.97%)	49 (14.67%)	
1-hour glucose tolerance test result Mean ± (SD)	100.45 (18.48)	151.68 (12.03)	161.03 (16.51	152.72 (13.96)	172.35 (48.09)	<0.001
1b: Adverse Maternal Outcomes						
Maternal Death[g]: n (%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	NA
Hypertensive Disorder of Pregnancy: n (%)	-	-	-	-	-	<0.01
Eclampsia	3 (0.05%)	1 (0.36%)	0 (0.00%)	1 (0.30%)	0 (0.00%)	
Superimposed preeclampsia	21 (0.33%)	3 (1.07%)	1 (2.70%)	4 (1.20%)	5 (1.50%)	
Severe preeclampsia	165 (2.60%)	6 (2.14%)	1 (2.70%)	6 (1.80%)	14 (4.19%)	
Mild preeclampsia	153 (2.41%)	9 (3.21%)	1 (2.70%)	14 (4.19%)	9 (2.69%)	
New onset antepartum hypertension (HTN)	427 (6.72%)	19 (6.79%)	1 (2.70%)	20 (5.99%)	26 (7.78%)	
New onset intrapartum/postpartum hypertension (HTN)	596 (9.38%)	21 (7.50%)	1 (2.70%)	29 (8.68%)	32 (9.58%)	
No hypertensive disorder	4977 (78.35%)	219 (78.21%)	3 (8.11%)	259 (77.54%)	195 (58.38%)	
Model of Delivery: n (%)	-	-	-	-	-	<0.001
Spontaneous, not augmented	1180 (18.58%)	44 (15.71%)	3 (8.11%)	49 (14.67%)	34 (10.18%)	
Spontaneous, augmented	2667 (41.99%)	119 (42.50%)	10 (27.03%)	140 (41.92%)	96 (28.74%)	
Induced	2114 (33.28%)	98 (35.00%)	16 (43.24%)	118 (35.33%)	129 (38.62%)	
Cesarean without labor or induction	387 (6.09%)	17 (6.07%)	8 (21.62%)	26 (7.78%)	23 (6.89%)	
Cesarean after failed labor or induction	507 (7.98%)	25 (8.93%)	5 (13.51%)	30 (8.98%)	211 (74.82%)	
Premature Prelabor Rupture of Membranes: n(%)	172 (2.7%)	6 (2.14%)	1 (2.70%)	9 (2.69%)	8 (2.40%)	<0.1
Small for gestational age: n (%)	-	-	-	-	-	<0.05
< 5th percentile	293 (4.61%)	14 (5.00%)	2 (5.41%)	7 (2.10%)	9 (2.69%)	
5th to < 10th percentile	400 (6.30%)	9 (3.21%)	1 (2.70%)	14 (4.19%)	26 (7.78%)	
>= 10th percentile	5642 (88.82%)	257 (91.79%)	34 (91.89)	313 (93.71%)	246 (73.65%)	
Preterm delivery <37w0d: n (%)	103 (1.62%)	6 (2.14%)	1 (2.70%)	9 (2.69%)	8 (2.40%)	>0.05

A value >135 mg/dL is defined as an abnormal 1-hour oral glucose tolerance test (OGTT).
Abnormal values on confirmatory 3-hour oral glucose tolerance test are defined by Carpenter-Coustan cutoffs.
[a] No GDM is defined as a 1-hour glucose tolerance test result <135 mg/dL.
[b] GDM1 is defined as an abnormal 1-hour OGTT and no abnormal values on 3-hour OGTT.
[c] GDM2 is defined as an abnormal 1-hour OGTT and an abnormal fasting value n 3-hour OGTT.
[d] GDM3 is defined as an abnormal 1-hour OGTT and an abnormal post-glucose load value on 3-hour OGTT.
[e] GDM is defined as a 1-hour OGTT > 200 mg/dL or an abnormal 1-hour OGTT and >2 abnormal values on confirmatory 3-hour OGTT.
[f] BMI, body mass index.
[g] Maternal mortality defined as maternal death during pregnancy or the first year postpartum.

601 Evolution of hypertension stages in pregnancy and postpartum from 2013-2022

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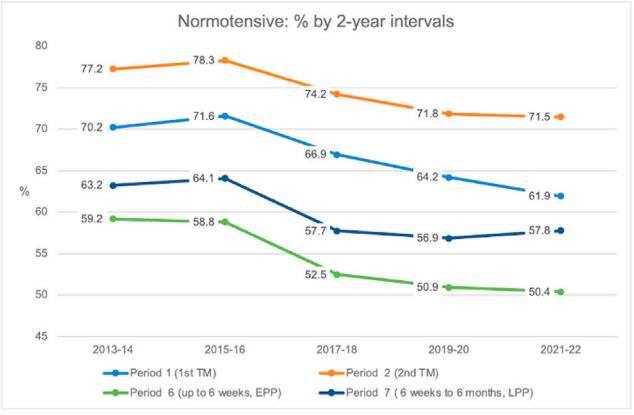
OBJECTIVE: We aimed to assess changes over time in the distribution of ACC/AHA hypertension (HTN) stages during pregnancy and postpartum (PP) from 2013-2022.

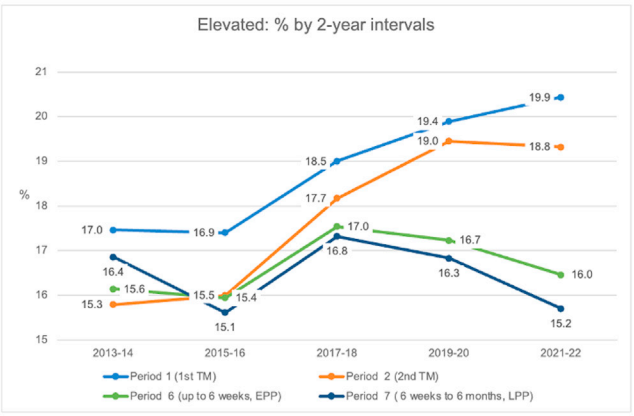
STUDY DESIGN: This was a retrospective cohort study of pregnancies within one healthcare system. Deliveries from 2013-2022 were analyzed in 2-year intervals. Every blood pressure (BP) was obtained from electronic medical records. Mean systolic (SBP) and diastolic (DBP) BPs were used to classify patients as normotensive (SBP < 120 mm Hg and DBP < 80mm Hg), elevated (SBP 120-129 mm Hg and DBP < 80 mm Hg), stage 1 (SBP 130-139 mm Hg or DBP 80-89 mm Hg), or stage 2 (SBP ≥ 140 mm Hg or DBP ≥90 mm Hg) per the ACC/AHA 2017 HTN guidelines for each of 7 discrete pregnancy periods: 1 = 1st trimester (TM), 2 = 2nd TM, 3 = 3rd TM, 4 = delivery admission to delivery, 5 = delivery to delivery discharge, 6 = up to 6 weeks (early) PP (EPP) and 7 = 6 weeks to 6 months (late) PP (LPP). HTN stages were reported by pregnancy periods and 2-year delivery intervals. Changes in HTN over time were computed.

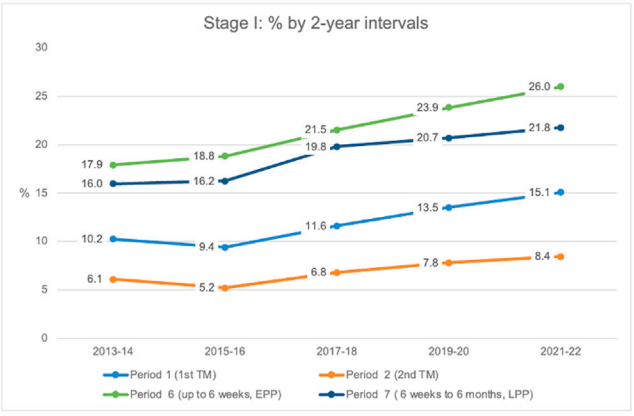
RESULTS: A total of 108,924 deliveries from 2013-2022 were included. The percentage of patients with BPs available for the 7 pregnancy periods ranged from 41.2% in the LPP to 99.5% for

period 5, but the proportion of patients contributing data did not change across the study. Over the 10-year interval, a decrease in normotensive BP was observed for all periods with largest decreases found in the EPP period from 59.2% in 2013-2014 to 50.4% in 2021-2022 (Δ-8.8%) and the 1st TM from 70.2% in 2013-2014 to 61.9% in 2021-2022 (Δ-8.3%). Elevated BPs and stage 1 HTN increased for every pregnancy period, most notably for elevated BPs in the 2nd TM (15.3% in 2013-2014 to 18.8% in 2021-2022: Δ+2.9%) and for stage 1 HTN in the EPP (17.9% in 2013-2014 to 26.0% in 2021-2022: Δ+8.2%).

CONCLUSION: The proportion of patients with elevated BPs or stage 1 HTN increased over the study period, with the most profound changes occurring in early pregnancy and early postpartum. Further exploration is needed to assess how maternal attributes may contribute to these observed changes in BP.







602 Fetal 'late bloomers' — factors and outcomes associated with apparent resolution of fetal growth restriction

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OBJECTIVE: To evaluate characteristics associated with apparent resolution of fetal growth restriction (FGR) and assess risk of adverse pregnancy outcomes (APO) among those with resolution.

STUDY DESIGN: Passive prospective cohort analysis of singleton non-anomalous pregnancies meeting Delphi consensus-based FGR criteria at a single academic tertiary care institution 2011-2020. FGR resolution was defined as a birthweight $^{3}3^{rd}$ centile in combination with a lapse of ≥3 weeks between the last ultrasound meeting consensus criteria for FGR and delivery. The primary composite APO includes perinatal demise and/or poor condition at birth: 5-min Apgar< 7, cord pH ≤7.10, or base excess ≥12. Regression analyses were undertaken to identify factors associated with FGR resolution and those associated with the primary outcome.

RESULTS: Of 901 pregnancies meeting Delphi consensus criteria for FGR, ongoing sonographic surveillance revealed apparent resolution of FGR in 74 (8%) pregnancies. The median time since FGR criteria was last met and delivery was 5.9 (IQR 4.2, 8.0) weeks. Resolution was more likely among those with isolated abdominal circumference < 3rd centile at diagnosis (RR 2.90, 95%CI 1.87-4.49). Those with hypertensive disorders of pregnancy (RR 0.21, 95%CI 0.10-0.41), male fetal sex (RR 0.37, 95%CI 0.22-0.63), and absent/reversed umbilical artery end-diastolic flow at the time of FGR diagnosis (RR 0.09, 95%CI 0.01-0.61) were less likely to have resolution. 173/901 pregnancies (19%) had APO: 5/74 (7%) with apparent resolution of FGR vs 168/827 (20%) without (RR 0.33, 95%CI 0.14-0.78). We failed to find an independent association between resolution of FGR and APO (Figure).

CONCLUSION: We identified four characteristics associated with apparent resolution of FGR and found no evidence its resolution is associated with APO. Further investigation in cohorts with more cases of FGR resolution is warranted. Confirmation of our findings would provide evidence that rigorous antenatal testing for these pregnancies may be safely discontinued and indicate risks associated with their iatrogenic early delivery safely avoided.

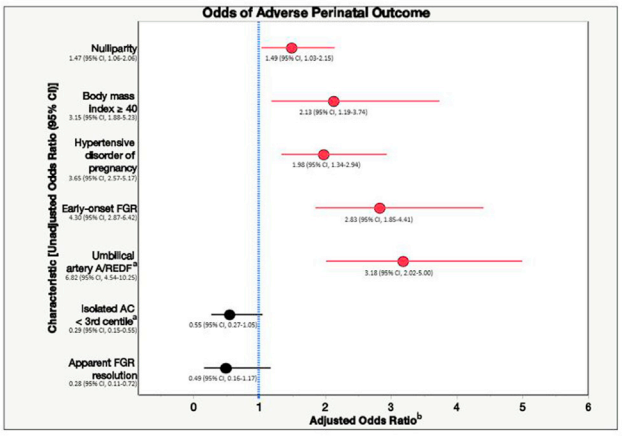

Figure. Odds of composite adverse perinatal outcome defined as perinatal demise and/or poor condition at birth: cord arterial pH ≤ 7.1, cord arterial base excess ≥ 12, 5-minute Apgar < 7. The bias-corrected bootstrapped (1000 replicates) area under the curve for the 7-factor model is 0.78 (95% CI 0.73-0.81). FGR, fetal growth restriction; A/REDF, absent/reversed end diastolic flow; AC, abdominal circumference; OR, odds ratio; [a]At the time of FGR diagnosis; [b]Adjusted for the other 6 covariates in the model

603 Differences in dosing strategies and perinatal outcomes for pregnant persons on buprenorphine compared with buprenorphine-naloxone

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OBJECTIVE: There is insufficient data on buprenorphine-naloxone (BUP-NA) in pregnancy, furthermore there is limited data to guide dosing strategies for medications for opioid use disorder (MOUD) beyond withdrawal symptoms. This study sought to compare perinatal outcomes between buprenorphine (BUP) and BUP-NA along with evaluating dosing alterations in pregnancy.

STUDY DESIGN: Retrospective single institution cohort study of pregnant persons with OUD who delivered between 2017 and 2023. Patients were divided based on MOUD: BUP vs BUP-NA. Exclusion criteria were no MOUD or methadone use for MOUD. Patient characteristics, obstetric and neonatal outcomes were collected, along with dosing requirements at the start of MOUD in pregnancy and at delivery. Groups were compared groups using Chi-square, McNemar test, and t-tests with statistical significance defined as $p < 0.05$.

RESULTS: 255 patients were identified. No differences were found comparing perinatal outcomes except for active drug use during pregnancy (p=0.04) (Table 1). Obesity (p=0.25), AMA (p=0.59), government assisted insurance (p=0.13), race/ethnicity (p=0.82), and rate of neonatal opioid withdrawal syndrome (NOWS) (p=.97) were similar. Changes in MOUD dosing occurred in 50.6% of patients. Initially, 50.5% of patients were on a split dosing strategy, and the rate increased by 17.5% by delivery, with 68% of patients requiring split dosing ($p< 0.01$). There was no difference in dosing frequencies between groups in the beginning of pregnancy versus delivery. More patients taking BUP-NA (69%) required an increase in dosage during pregnancy vs BUP (46.1%, $p < 0.01$). The frequency of weaning between the two groups (p=0.523) was similar with the majority (73.5%) not weaning.

CONCLUSION: Perinatal outcomes including NOWS were similar between BUP and BUP-NA in our cohort, supporting the growing literature of safety of BUP-NA in pregnancy. Split dosing strategies were required more frequently throughout pregnancy for all patients, however patients taking BUP-NA may need increased dosages during pregnancy compared to patients taking BUP.

	Buprenorphine (n=63)	Buprenorphine/naloxone (n=192)	p-value
Pregnancy induced hypertension	26 (13.5%)	8 (12.7%)	0.86
Gestational diabetes	14 (7.3%)	2 (3.2%)	0.37
Fetal Growth Restriction	9 (4.7%)	5 (7.9%)	0.34
Active illicit drug use	52 (27.1%)	9 (14.3%)	0.04
Any OB complication	16 (8.3%)	6 (9.5%)	0.77
PTB <37 weeks	23 (12.0%)	10 (15.9%)	0.43
Cesarean Delivery	85 (45.0%)	26 (41.3%)	0.61
Discharge dose (mg)	11.4 (±7.1)	12.7 (±7.6)	0.32
Birth weight (g)	3060 (±598)	3022 (±623)	0.98
5 min APGAR <7	7 (3.7%)	1 (1.6%)	0.68
Neonatal opioid withdrawal syndrome (NOWS)	148 (79.1%)	50 (79.4%)	0.97
Pharmacologic treatment for NOWS	75 (40.1%)	25 (39.7%)	0.84
NOWS requiring morphine	43 (22.4%)	12 (19%)	0.58
Admitted to NICU	119 (62.6%)	35 (55.6%)	0.32
Infant hospital LOS (days)	12.5 (±12.1)	10.4 (±12.0)	0.48

604 Frequency of preterm birth after regional maternal transport for threatened preterm birth

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OBJECTIVE: Perinatal regionalization, which allows for inpatient maternal transport in the context of predicted need for a higher level of neonatal care, has been demonstrated to reduce infant morbidity and mortality. However, some maternal transports will ultimately prove unnecessary in the context of threatened preterm birth (PTB). Here, we investigate maternal characteristics of those transported for threatened PTB from community-based hospitals to our tertiary academic center.

STUDY DESIGN: This was a retrospective cohort study of maternal transports for threatened PTB without PPROM between 21+0 and 35+6 weeks from 2019-2022. Chart review was used to collect gestational age (GA) at transport, prior obstetric history, and current pregnancy course and outcome. Fisher's exact and t-test were used for statistical analyses, with significance set at a p- value of < 0.05.

RESULTS: There were 502 maternal transports to our institution from 17 different community hospitals. Of these, 215 transports were for threatened PTB and/or PPROM, of which 151 were for threatened PTB alone. The average GA of transport was 31+3 weeks, and in 83% of cases, betamethasone was initiated before transport. Table 1 demonstrates the obstetric parity of the cohort overall and stratified by whether or not delivery occurred during transport hospitalization. As shown, there were no differences in obstetric history between the two groups. Most patients did not deliver during the transport hospitalization (96/151, 65%), though 65% ultimately delivered < 37 weeks. Only 5 patients delivered within 1 week of

discharge from the transport hospitalization. The cervical exam prior to transport was documented in 114 cases and was greater in those who delivered during the transport hospitalization (3.1 cm vs. 1.8 cm, p= < .001).

CONCLUSION: Prediction of need for acute transport for threatened PTB remains challenging regardless of prior obstetric history. While the majority of transports did not deliver during transport hospitalization, risk assessment for PTB was reasonably accurate, as 65% of the cohort ultimately delivered < 37 weeks.

Table 1: Obstetrical parity with respect to outcome during transport hospitalization

	Delivered, transport hospitalization %, (n)	Undelivered, transport hospitalization %, (n)	
Total (n= 151)	35.1(53)	64.9 (98)	
Nulliparous	49.1 (26)	40.8 (40)	
Multiparous	50.9 (27)	59.22 (58)	*p-value*
Prior Term Birth	74.1 (20)	56.9 (33)	*0.39*
Only Prior PTB	18.5 (5)	20.7 (12)	*0.15*
Mixed (Term and PTB)	7.4 (2)	22.4 (13)	*0.58*

605 Fetal extraction time during intrapartum cesarean deliveries and the risk of neonatal acidemia

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OBJECTIVE: Prolonged fetal extraction time, particularly during intrapartum cesarean delivery (CD), can be anxiety-provoking for providers, yet there is little known about neonatal risks with prolonged extraction times. We sought to evaluate the relationship between fetal extraction time and neonatal acidemia.

STUDY DESIGN: This is a case-control study of all intrapartum CD from June 2018-2021 at a single tertiary academic hospital with universal cord gas collection. Cases were patients with neonatal acidemia defined as umbilical artery (UA) pH < 7.1. Controls were patients with neonatal UA pH ≥7.1. We compared rates of neonatal acidemia between cases and controls at different fetal extraction times (defined as the duration of time from hysterotomy to delivery in minutes) using < 1 minute as a reference. Backwards stepwise multivariable logistic regression was used to adjust for potential confounders.

RESULTS: Of 1057 intrapartum CD, 107 (10.1%) were complicated by neonatal acidemia. The median (IQR) fetal extraction time was 1 minute (1-2) for both cases and controls (p=0.79). Cases and controls differed with respect to rates of pregestational diabetes, emergent cesarean delivery, general anesthesia, non-reassuring fetal status at time of delivery, and time from skin incision to hysterotomy. After adjusting for skin to uterine time and non-reassuring fetal status, the risk of neonatal acidemia did not increase until fetal extraction times were ≥ 5 minutes (aOR 2.86, 95% CI 1.02-8.01).

CONCLUSION: The risk for neonatal acidemia at the time of unscheduled intrapartum cesarean delivery is increased when fetal extraction is prolonged ≥ 5 minutes. These findings provide a reasonable period during which the primary surgeon can troubleshoot the extraction without impact on neonatal acidemia as well as a timeframe for surgeons to start enlisting additional assistance and employing aggressive tactics, such as hysterotomy extension, to expedite delivery.

Table 1. Fetal extraction times and risk of neonatal acidemia

Fetal extraction time	Neonatal Acidemia n=107	No Neonatal Acidemia n=950	OR (95%CI)	aOR[1] (95%CI)
<1 minute (n=169)	16 (15.0)	153 (16.1)	*ref*	*ref*
1 minute (n=465)	48 (44.9)	417 (43.9)	1.10 (0.59-2.14)	1.35 (0.73-2.49)
2 minutes (n=228)	19 (17.8)	209 (22.0)	0.87 (0.41-1.87)	1.54 (0.72-3.30)
3 minutes (n=95)	6 (5.6)	89 (9.4)	0.64 (0.20-1.82)	1.01 (0.36-2.86)
4 minutes (n=49)	7 (6.5)	42 (4.4)	1.59 (0.52-4.42)	2.63 (0.89-7.76)
>/=5 minutes (n=51)	**11 (10.3)**	**40 (4.2)**	**2.63 (1.01-6.6)**	**2.86 (1.02-8.01)**

[1]*adjusted for skin to uterine time and non-reassuring fetal status; Data represent n(%)*

606 Do social determinants of health influence prescribing practices of low dose aspirin prophylaxis?

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OBJECTIVE: To evaluate social determinants of heath (SDH) and their effect on provider practices in prescribing low dose aspirin (LDA) for preeclampsia prophylaxis.

STUDY DESIGN: Retrospective cohort of patients who met SMFM criteria to recommend LDA prophylaxis that had live births at a single academic center between January - May 2021. Exclusion criteria: maternal age < 18 years and initiation of prenatal care in 3rd trimester. Patient characteristics, including SDH, criteria for LDA prophylaxis, timing of first prenatal visit and LDA initiation were collected. Statistical analysis was performed using Chi square, Fisher's exact, and student t-tests (significance defined as p < 0.05) to compare different SDH and LDA prescribing practices.

RESULTS: During the study period, 55% (N=375/622) patients met inclusion criteria. Race and primary language did not affect appropriate prescribing practices of LDA (Table 1). When LDA prescribing rates were compared between different race categories (e.g., African American race or Non-white race), there was no difference. Most patients initiated prenatal care prior to 16 weeks (86.1%); 77.8% of those prescribed LDA were optimally initiated prior to 16 weeks. LDA prescription did not differ between those that initiated care before or after 16 weeks (31.9% vs. 26.9%, p = 0.473). The relationship between prenatal care initiation and LDA prescription did not differ across any SDH category. Government assisted insurance decreased the likelihood of correct LDA prescription by providers (p = 0.041). There was a 37% lower chance of being appropriately prescribed LDA prophylaxis for patients with government assisted insurance (OR 0.63, 95% CI 0.41-0.98).

CONCLUSION: Only one social determinant of heath (SDH), government assisted insurance, was associated with lower prescription rate of LDA in patients at high risk of developing preeclampsia.

Do social determinants of health influence prescribing practices of low dose aspirin prophylaxis?

Table 1. Low dose aspirin prescribing practices by social determinants of health.

Factor	Prescribed Aspirin (n=117)	Not Prescribed Aspirin (n=258)	p-value
African American Race	19 (17.4%)	45 (16.2%)	0.774
Non-White Race	51 (43.6%)	118 (45.7%)	0.699
English Speaking	109 (93.2%)	233 (90.3%)	0.366
Government assisted insurance	52 (44.4%)	144 (55.8%)	0.041
AMA (≥35 years)	50 (42.7%)	87 (33.7%)	0.093
Gestational Age (wks) at first prenatal visit	10.8 (± 4.5)	10.9 (±5.2)	0.815
Initiation of prenatal care <16 weeks GA	103 (88.0%)	220 (85.3%)	0.473

*Data represented at n(%) or mean (±SD)

607 Differences in provider practices in recommending low dose aspirin for preeclampsia prophylaxis

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OBJECTIVE: We sought to evaluate differences of recommending low dose aspirin (LDA) prophylaxis (ppx) for preeclampsia prevention among providers.

STUDY DESIGN: Retrospective study of patients who received prenatal care and delivered at a single academic center between Jan - May 2021. Exclusion criteria: age < 18 years, transfer of care >28 weeks, and delivery < 20 wks gestation. Patient characteristics, ppx risk factor (RF) criteria based on SMFM guidance, OB provider type and prescribing practices were collected. Statistical analysis was performed using Chi square, Fisher's exact and multivariate logistic regression (significance, $p < 0.05$).

RESULTS: Of the 622 patients in the study period, 375 patients met criteria to initiate LDA ppx (i.e., ≥1 high RF or ≥2 moderate RFs) and were included in the analysis. All providers were more likely to prescribe LDA in patients with ≥1 high RF compared to ≥2 moderate RFs (< 0.01). There was no difference in rates of LDA ppx based on race, insurance type, obesity (BMI ≥30), class III obesity (BMI ≥40), and AMA. Providers who were more likely to recommend LDA were MFM (58.4%), any high risk practice (MFM/high risk resident clinic) (58.6%), and all resident clinics (44.7%), whereas general OB/GYN (12.0%), any general OB practice (19.7%) and midwives (6.8%) recommended LDA at lower rates (p< 0.01). The difference in provider type recommendation for those with ≥1 high RF (p< 0.01) and with ≥2 moderate RFs (p< 0.01) remained significant across provider type. (Table 1) In multivariate regression analysis (p< 0.01), the predictors of LDA recommendation were general OB/GYN provider (OR 0.16 (95%CI 0.06-0.46),p< 0.01), midwife provider (OR 0.11 (95%CI 0.04-0.32),p< 0.01), gravidity (OR 0.85 (95%CI 0.73-0.98)p=0.04), and moderate risk factors only (OR 0.10 (95%CI 0.05-0.18)p< 0.01).

CONCLUSION: MFM specialists and resident clinics appropriately recommended LDA more often than general OB/GYN and midwife practitioners, regardless of whether patients met criteria with ≥1 high RF or ≥2 moderate RFs.

Table 1. Provider practices in recommendation of low dose aspirin prophylaxis for preeclampsia prevention during pregnancy divided by criteria met for prophylaxis.

Low Dose Aspirin	Provider					P
	Resident	HROB	General OB/GYN	MFM	CNM	
Prescribed						
≥1 High Risk Factor	6 (85.7%)	13 (81.2%)	10 (52.6%)	49 (75.4%)	4 (28.6%)	0.003
≥2 Moderate Risk Factors	9 (24.3%)	6 (37.5%)	0 (0.0%)	17 (35.4%)	3 (3.4%)	<0.001
Not Prescribed						
≥1 High Risk Factor	1 (14.3%)	3 (18.8%)	9 (47.4%)	16 (24.6%)	10 (71.4%)	0.003
≥2 Moderate Risk Factors	28 (75.7%)	10 (62.5%)	64 (100%)	31 (64.6%)	86 (96.6%)	<0.001

608 Fully quantitative numeric cervical softening device at 37 weeks: Information for labor management decision making?

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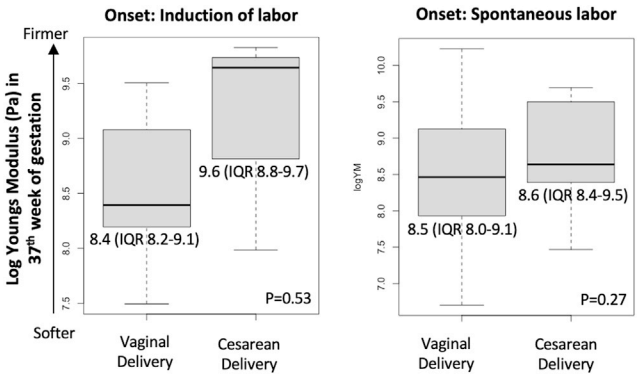
OBJECTIVE: To utilize a novel, fully quantitative cervical elastography system (FQ-CES) which numerically quantifies cervical stiffness to examine association with onset of labor and mode of delivery.

STUDY DESIGN: This is a prospective cohort study of pregnant patients who underwent FQ-CES in the 37th week of pregnancy at a routine prenatal visit. We invented FQ-CES, which modifies a transvaginal ultrasound probe to quantify both pressure applied and tissue deformation, thereby yielding a fully quantified strain-based elastography system that provides a numeric quantification (Young's modulus) of cervical tissue stiffness. This system is operator independent and can be compared across patients and within patients over time. Singleton pregnancies without indication for delivery at 37 weeks were enrolled and FQ-CES were obtained. Patients remained enrolled regardless of their eventual timing or indications for delivery. The primary outcomes were onset of labor (spontaneous-SOL or induced IOL) and mode of delivery. Young's modulus was log transformed to achieve normality of distribution (logYM). The Wilcoxon rank sum test was performed to assess the tissue FQ-CES with type of labor and mode of delivery.

RESULTS: Of 149 patients included, 56 (37.5%) had IOL and 94 (63.1%) had SOL. 132 (88.5%) had vaginal birth and 17(11.4%) had cesarean birth. Cervical elastography at 37 weeks was not significantly different between groups but was nominally higher (indicating a firmer cervix) in those who underwent induction of labor that ended in cesarean delivery.

CONCLUSION: An operator-independent fully quantitative cervical elastography measurement at 37 weeks could be used to identify individuals at higher risk for cesarean birth and allow time to modify clinical care to optimize opportunity for vaginal delivery. Future intervention studies such as outpatient cervical ripening or modified inpatient ripening protocols based on cervical elastography measurement are warranted.



609 Does integrating diabetic educators in pregnancy management program improve glycemic control?

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OBJECTIVE: To determine if integrating diabetic educators into pregnancy care improves glycemic control.

STUDY DESIGN: A formalized diabetes in pregnancy program was developed in 2019 involving 2 diabetic educators supervised by MFM provider & secure electronic messaging. We hypothesize that integration of diabetes educators improves glycemic control, & tested this using a pre-post study design. Prior to establishment of the program (10/1/2018-9/30/2019; PRE), communication was via telephone messaging with the MFM provider. The POST period was a year after the program began (10/1/2021-9/30/2022). Variables of interest were volume of patients seen, # of ultrasounds per patient, demographics, medication initiation, percentage of time of logs in goal, delivery medication advice & documentation of compliance. This study was IRB exempt.

RESULTS: In the PRE period, 87 women were seen for diabetes vs. 271 in the POST. There were no significant differences in age (32 vs 33, P=0.88), race/ethnicity (58.6% vs 59.8%, Non-Hispanic white), gestational age (weeks) of diagnosis (28 vs 29, P-0.09) or public insurance status (17.2% vs 17.7 %, P=0.85). (Table) In the POST group, there were significantly more women who were pre-gestational diabetic (14.8% vs 4.6%, P=0.01) & on continuous glucose monitoring (0% vs 6.3%, P=0.017). There was no difference in medication initiation (50.6% vs 56.8%), but a significant shift from Glyburide to Insulin (Table). Average number of scans per patient was not different (2.5 vs 2.1, P=0.37), but more patients only had 1 scan POST (52% vs 34%, P< 0.01). There was better compliance in the POST group with more uploads of glucose logs (average 5 vs 7, P< 0.01), more glucose values in range (81.8% vs 90.9%, P< 0.01) & documented delivery recommendations (29.9% vs 95.3%, P< 0.01). Documented reasons for non-compliance were stopping uploading logs, declining insulin & cancelling appointments.

CONCLUSION: A formalized diabetes in pregnancy program improved glycemic control parameters & resulted in a 3-fold increase in number of patients seen without increasing number of scans per patient.

Table: Comparison of selected maternal demographics & outcomes pre/post program initiation

	Pre-Program (n=87)	Post-Program (n=271)	P-value
Maternal age at first visit	32 (29-37)	33 (30-36)	0.88
Gravidity	2.0 (1.0-3.0)	2.0 (1.0-3.0)	0.71
Parity	0 (0-1)	1 (0-1)	0.14
Race/Ethnicity			
Non-Hispanic White	51 (58.6)	162 (59.8)	0.76
Non-Hispanic Black	2 (2.3)	9 (3.3)	
Non-Hispanic Other	14 (16.1)	53 (19.6)	
Hispanic	10 (11.5)	22 (8.1)	
Unknown/Patient Refused	10 (11.5)	25 (9.23)	
Insurance			
Private	62 (71.3)	211 (77.9)	
Public	15 (17.2)	48 (17.7)	
Uninsured/other/unknown	10 (11.5)	12 (4.4)	0.57
Pre-gestational diabetes	4 (4.6)	40 (14.8)	0.01
On medication at first visit	13 (14.9)	66 (24.4)	0.07
Type of medication at first visit			
Insulin	2 (15.4)	40 (60.6)	<0.01
Glyburide	7 (53.8)	14 (21.2)	
Metformin	2 (14.4)	11 (16.7)	
Medication started during monitoring	44 (50.6)	123 (45.4)	0.40
Insulin	33 (75)	120 (71.4)	<0.01
Glyburide	7 (15.9)	2 (1.3)	
Metformin	4 (9.1)	1 (0.65)	
Continuous glucose monitoring	0 (0)	17 (6.3)	0.017
Number of uploads	5 (1-8)	7 (4-9)	<0.01
Percent of blood glucose at goal at last visit	81.8 (67.7-92.8)	90.9 (75.0-100.0)	<0.01
Noncompliance documented	10 (11.5)	45 (16.6)	0.25
Peri-partum recommendations	26 (29.9)	250 (95.3)	<0.01

610 Environmental exposures and disparities in infant mortality: a positive deviance analysis

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OBJECTIVE: To identify factors that buffer adverse associations between county-level vulnerability and infant mortality disparities.

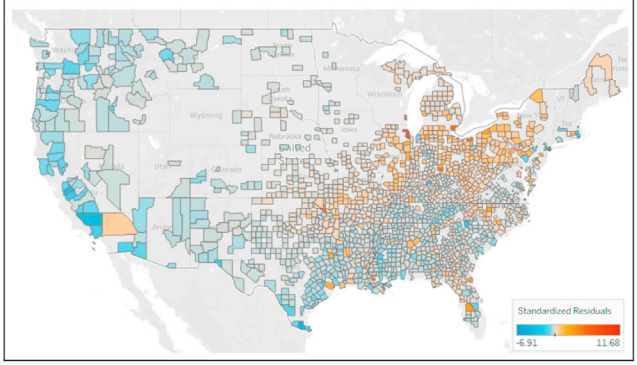
STUDY DESIGN: We conducted a positive deviance analysis of United States vital statistics data from 2017 to 2019, evaluating variation in county Black-white infant mortality difference (BW-IMD) per 1000 live births with Environmental Justice Index (EJI), a CDC index of social vulnerability, health vulnerability, and environmental burden. Using linear regression, we modeled the association between county BW-IMD and EJI. Among counties with above median EJI scores, we identified positive deviant counties (PDC) as those with observed BW-IMD >1.96 standard deviations below predicted. We used Wilcoxon tests to compare median EJI component measures between PDC and typical counties (TC), with p values < 0.001 considered to be statistically significant.

RESULTS: BW-IMD data was available for 2922 US counties, with a median BW-IMD of 6 per 1000 (range 2.6 to 11.6). Higher EJI scores were associated with higher BW-IMD (p< .0001). Among 1794 counties with EJI >50% (Figure), 24 (1.3%) were PDC. Compared with TC, PDC had higher proportions of residents who were not non-Hispanic white, spoke English "less than well," rented their homes, and had household income < $75,000. PDC had fewer residents without internet access, who were 65 or older, had a

disability, or lived in a mobile home. Chronic conditions were also less prevalent, including cancer, high blood pressure, and poor mental health. Overall environmental burden percentile was higher in PDC, with higher percentile scores for air pollution and proximity to transportation infrastructure, but better scores for built environment, including walkability and proximity to green space.

CONCLUSION: Positive deviance analysis identified protective factors for BW-IMD in high EJI counties, including non-White and non-English speaking communities, internet access, population health, walkability, and green space. Policies to strengthen community, wellbeing, and infrastructure have the potential to impact perinatal health disparities.

Figure: We analyzed standardized residuals for the association between Environmental Justice Index and Black-White infant mortality difference to identify positive outliers, counties with lower-than-predicted disparities in infant mortality. For counties with greater-than-median EJI scores, we present standardized residuals, with darker blue indicating lower-than-predicted disparities, and darker orange indicating higher-than-expected disparities.



611 Comparative Effectiveness of Alternate Antibiotic Therapies for Pregnant Patients with Group B Streptococcus Infections

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OBJECTIVE: Group B streptococcus infection is the most common cause of early-onset neonatal sepsis. Intrapartum antibiotic therapy is imperative to minimize maternal-to-fetal transmission of Group B Streptococcus (GBS). Penicillin is the agent of choice, with ampicillin or cefazolin as acceptable alternatives, but there is a paucity of data on the efficacy of alternate antibiotic therapies for penicillin-allergic patients. This study evaluates the effectiveness of alternate antibiotic therapies among pregnant patients at an urban safety net hospital.

STUDY DESIGN: This was a retrospective analysis of GBS+ pregnant patients from 2019 through 2022. Penicillin-allergic patients were matched 1:2 with non-allergic controls. Primary outcomes were GBS positive neonates, neonatal length of stay, GBS septicemia, Apgar scores, neonatal demise, and 30-day neonatal infectious complications (sepsis, deafness, pneumonia, or meningitis). Chi-square and Fischer exact analyses were performed on Stata version 16.1 (StataCorp, College Station, Texas).

RESULTS: 229 GBS+ pregnant patients were analyzed, including 84 penicillin-allergic (36.7%) and 145 non-allergic (63.3%). Patients were treated with vancomycin (n=66, 28.8%), clindamycin if susceptibilities were performed on maternal GBS culture (n=10, 4.4 %), cephalosporins (n=6, 2.6%), or penicillin/ampicillin (n=147, 64.2%). Rates of GBS positive infants were low but varied by antibiotic treatment (p< 0.01): penicillin (0%); vancomycin (0%); clindamycin (20%); and cephalosporins(16.7%). There was a significant difference in 30-day neonatal complications (p=0.03): penicillin (2.0%); vancomycin(0%); clindamycin (10%); and cephalosporins(16.7%) but no difference in length of stay, 1 or 5-minute Apgar scores, or neonatal demise.

CONCLUSION: Antibiotic effectiveness for GBS+ pregnant patients varied slightly by medication, but risk was low in all cohorts. Vancomycin appears to be most effective in reducing neonatal morbidity among penicillin-allergic patients, but alternative antibiotic therapies may also provide adequate coverage with a lower risk of promoting antibiotic resistance.

Table 1: Neonatal Outcomes in GBS positive mothers treated with alternative antibiotic therapies

	Antibiotic, N(%), n=229				
	Vancomycin	Clindamycin	Cephalosporin	Penicillin/Ampicillin	P value
	66 (28.8)	10 (4.4)	6 (2.6)	147 (64.2)	
GBS positive Neonate					
Yes	0 (0)	2 (20.0)	1 (16.7)	0 (0)	**p<0.01**
No	66 (100)	8 (80.0)	5 (83.3)	147 (100)	
Neonatal length of hospital stay					p=0.11
<48 hours	36 (54.6)	5 (50.0)	1 (16.7)	84 (56.1)	
48 hours	20 (30.3)	1 (10.0)	2 (33.3)	38 (25.9)	
72 hours	1 (1.5)	1 (10.0)	1 (16.7)	3 (2.0)	
>72 hours	9 (13.6)	3 (30.0)	2 (33.3)	22 (15.0)	
Birth outcome					p=1.0
Live birth	66 (100)	10 (100)	6(100)	145 (99.3)	
Neonatal demise	0(0)	0(0)	0 (0)	1 (0.7)	
Missing			N=1		
Adverse outcomes w/in 30 days of delivery	0	1 (10.0)	1 (16.7)	3 (2.04)	**p=0.03**
Deafness	0	0	0	1(0.67)	
Meningitis	0	0	1 (16.7)	0	
Pneumonia	0	0	0	1 (0.7)	
Early onset sepsis	0	1 (10.0)	0	1 (0.7)	
Average APGARS			N(SD*)		
1 minute	8.0 (0.1)	6.8 (0.9)	7.4 (0.9)	7.6 (0.1)	p=0.10
5 minute	8.9 (0.1)	8.8 (0.2)	8.4 (0.6)	8.7 (0.1)	p=0.25

*Standard Deviation

612 Disparities in Mortality and Non-Transfusion Severe Maternal Morbidity Trends During Delivery Hospitalizations by Payer Status

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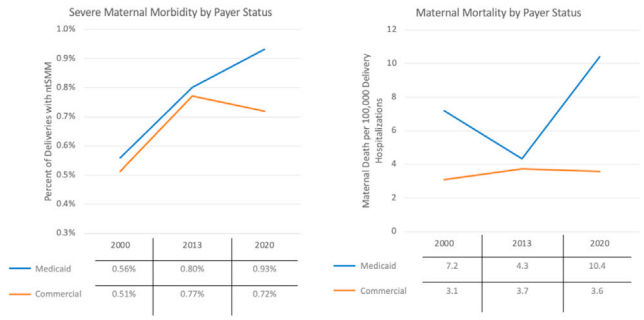
OBJECTIVE: Non-transfusion severe maternal morbidity (ntSMM) and maternal mortality are key indicators of population health with a disparate burden on certain socioeconomic groups. We sought to compare temporal trends in ntSMM and mortality among births by payer status.

STUDY DESIGN: This cross-sectional study analyzed data from the 2000-2020 Nationwide Inpatient Sample. Mortality and ntSMM (per Centers for Disease Control and Prevention criteria) trends were stratified by payer status (Medicaid versus commercial) and analyzed using joinpoint regression estimating the average annual percent change (AAPC) with 95% confidence intervals (CI). Logistic regression models were performed to estimate adjusted odds ratios (aORs) for maternal mortality and ntSMM accounting for demographic, hospital, and clinical factors.

RESULTS: Of 80.2 million births, 41.3% and 52.1% were Medicaid and commercially insured births, respectively. The rate of ntSMM increased steadily from 56 to 93 per 100,000 Medicaid births (AAPC

2.6%, 95% CI 1.9%, 3.4%). Among the commercially insured, ntSMM rates significantly increased from 51 to 77 per 100,000 births in 2000-2013 (AAPC 3.3%, 95% CI 2.4%, 5.0%), but later significantly decreased from 77 to 72 per 100,000 births in 2013-2020 (AAPC -2.3%, 95% CI -6.7%, -0.1%). Mortality did not significantly change over this time (Figure). Specifically, maternal deaths among individuals with Medicaid did not increase between 2000-2020 (AAPC 2.7%, 95% CI -0.5%, 6.2%) or between 2014-2020 (AAPC 12.1%, 95% CI -0.2%, 48.8%). In adjusted analysis, Medicaid births had 14% (aOR 1.14, 95% CI 1.12, 1.16) and 75% (aOR 1.75, 95% CI 1.48, 2.08) higher odds of ntSMM and mortality, respectively, compared to commercially insured births.

CONCLUSION: Disparities in ntSMM and maternal mortality persist based on socioeconomic status. While ntSMM rates have decreased among commercially insured births, it has continued to rise in those with Medicaid. Medicaid insured individuals are significantly more likely to incur ntSMM and die during delivery hospitalization compared to those with commercial insurance.



613 Association of maternal serum leptin levels in mid gestation with fetal adiposity

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OBJECTIVE: Leptin is one of the adipokines that has been associated with birth weight and infant adiposity. Recent improvements in ultrasound imaging have enabled better tissue characterization and more reliable quantification of fetal fat deposition at specific anatomical sites (arm, thigh and abdomen). However, the association between maternal serum leptin levels and change in fetal fat deposition remains unclear. This study aimed to investigate the association of maternal serum leptin in mid gestation with longitudinal change of fetal fat deposition in the arm, thigh and abdomen.

STUDY DESIGN: A prospective study was conducted in a cohort of 24 singleton pregnancies. Maternal blood sample was obtained at 24 weeks' gestation, and fetal ultrasonography was performed at 24, 30, and 36 weeks' gestation. 3D ultrasonography was used to acquire total contours of arm and thigh, then analyzed offline using appropriate software to determine subcutaneous fat area with standardized cross-sectional images. The fat area was calculated as difference between the total cross-sectional area and the lean mass area. Subcutaneous fat thickness in the abdomen was measured as the high-echoic region anterior to the margins of the ribs, proximal to the cord insertion. The association between maternal serum leptin level and fetal fat deposition was examined using Pearson product moment correlations.

RESULTS: Maternal serum leptin at 24 weeks was 23.6±3.1 ng/ml (mean±S.E.). Maternal leptin level was not associated with fetal fat deposition at 24 weeks and 30 weeks. Maternal leptin level significantly correlated with fetal arm fat area ($r = 0.407$, $p < 0.05$), and not with thigh fat area ($r = 0.245$, $p = 0.249$) or subcutaneous fat thickness in the abdomen ($r = 0.361$, $p = 0.084$) at 36 weeks.

CONCLUSION: Maternal serum leptin level at 24 weeks significantly correlated with fetal arm fat mass in late gestation. Maternal serum leptin level in mid-gestation could be a marker for identifying increased fetal adiposity in late gestation.

614 Childhood Opportunity Index and Severe Morbidity in a cohort complicated by Placenta Accreta Spectrum Disorder

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OBJECTIVE: The objective of this study was to evaluate the association of the Childhood Opportunity Index (COI) with severe maternal and neonatal morbidity in a sample of cases complicated by Placenta Accreta Spectrum (PAS) in New York City (NYC). COI is a complex measure evaluating social and built environment regarding individual capacity for development.

STUDY DESIGN: This was a multicenter retrospective cohort study of histopathologically confirmed PAS cases between 1/1/2013 - 6/30/2022 at three NYC institutions. Subjects were assigned a COI value ranging from 0 to 1 based on their home zip code. Primary outcomes were composite maternal and neonatal morbidity. Outcomes were analyzed using logistic regression. Multivariate models adjusted for age, body mass index (BMI), race, ethnicity, insurance type, use of assisted reproductive technology, history of prior cesarean section, prior myomectomy, prior dilation & curettage, smoking, placental location, grade of placental invasion, presence of inter-disciplinary meeting, and delivering institution. Covariates were retained if $p < 0.10$.

RESULTS: 291 cases were included in these analyses. Logistic regressions were used to examine correlations between COI and severe morbidity. In univariate models, several maternal morbidity outcomes were significantly associated with COI. In the multivariate regression, mechanical ventilation's association with COI was still significant ($p < 0.01$). Regarding neonatal morbidity, only intraventricular hemorrhage had statistical significance in its association with COI (OR=0.98, CI 95%=0.96, 1.00).

CONCLUSION: These results suggest that socioenvironmental factors influence health outcomes through complex pathways in cases of severe morbidity. Different components of the composite outcomes correlated differently with COI values, suggesting that COI alone is insufficient to predict impact of social determinants of health on in

morbidity. Further research exploring the intersections of socio-environmental and clinical factors must be conducted.

		Univariate Logistic Regression		Multivariate Logistic Regression*	
	Childhood Opportunity Index	OR (95% CL)	p-Value	aOR (95% CL)	Adjusted p-value
Composite Maternal Morbidity		1.00 (0.99, 1.00)	0.22	0.99 (0.98, 1.01)	0.38
Transfusion of 4+ units of red blood cells		1.00 (0.99, 1.00)	0.21	1.00 (0.99, 1.00)	0.55
Vasopressor use		1.01 (1.00, 1.02)	0.02	0.99 (0.98, 1.01)	0.37
Mechanical ventilation or intubation		0.98 (0.98, 0.99)	< 0.001	0.98 (0.97, 1.00)	< 0.01
Admission to ICU		0.99 (0.99, 1.00)	0.07	0.99 (0.98, 1.00)	0.31
Surgical injury to organ		0.98 (0.97, 1.00)	0.02	1.00 (0.98, 1.02)	0.67
Gynecology Oncology Involvement		0.99 (0.98, 1.00)	< 0.01	0.99 (0.98, 1.01)	0.38
Maternal mortality		--	--	--	--
Composite Neonatal Morbidity		1.00 (0.99, 1.00)	0.35	0.99 (0.98, 1.01)	0.41
Intraventricular hemorrhage		0.98 (0.96, 0.99)	0.02	0.98 (0.95, 1.01)	0.16
Respiratory Distress		1.00 (0.99, 1.02)	0.75	1.00 (0.97, 1.02)	0.72
Necrotizing Enterocolitis		1.00 (0.98, 1.01)	0.59	0.99 (0.97, 1.01)	0.39

615 Expectant management of preeclampsia with severe features: clinical outcomes based on severe features at diagnosis

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OBJECTIVE: To evaluate latency and clinical outcomes based on severe features present at diagnosis among patients with preeclampsia with severe features (SPEC) who were expectantly managed.

STUDY DESIGN: Retrospective cohort study from two hospitals within our academic institution including patients diagnosed with SPEC between 24 0/7-33 6/7 weeks from 2015-2019. Patients were included if expectantly managed and excluded if delivery was planned immediately or following steroid administration. We compared outcomes based on severe features present at diagnosis.

RESULTS: 220 of 407 deliveries (54%) complicated by SPEC were expectantly managed. Three groups were established based on severe features at diagnosis: Group 1: severe blood pressure (BP) alone n=145; Group 2: symptomatic (headache, visual disturbances, or right upper quadrant/epigastric pain; +/- severe BP, n=52); Group 3: lab abnormalities (elevated liver function tests 2x normal, low platelets < 100,000, or creatinine >1.1 mg/dL; +/- severe BP, n=23). Fetal growth restriction was least likely in the lab abnormalities group (50% vs 61% vs 29%, p=0.01). The severe BP alone and lab abnormalities groups both had a median diagnosis-to-delivery interval of 3 days compared to 2 days among the symptomatic group (p=0.02). 43 (20%) had a latency of ≥7 days. Only 13 (6%) achieved 34 weeks. Indications for delivery differed by group (p< 0.001). Maternal ICU admission was more common in the lab abnormality group (3% vs 4% vs 17%, p=0.007), and maternal length of stay was longer in the severe BP alone group (8 vs 7 vs 6 days, p=0.004). Neonatal outcomes evaluated did not differ significantly.

CONCLUSION: In our cohort, the time from diagnosis of SPEC to delivery was 2-3 days depending on the severe features present at diagnosis, and only 6% reached 34 weeks. Indications for delivery differed by severe features present at diagnosis. Maternal ICU admission was more common among patients with lab abnormalities, and maternal length of stay was slightly longer for women with severe BP alone. Other clinical outcomes studied did not differ substantially.

	Severe BP alone n = 145	Symptomatic n = 52	Laboratory abnormalities n = 23	*P* value
Baseline characteristics				
Maternal age	31(25-35)	30(24-35)	30(27-34)	0.95
Ethnicity and race				0.05
Hispanic	66(46)	13(57)	27(52)	
Non-Hispanic White	23(16)	2(9)	15(29)	
Non-Hispanic Black	41(28)	7(30)	10(19)	
Other	15(10)	1(4)	0(0)	
Payment				0.46
Medicaid	53(49)	9(47)	11(38)	
Commercial	53(49)	10(53)	16(55)	
Other	0(0)	0(0)	2(7)	
BMI (kg/m^2)	33.3(29.3-37.2)	34.0(28.3-41.0)	33.9(29.6-40.2)	0.68
Nulliparous	79(54)	10(43)	22(42)	0.25
Gestational age at diagnosis	30.3(27.7-32.1)	30.7(28.4-32.8)	29.8(27.7-31.1)	0.37
Twin gestation	7(5)	1(4)	3(6)	0.95
Fetal growth restriction	73(50)	14(61)	15(29)	**0.01**
Chronic hypertension	30(21)	6(26)	7(13)	0.37
Pregestational diabetes	14(10)	2(9)	4(8)	0.91
Gestational diabetes	11(8)	5(22)	4(8)	0.08
Outcomes				
Gestational age at delivery	31.1(28.8-32.8)	31.1(29.2-33.1)	30.4(28.6-31.4)	0.40
Diagnosis to delivery (weeks)	0.43(0.28-0.86)	0.28(0.14-0.43)	0.43(0.28-0.57)	**0.02**
Indication for delivery				**<0.001**
Severe BP	46(32)	8(15)	2(9)	
Fetal	36(25)	7(13)	4(17)	
Symptoms	4(3)	15(29)	0(0)	
Labs	8(6)	0(0)	7(30)	
Other*	21(14)	6(12)	2(9)	
Multifactorial	30(21)	16(31)	8(35)	
Maternal ICU	4(3)	2(4)	4(17)	**0.007**
Maternal transfusion	10(7)	3(6)	2(9)	0.90
Cesarean delivery	123(85)	35(67)	18(78)	**0.02**
Postpartum hemorrhage	31(21)	8(15)	5(22)	0.64
Maternal LOS (days)	8(6-12)	7(5-8)	6(5-9)	**0.004**
Apgar score at 5 minutes	8(7-9)	8(8-9)	9(8-9)	0.22
Umbilical artery pH	7.27(7.22-7.30)	7.28(7.24-7.31)	7.28(7.24-7.33)	0.50
Neonatal birthweight (gm)	1405(1000-1740)	1448(1008-1820)	1150(930-1605)	0.26
Neonatal LOS (days)	35(22-66)	38(22-66)	57(34-79)	0.12
Neonatal death	8(6)	1(2)	1(4)	0.56

Data presented as median(interquartile range) or number(percentage).
P values obtained for continuous variables using Kruskal-Wallis tests, and for categorical variable using Chi square or Fisher exact tests, as appropriate.
*Other includes the following indications for delivery: placental abruption, pulmonary edema, eclampsia, patient declined expectant management.

616 Association between Cotinine Exposure and Outcomes in Patients with Prenatal Cannabis Use: A Secondary Analysis

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OBJECTIVE: Existing data regarding prenatal cannabis use (PCU) and adverse outcomes are often confounded by tobacco use. We initially sought to assess maternal and neonatal outcomes in patients with isolated PCU, and performed a prospective cohort study with negative verbal tobacco use screening as criteria for enrollment. Interestingly, a large percent of enrolled patients were excluded from primary analysis due to urine drug screening (UDS) demonstrating exposure to cotinine, a tobacco metabolite. We sought to evaluate differences in outcomes between this excluded group and the larger PCU positive cohort.

STUDY DESIGN: We performed a secondary analysis of a prospective cohort study of patients with pre-pregnancy cannabis use who were enrolled in the first trimester. The primary outcomes were a pre-eclampsia and small for gestational age (SGA). Secondary outcomes included gestational hypertension, gestational diabetes, fetal growth restriction, preterm birth, mode of delivery, large for gestational age

(LGA)and APGARs. Descriptive statistics were used to compare baseline characteristics. Backwards stepwise logistic regression was used to control for potential confounders.

RESULTS: 235 patients were enrolled in the PCU arm of the initial study. After crossover between PCU arms and cotinine testing, 96 PCU patients were positive for cotinine (Cpos) and 131 were negative (Cneg). Baseline characteristics were similar in between groups, though the categorical distribution of income in the Cpos group was lower (p=0.006) and more Cpos patients had hypertensive disorders in prior pregnancies (23% Cpos vs 17% Cneg, p=0.03). Cpos patients had greater risk of SGA $< 5^{th}$ and 10^{th} percentiles in unadjusted analysis, but after controlling for confounds this finding only persisted for SGA$< 10^{th}$% (32% Cpos vs. 15% Cneg; aRR 2.16; 95% CI 1.21-3.42).

CONCLUSION: In patients with PCU, cotinine exposure was associated with a 2-fold increased risk of SGA $< 10^{th}$ percentile, underscoring the differing contributions of PCU and tobacco to the risk of adverse pregnancy outcomes.

Table 1: Maternal and neonatal outcomes in patients with cannabis use in pregnancy, stratified by urine-confirmed cotinine exposure.

	Positive cotinine (96) N (%)	Negative cotinine (131) N (%)	RR (95% CI)	*aRR (95% CI)
Adverse Pregnancy Outcomes				
Preeclampsia	8 (8.8%)	21 (16.54%)	0.53 [0.35-1.15]	1.55 [0.53-3.91]
Gestational diabetes	1 (1.1%)	5 (3.9%)	0.28 [0.03-2.34]	0.04 [0.00-2.58]
Gestational hypertension	23 (25%)	20 (15.63%)	1.6 [0.93-2.73]	1.70 [0.82-3.08]
Fetal growth restriction	10 (11.11%)	11 (8.87%)	1.25 [0.55-2.82]	1.55 [0.53-3.91]
Preterm delivery	12 (12.5%)	24 (18.32%)	0.68 [0.35-1.3]	0.5 [0.20-1.12]
Mode of delivery				
Vaginal-spontaneous	69 (74.1%)	90 (71.4%)	1.03 [0.88-1.22]	1.01 [0.79-1.16]
Vaginal-operative	6 (6.45%)	6 (4.76%)	1.35 [0.45-4.06]	0.98 [0.27-3.16]
Cesarean	18 (19.35%)	30 (23.81%)	0.81 [0.48-1.37]	0.93 [0.46-1.68]
Neonatal Outcomes				
SGA <5 percentile	14 (14.58%)	8 (6.1%)	**2.39 [1.04-5.46]	1.96 [0.78-4.38]
SGA <10 percentile	31 (32.29%)	20 (15.27%)	**2.12 [1.28-3.48]	**2.16 [1.21-3.42]
LGA	3 (3.13%)	6 (4.58%)	0.68 [0.17-2.66]	0.31 [0.25-3.51]
5 minute Apgar < 7	4 (4.35%)	5 (3.91%)	1.11 [0.31-4.03]	0,92 [0.19-3.85]

* Maternal outcomes adjusted for AMA, BMI > 30, income, history of diabetes, history of preterm birth, and chronic hypertension. Neonatal outcomes adjusted for income, race, history of diabetes, chronic hypertension, preeclampsia, gestational hypertension, and gestational diabetes.
**denotes statistical significance
SGA = small for gestational age (Alexander); LGA= large for gestational age (Alexander); BMI= body mass index; AMA= advanced maternal age; RR= risk ratio; aRR= adjusted risk ratio; CI = confidence interval

617 Associations between Isolated Prenatal Cannabis Use and Outcomes: A Prospective Cohort Study

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OBJECTIVE: Despite data linking prenatal cannabis use (PCU) to adverse childhood outcomes, use in pregnancy is rising. Studies are often confounded by tobacco use, a known risk factor for maternal antenatal morbidity and small for gestational age (SGA). We sought to assess antenatal and birthweight outcomes of patients with isolated PCU.

STUDY DESIGN: We performed a prospective cohort study of patients with pre-pregnancy cannabis use who were enrolled in the first trimester. Patients were not eligible if they self-reported tobacco use; patients were then followed with serial urine cotinine testing and excluded from final analysis if positive. Primary outcomes were SGA $< 10^{th}$ percentile and preeclampsia. Secondary outcomes included gestational hypertension, gestational diabetes, fetal growth restriction, preterm birth, mode of delivery, SGA $< 5^{th}$ percentile, large for gestational age (LGA), and 5-minute APGAR < 7. Descriptive statistics were used to compare baseline characteristics and backwards stepwise logistic regression was used to control for potential confounding.

RESULTS: 366 patients were enrolled: 235 PCU and 131 controls. After serial urine drug screening with exclusion for cotinine positivity (42% of PCU and 10% of controls), and crossover between groups, a total of 131 PCU and 125 controls remained. Patients with PCU were younger (25 vs 27 yrs, p=0.03), had lower BMI (27 vs 31 kg/m2, p=0.00), and were less likely to identify as Hispanic (1.5% vs 7.26%, p=0.02). Isolated PCU was not associated with preeclampsia (17% PCU vs. 14% control; aRR 1.36; 95% CI 0.62-2.63), SGA (15% vs. 11%; aRR 0.79; 95% CI 0.36-1.59), or any of the secondary maternal outcomes (Table 1). PCU was associated with a decreased risk of LGA in unadjusted analysis (5% vs. 14%; RR 0.33; 95% CI 0.13-0.83); this result was attenuated after adjustment (aRR 0.94; 95% CI 0.23-3.33).

CONCLUSION: Isolated PCU was not associated with differences in maternal or neonatal adverse pregnancy outcomes, consistent with prior literature. Additional study is ongoing to assess cannabis-specific outcomes in the newborn and early childhood periods.

Table 1: Maternal and neonatal outcomes in non-tobacco exposed patients with and without cannabis use in pregnancy

Maternal Outcomes				
	Cannabis use (131) N (%)	Control (125) N (%)	RR (95% CI)	*aRR (95% CI)
Adverse Pregnancy Outcomes				
Preeclampsia	21 (16.54%)	16 (14.04%)	1.18 [0.65-2.145]	1.36 [0.62-2.63]
Gestational hypertension	20 (15.63%)	25 (21.93%)	0.71 [0.42-1.21]	0.65 [0.30-1.27]
Gestational diabetes	5 (3.91%)	7 (6.48%)	0.64 [0.21-1.97]	0.35 [0.27-3.16]
Fetal growth restriction	11 (8.87%)	12 (10.53%)	0.84 [0.39-1.83]	1.35 [0.61-2.60]
Preterm delivery	24 (18.32%)	23 (18.40%)	1.0 [0.59-1.67]	0.87 [0.42-1.60]
Mode of delivery				
Vaginal-spontaneous	90 (71.43)	82 (71.30)	1.00 [0.85-1.17]	0.86 [0.61-1.07]
Vaginal-operative	6 (4.76%)	2 (1.74%)	2.73 [0.56-13.3]	0.57 [0.20-1.51]
Cesarean	30 (23.81%)	31 (26.96%)	0.88 [0.57-1.36]	1.24 [0.68-1.99]
Neonatal Outcomes				
	Cannabis use N(%)	Control N (%)	RR (95% CI)	**aRR (95% CI)
SGA <5 percentile	8 (6.1%)	4 (4.0%)	1.53 [0.51-4.54]	0.71 [0.19-2.43]
SGA < 10 percentile	20 (15.3%)	14 (11.2%)	1.36 [0.72-2.57]	0.79 [0.36-1.59]
LGA	6 (4.6%)	17 (13.6%)	***0.33 [0.13-0.83]	0.94 [0.23-3.33]
5 minute Apgar < 7	5 (3.9%)	8 (6.90%)	0.57 [0.19-1.68]	0.68 [0.2-2.16]

*adjusted for AMA, BMI > 30, ethnicity, race, education, income, chronic hypertension, and history of diabetes
**adjusted for AMA, BMI > 30, ethnicity, race, income, education, gestational diabetes, and preeclampsia
***denotes statistical significance
THC= tetrahydrocannabinol ; BMI = body mass index; SGA= small for gestational age; LGA= large for gestational age; RR= risk ratio; aRR= adjusted risk ratio; CI= confidence interval

618 Does a best practice implementation prompting providers on syphilis screening guidelines impact physician adherence?

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OBJECTIVE: According to the 2021 Centers for Disease Control and Prevention Sexually Transmitted Disease Surveillance report, the number of congenital syphilis (CS) cases increased 754.8% from 2012 to 2021. Missed opportunities for CS prevention in Texas include a lack of provider adherence to screening mandates. A best practice advisory (BPA) was implemented in the electronic medical record system (EMR) in an academic obstetrical center in Texas in April 2023 to prompt providers to screen pregnant patients at initiation of prenatal care, 28 weeks gestation, and admission for delivery. This quality initiative aimed to determine if provider adherence to the screening mandate improved with the BPA.

STUDY DESIGN: This was a prospective cohort study of obstetric patients from a large public healthcare system in Southeastern Texas

between 12/01/22 and 05/31/23. Individuals who initiated care after 26 weeks gestation were excluded. Data regarding gestational age at each screen and corresponding results were collected prior to and after implementation of the BPA. The number of appropriately ordered syphilis screening tests pre- and post-BPA were compared using chi-square analysis with a p-value < 0.05 considered statistically significant.

RESULTS: Screening for syphilis at initiation of care did not increase with the BPA, however screening rates at admission for delivery increased significantly from 6% to 99% post-BPA ($p < 0.05$). Screening at both 28 weeks and delivery also increased significantly from 3% to 89% ($p < 0.05$), and screening at all three timepoints (initiation, 28 weeks, delivery) significantly increased from 2% to 47% ($p < 0.05$) [Table 1, Figure 1]. Notably, there was a 50% reduction in CS cases (8 to 4) following the BPA.

CONCLUSION: The use of a BPA within the EMR increased provider adherence to syphilis screening mandates for pregnant women in a high CS morbidity region. Given the differing screening mandates across the US, utilization of a BPA to inform providers about state-specific mandates can lead to improved compliance with perinatal syphilis screening and help prevent congenital syphilis.

Table 1. Screening rates before and after BPA implementation

Timepoints	BPA Implementation		
	Pre	Post	p value
Intake (n, %)	152 (49)	113 (51)	0.65
Delivery (n, %)	17 (6)	217 (99)	< 0.05*
28 + Delivery (n, %)	9 (3)	195 (89)	< 0.05*
All (n, %)	6 (2)	104 (47)	< 0.05*

*Sig p value

619 Effectiveness of cerclage in twin pregnancies with short cervix: systematic review and meta-analysis

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OBJECTIVE: Evaluate the effectiveness of cervical cerclage in preventing preterm birth (PTB) and improving neonatal outcomes in women with a twin pregnancy and an asymptomatic short cervix ($\leq$ 25mm).

STUDY DESIGN: On 17 April 2023, we systematically searched PubMed, MEDLINE, EMBASE, Web of Science, and Cochrane Library databases. Included were randomized controlled trials (RCTs), cohort, and case-control studies comparing cerclage vs. expectant management in women with twin pregnancies and an asymptomatic short cervix ($\leq$ 25mm) before 24 weeks.

RESULTS: We included 10 retrospective cohort studies and 1 prospective cohort, involving 563 patients with cerclage and 489 controls. Information regarding women involved in the RCTs could not be obtained because this data has not been made publicly available. In women with a cervical length of $\leq$ 25mm significantly less preterm births were reported in women with a cerclage as compared to expectant management (PTB before 37 weeks (RR 0.87, 95% CI 0.77-0.98), 34 weeks (RR 0.75, 0.62-0.91), 32 weeks (RR 0.61, 0.41-0.91), and 28 weeks (RR 0.62, 0.42-0.91) of gestation). Upon further analysis of studies explicitly describing spontaneous PTB (sPTB), in the cerclage group were less sPTB before 34 weeks (RR 0.72, 0.54-0.95) and 32 weeks (RR 0.70, 0.51-0.97). Cerclage was related to lower risk ratios for infants $<$ 1500g and respiratory distress syndrome.

In a subgroup of women with cervical length $<$ 15mm, cerclage reduced PTB before 34 weeks (RR 0.62, 0.44-0.87), 32 weeks (RR 0.62, 0.44-0.86), and 28 weeks (RR 0.53, 0.34-0.84), while the gestational age at birth was more advanced (MD 3.87 weeks, 2.97-4.77). In addition, sPTB was less frequent in women with a cerclage (before 34 weeks (RR 0.61, 0.41-0.91) and 32 weeks (RR 0.50, 0.33-0.77)).

CONCLUSION: Based on our meta-analysis, of observational studies, cerclage may benefit women with a twin pregnancy with cervical length $<$ 25mm and $<$ 15mm by reducing PTB and prolonging pregnancy. However, a large RCT is needed to validate these findings.

Outcomes	Studies	Cerclage n/N	No cerclage n/N	Risk ratio (95% CI)	I^2
Cervical length (< 25mm)					
PTB < 37 weeks	6	304/401	285/333	**0.87 (0.77-0.98)**	58
sPTB < 37 weeks	3	78/136	103/142	0.93 (0.83-1.05)	0
PTB < 32 weeks	9	145/489	177/391	**0.61 (0.41-0.91)**	71
sPTB < 32 weeks	5	45/195	73/194	**0.70 (0.51-0.97)**	4
PTB < 28 weeks	8	63/477	99/439	**0.62 (0.42-0.91)**	30
sPTB < 28 weeks	4	21/159	40/170	0.62 (0.36-1.08)	12
Gestational age at birth (SMD)	9	499	466	**0.22 (0.01-0.44)**	58
Pregnancy prolongation in weeks (SMD)	6	260	271	**2.65 (1.83-3.47)**	40
PPROM	6	116/766	110/650	0.86 (0.69-1.08)	0
NICU admission	5	335/658	347/543	0.82 (0.66-1.02)	79
Birthweight <1500 g	5	183/614	198/489	**0.76 (0.65-0.89)**	57
RDS	2	22/116	22/65	**0.59 (0.36-0.96)**	78
Overall perinatal mortality	6	125/788	129/660	0.84 (0.62-1.14)	34
Cervical length (< 15mm)					
PTB < 37 weeks	6	178/401	157/333	0.92 (0.79-1.08)	0
sPTB < 37 weeks	4	65/181	79/187	0.85 (0.60-1.18)	38
PTB < 32 weeks	6	76/378	109/337	**0.62 (0.44-0.86)**	22
sPTB < 32 weeks	4	25/181	57/187	**0.50 (0.33-0.77)**	0
PTB < 28 weeks	5	27/365	47/313	**0.53 (0.34-0.84)**	0
sPTB < 28 weeks	3	10/145	25/167	0.53 (0.26-1.07)	0
Gestational age at birth (SMD)	5	365	313	**2.29 (1.60-2.98)**	33
Pregnancy prolongation in weeks (SMD)	4	178	180	**3.87 (2.97-4.77)**	0
PPROM	2	21/45	10/31	0.78 (0.38-1.60)	0
NICU admission	3	169/273	135/183	**0.85 (0.75-0.96)**	40

620 Childhood outcomes of multiples prenatally exposed to progesterone for the prevention of preterm birth

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OBJECTIVE: Progesterone is extensively used in pregnancy for the prevention of preterm birth in high risk women. We assessed the long-term effect of prenatal progesterone exposure versus placebo on child development and behaviour until early adolescence.

STUDY DESIGN: This study is a follow-up of the AMPHIA randomized controlled trial which assessed weekly intramuscular injections starting at 16 weeks of gestation of 250 mg 17-alpha-hydroxyprogesterone caproate (17-OHPC, n=336 women; 681 children) compared to placebo (n=335 women; 674 children) to prevent adverse neonatal outcome in multiple pregnancies. In this follow-up study children were assessed through parental, self-reported and teacher questionnaires at 11-14 years of age. Main outcome of interest were cognition, behaviour, mortality, gender identity, general health and a composite of mortality or survival with abnormal development.

RESULTS: In total 60 children deceased, 24 (3.7%) in 17-OHPC group versus 36 (5.6%) in the placebo group (OR 0.66, 95%CI 0.39-1.11). Developmental outcomes were collected for 303 of 1296

(23%) surviving children. No differences between 17-OHPC and placebo group were measured regarding child's cognition, behaviour, mortality, gender identity and general health up to 14 years of age. A composite of abnormal development or mortality did not differ between progesterone (9.5%) and placebo (10.1%) groups (OR 0.93, 95% CI 0.65-1.35).

CONCLUSION: Mortality or neurodevelopmental disability of children exposed in utero to 17-OHPC compared to placebo during the second and third trimester of pregnancy does not differ between groups at 11-14 years of age.

621 CD4+T-Cells cause increased glucose, hypertension, and organ dysfunction in a rat model of gestational diabetes

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OBJECTIVE: Gestational diabetes mellitus (GDM), impacts 10% of all pregnancies and refers to glucose intolerance, insulin sensitivity and beta islet cell dysfunction during pregnancy which is a risk factor for hypertensive disorders of pregnancy. The mechanisms of GDM are unknown and the management strategies are limited. The lack of an appropriate animal model of GDM further limits our understanding of this disease. Many studies show CD4+ T cells play a role in diabetes, therefore we hypothesize that CD4+ T cells play a role in the pathogenesis of GDM.

STUDY DESIGN: Splenic CD4+Tcells from female streptozotocin (STZ)-induced diabetic Dahl Salt Sensitive (DM-SS) rats and control nondiabetic female Dahl SS rats were injected on gestational day (GD) 12 into pregnant Sprague Dawley (SD) rats to create the DM-CD4+ T cells and nondiabetic control SS-CD4+ T cell pregnant rats. Glucose, blood pressure, renal, pancreatic and placental function were assessed on gestation day 19. Renal and pancreatic tissues were stained for Periodic acid Schiff (PAS) and hematoxylin and eosin (H&E). A one-way ANOVA was used for statistical analysis.

RESULTS: MAP increased in DM-CD4+ T cell rats (106±2, n=11, $p< 0.05$) and SS-CD4+ T cell rats (109±2, n=9, $p< 0.05$) compared to pregnant SD controls (92±2 mmHg, n=7). Proteinuria occurred with DM CD4+ T cells (9±1 $p< 0.05$) and SS-CD4+ T cells (10±1 $p< 0.05$) compared to pregnant SD controls (4±1 ml/day). Glucose tolerance was impaired and blood glucose was elevated only in recipients of DM-CD4+ T cells (136 ± 9 mg/dl, $p< 0.05$). Glomerular and pancreatic damage occurred in DM-CD4+T cell recipient rats ($p< 0.05$). Markers of renal dysfunction KIM-1 and NGAL were increased in DM-CD4+ T cell rats (42±8; 449 ±3, $p< 0.05$) compared to SS-CD4+ T cell rats(36±5; 47±4 pg/mg, $p< 0.05$) and pregnant SD rats (11±2;19±3 pg/mg). Placental mitochondrial dysfunction was impaired with DM-CD4T cells.

CONCLUSION: Collectively, these data indicate that CD4+ T cells induce a GDM phenotype identifying a new animal model for studying mechanisms of the pathophysiology of GDM.

622 Deep learning to assess twin gestation from blindly obtained ultrasound sweeps

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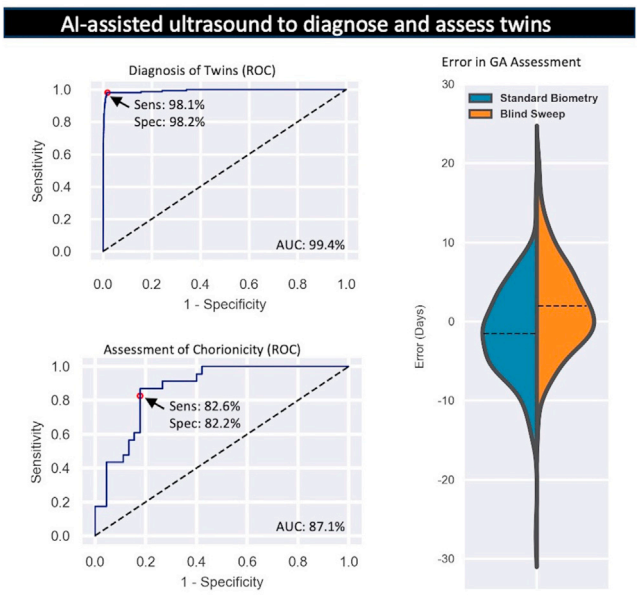
OBJECTIVE: In low resource settings, twins often go undiagnosed until delivery. We sought to create a low-cost ultrasound tool for diagnosis and assessment of twins in settings where trained sonographers are scarce.

STUDY DESIGN: We collected blind ultrasound sweeps (~10 second cines in cranio-caudal and lateral directions) from pregnant people in North Carolina. The cohort was randomly divided at the patient level into discreet training/tuning (80%) and testing (20%) datasets. We built deep learning AI models to diagnose twins and estimate their gestational age (GA). We also explored assessment of chorionicity.

RESULTS: From Feb 2020 thru March 2023, 16,557 pregnancies contributed 30,106 studies containing blind sweeps. Of these, 490 pregnancies (1,215 studies) were twins. To evaluate twin diagnosis, we restricted the test set to studies ≥14 weeks GA (3,163 pregnancies; 5,424 studies). Among the 87% of studies in which the model could make a prediction, the area under the receiver operating curve (AUC-ROC) was 99.4% (sens: 98.1%; spec: 98.2%). To evaluate twin GA estimation, we restricted the test set to twin pregnancies whose GA had previously been established by early CRL or IVF (92 pregnancies; 185 scans). The model made a prediction in all studies with a mean absolute error of 4.6 ±0.3 days vs 4.5 ±0.3 days for biometry (difference, 0.1 days; 95% CI: -0.6, 0.8). To evaluate chorionicity assessment, we limited the test set to twins with scans performed < 24 weeks (67 pregnancies, 93 scans). Among the 73% of studies in which the model could make a prediction, AUC-ROC was 87.1% (sens: 82.6%; spec: 82.2%).

CONCLUSION: AI-assisted ultrasound, which can be deployed on low-cost point-of-care devices, can diagnose twins and assess their gestational age with high performance. Preliminary results for chorionicity assessment are encouraging but more training data from earlier GA are needed. These results presage a future where all patients carrying twins — not just those in rich countries — can access the diagnostic benefits of sonography.



623 Dimensions of COVID-19 Vaccine Uptake in Pregnant People: A Mixed Methods Approach

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OBJECTIVE: Population-based COVID-19 vaccines have been a highly debated medical innovation. Rationale for vaccine uptake is well-researched in the general population but poorly studied in pregnant people who have historically incorporated different dimensions of risk analysis in their medical decision-making due to their pregnancy status. While provider recommendation is the single most important driver of Tdap and influenza vaccination during pregnancy, the role of the healthcare provider has been less clear regarding COVID-19 vaccinations. This study addresses this gap in knowledge through a mixed-methods approach that analyzes COVID-19 vaccine uptake through EMR review and in-depth, semi-structured interviews.

STUDY DESIGN: A systematic retrospective medical chart review was performed for 915 patients who received prenatal care and delivered at an academic health care center between August 2021 and August 2022 alongside five semi-structured interviews with people who received prenatal care and delivered in Central Virginia that explored their experience of pregnancy during COVID-19 and their decision-making process around the COVID-19 vaccine.

RESULTS: Concurrent analysis of medical records and interviews revealed that discussion of the COVID-19 vaccine with the healthcare team was not associated with changes in vaccination uptake ($p=0.604$, logistic regression). Instead, pregnant people discussed how they incorporated anecdotal, informal discussions with trusted others into their decision-making process. Age, total number of prenatal visits, and influenza vaccine uptake were positively correlated with COVID-19 vaccine uptake, while prior COVID-19 infections during pregnancy were negatively correlated with COVID-19 vaccine uptake. Lastly, risk tolerance during pregnancy was seen as a finite resource, and its allocation was altruistic

CONCLUSION: The findings of this study, one of the first to characterize risk analysis and COVID-19 vaccine hesitancy in pregnant people, indicate that not only vaccine hesitancy but also medical decision-making in pregnant people is more complex than previously thought.

624 Contingency management for methamphetamine cessation during pregnancy: a cost-effectiveness analysis

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OBJECTIVE: Methamphetamine use in pregnancy is rising and is associated with increased perinatal morbidity and mortality. Contingency management (CM) programs provide financial incentives for decreased use and are one of the most effective interventions for methamphetamine cessation in the general population. However, the use of CM during pregnancy to encourage methamphetamine cessation has not yet been studied. The objective of this study is to examine the cost-effectiveness of CM programs for pregnant individuals who use methamphetamines.

STUDY DESIGN: A decision-analytic model was built to compare CM programs with psychosocial support to standard of care for pregnant individuals who use methamphetamines. We estimated a theoretical cohort of 26,000 pregnant patients who use meth annually in the United States. We assumed CM patients received $725 in incentives. Probabilities associated with methamphetamine use were adjusted for race/ethnicity, insurance status, and tobacco use. Primary outcomes included costs, quality-adjusted life years (QALYs), methamphetamine cessation in pregnancy, preeclampsia, stillbirth, preterm birth, small for gestational age (SGA) neonates, infant death, and neurodevelopmental delay. The cost-effectiveness threshold was $100,000/QALY.

RESULTS: Contingency management was associated with methamphetamine cessation in 8,086 more individuals and a reduction of 135 stillbirths, 1,469 preterm births, 588 SGA neonates, 12 infant deaths, and 10 cases of neurodevelopmental delay. Overall, CM was the dominant strategy with decreased costs of $7 million and better outcomes with an increase of 107,290 QALYs.

CONCLUSION: Contingency management for methamphetamine cessation during pregnancy is a cost-effective intervention to promote abstinence from use and reduce rates of adverse pregnancy outcomes such as preterm birth and stillbirth. Implementing these programs should be considered when caring for these patients, but will need to be proactively funded.

Table 1. Outcomes associated with contingency management (CM) plus standard of care (SOC) versus SOC alone in a theoretical cohort of 26,000 pregnant people who use methamphetamines.

Outcome	CM +SOC	SOC	Difference
Preeclampsia	1593	1991	-398
Stillbirth	367	502	-135
Preterm birth	5,238	6,707	-1,469
Small for gestational age	3,986	4,574	-588
Infant death	57	69	-12
Neurodevelopmental disability	122	132	-10
Meth cessation in pregnancy	8970	884	+8086
Cost (USD)	$560,284,630	$568,050,577	-$7,765,947
Effectiveness (QALYs)	1,225,862	1,118,572	+107,290

625 Comparison of a New Tool for Obstetric Early Sepsis Versus Systemic Inflammatory Response Syndrome (SIRS)

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OBJECTIVE: To compare a new clinical screening tool for obstetric early sepsis (TOES) against established SIRS criteria.

STUDY DESIGN: Retrospective case-control study of sixty-five patients diagnosed with sepsis either antepartum or within three days of

delivery. Sepsis was diagnosed utilizing the SIRS criteria. Sixty-five random controls with similar demographics without sepsis were used. The TOES tool (Table 1) was developed utilizing pregnancy-specific clinical parameters only excluding laboratory evaluations. The sensitivity, specificity, positive predictive and negative predictive values for TOES were determined. Group comparisons were performed with the Mann-Whitney Rand Sum test. Significance was set at a P value < 0.05.

RESULTS: There were no differences in the demographics (age, race, BMI, gravidity, parity, and gestational age) between the two groups. The temperature, respiratory rate, heart rate and TOES score were all higher in the sepsis group ($P < 0.001$). There was no difference between the systolic, diastolic and the mean arterial pressures (MAP) between the two groups. The sensitivity, specificity, positive predictive and negative predictive values for TOES were 95.4%, 96.9%, 96.9 % and 95.5% respectively.

CONCLUSION: TOES performed comparably to SIRS in screening for obstetric sepsis. We speculate that TOES, which only requires clinical parameters without laboratory testing may facilitate earlier identification of obstetric sepsis over traditional screening tools. We suggest that TOES may demonstrate improved clinical utility which may decrease adverse outcomes. Further validation of TOES with a prospective cohort is suggested.

Table 1. TOES Score ≥ 2 is a positive screen

	2	1	0	1	2
Temp (° C)	≤35.0	35.1-36.0	36.1-38.0	38.1-39.0	≥39.1
HR (bpm)	<60	60-70	71-109	110-120	>120
Resp / min	<8	8-11	12-20	21-24	>24
MAP (mmHg)	<65	65-69	≥70	---	---

626 Extracellular Vesicles Carrying Efflux Protein P-glycoprotein Alter Drug Transport Functions in Decidua

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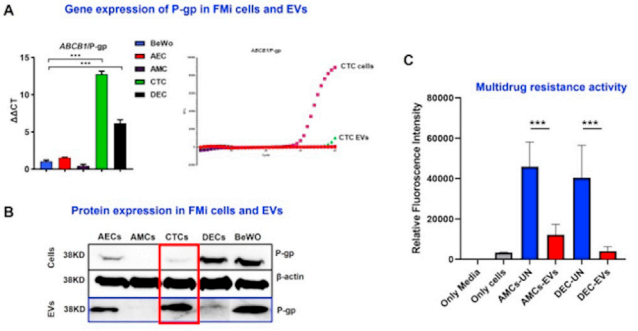
OBJECTIVE: P-glycoprotein (P-gp) is primarily reported in chorion trophoblast cells (CTC) for efflux drug transport. Its presence is reported in the neighboring amnion mesenchymal cells (AMC) and decidual cells (DEC), suggesting limited efflux capabilities of these cells. To test the hypothesis that CTC-derived extracellular vesicles (EVs) containing P-gp as cargo could induce P-gp expression in AMC and DEC, we examined CTC-EVs' impact on transitioning cells to perform efflux functions.

STUDY DESIGN: Gene expression levels of P-gp were analyzed in fetal membrane cells through quantitative real-time polymerase chain reaction (qRT-PCR), and protein levels were assessed using western blot analysis. CTC-derived EVs were isolated and characterized for size, shape, and quantity using nanoparticle tracking analysis, and the presence of P-gp was confirmed. Flow cytometry was utilized to evaluate CTC-EVs' effect on inducing P-gp expression in cells lacking it. The functional activity of P-gp in AMC and DEC was assessed through a multidrug resistance assay after exposure to CTC-derived P-gp-containing EVs. To validate our findings, decidual cells with P-gp knockdown (KD) using the CRISPR/Cas9 approach were treated with CTC-derived EVs containing P-gp and tested for restoration.

RESULTS: The gene and protein expression levels of P-gp in the amniochorion layers and their derived EVs were determined (Fig. 1A and 1B). Although the expression levels of EVs within the cells were low, both amniotic epithelial cells (AEC) and CTC-derived EVs carried P-gp. Treatment with CTC-derived EVs containing P-gp led to increased P-gp expression in AMC and DEC, resulting in enhanced drug efflux and a decrease in drug resistance (Fig. 1C). Furthermore, P-gp expression was reduced in trophoblast cells with P-gp KD but was restored upon treatment with chorion-derived EVs.

CONCLUSION: This study demonstrates that EV-mediated delivery of P-gp can induce drug efflux functions in cells in a paracrine fashion. The modulation of P-gp by EVs highlights the interplay between EVs and the cells of the feto-maternal interface drug transport mechanisms.



627 Does the dosing of low-dose aspirin for preeclampsia prevention alter serum extracellular vesicle characteristics?

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OBJECTIVE: Extracellular vesicles (EVs) are essential for communication at the fetal-maternal interface. EVs represent the physiologic state of the cell at the time of its release. This study evaluated the

changes in the serum EV characteristics and their protein cargo in women with preeclampsia (PE) treated with aspirin (ASA).

STUDY DESIGN: Previously collected maternal samples from at-risk people receiving 81 mg vs. 162 mg aspirin, based on the development of PE or not. Samples were collected between 28-32 weeks (12-20 weeks after aspirin initiation). The optimal method of ultracentrifugation (UC) followed by size exclusion chromatography was chosen for EV isolation and characterization. EVs from women not on ASA (control), on 81 mg, or 162 mg ASA were isolated and characterized (size and quantity [ZetaView], shape [transmission electron microscopy], markers [Exoview]). Mass spectrometry-based proteomics experiments are performed using a stochastic sampling approach (data-dependent acquisition) for EV proteome cargo analysis.

RESULTS: Ultracentrifugation and size exclusion chromatography yielded EVs' highest number and quality. EV size and concentrations among groups were similar (Fig. 1A-B). TEM images validated intact and expected EVs' size and shape (Fig. 1C). Average gestational age at collection was 35 weeks for the control group (n=7), 29 weeks for 81 mg group (n=32), and 28 weeks for 162 mg group (n=13). ExoView analysis confirmed known EV markers of CD9, CD81, and CD63 (Fig. 1D) that were not different between groups. The proteomic analysis did not show any differences in total maternal serum EV proteins regardless of the dose of treatment or untreated groups.

CONCLUSION: Total serum EVs were not different between different doses of ASA-treated and untreated PE groups, as our current approach did not distinguish between fetal vs. maternal EVs. PE is a disease of the placenta and vasculature and therefore, we postulate that placental-specific (fetal) EV characterization is required to identify prognostic markers of ASA treatment.

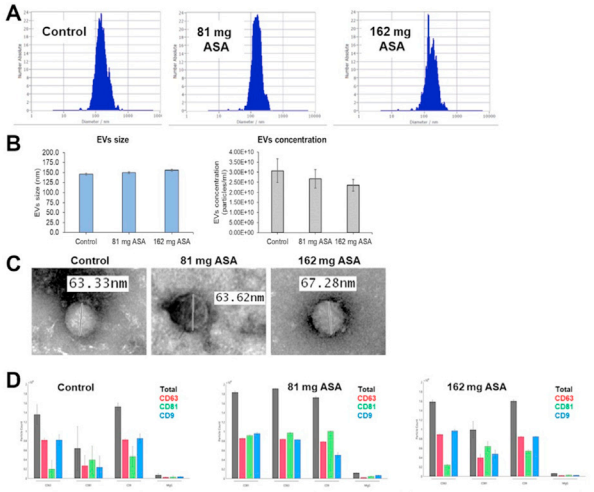

Figure 1. Characteristics of isolated human serum extracellular vesicles. **(a)** EV size and concentration. **(b)** EV size and concentration averages per study group. **(c)** Representative EV TEM images. **(d)** Reference EV markers.

628 Association of disease severity and placental pathology changes in pregnant patients with SARS-CoV-2

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OBJECTIVE: Pregnant people infected with SARS CoV-2 are at increased risk for greater disease severity and complications. Prior studies have shown an unusual pathologic group of COVID placentitis in some patients diagnosed with SARS CoV-2 in pregnancy. We sought to investigate the association between disease severity and placental pathology in pregnant patients with confirmed SARS CoV-2.

STUDY DESIGN: This was a retrospective cohort study of all pregnant patients with PCR confirmed SARS CoV-2 (3/2020-4/2022) at a single institution. Disease severity was based on the NIH standard definitions and grouped into asymptomatic, mild/moderate, and severe/critical disease. Primary outcome evaluated by a trained placental pathologist were findings characteristic for SARS CoV-2 placentitis: chronic histiocytic intervillositis, massive perivillous fibrinoid deposition, and trophoblast necrosis. Secondary outcomes included additional descriptors of placental pathology and infant variables.

RESULTS: A total of 530 women delivered at our institution and were included in the study: 406 (77%) had placental pathology available. Among patients with placental pathology available, 46% were asymptomatic, 42% had mild/moderate disease, and 12% had severe/critical disease. Pregnant women with severe disease had an older age, higher BMI, and lower gestational age at delivery (all $p< 0.05$). SARS CoV-2 placentitis was observed in four patients (0.01%) with no association with disease severity. Higher disease severity was associated with chronic villous ischemic changes ($p< 0.01$), infant head circumferences $< 10^{th}$ percentile ($p< 0.01$), and decreased acute chorionic vasculitis ($p< 0.01$). All other placental pathology descriptors and infant variables were similar across groups.

CONCLUSION: Overall, we found no association between disease severity and risk of SARS CoV-2 placentitis.

	All (n=406)	Asymptomatic (n=186)	Mild/Moderate (n=173)	Severe/Critical (n=47)	P-value
Primary outcome					
SARS-CoV-2 Placentitis	4 (1.0%)	0 (0.0%)	3 (1.7%)	1 (2.1%)	0.14
Secondary outcomes					
Placental Weight (adjusted for GA)					0.87
Low	103 (26.1%)	43 (23.6%)	48 (28.4%)	12 (27.3%)	
Expected	239 (60.5%)	114 (62.6%)	98 (58.0%)	27 (61.4%)	
High	53 (13.4%)	25 (13.7%)	23 (13.6%)	5 (11.4%)	
Chronic villitis of unknown etiology	34 (8.4%)	21 (11.3%)	12 (6.9%)	1 (2.1%)	0.09
Abruption	19 (4.7%)	7 (3.8%)	7 (4.1%)	5 (10.6%)	0.12
Maternal vascular malperfusion features					
Chorionic villous ischemic changes	121 (29.8%)	42 (22.6%)	56 (32.4%)	23 (48.9%)	<0.01
Decidual arteriopathy or vasculopathy	10 (2.5%)	4 (2.2%)	4 (2.3%)	2 (4.3%)	0.60
Chorionic villous infarctions	65 (16.0%)	24 (12.9%)	35 (20.2%)	6 (12.8%)	0.14
Fetal vascular malperfusion lesions	27 (6.7%)	14 (7.5%)	11 (6.4%)	2 (4.3%)	0.71
Acute chorionic vasculitis	44 (10.9%)	30 (16.1%)	12 (7.0%)	2 (4.3%)	<0.01
Infant variables					
Birthweight (%tile) mean	44.8 ± 26.4	44.7 ± 27.4	43.5 ± 26.2	50.1 ± 22.5	0.35
Birthweight (<10th %tile)	40 (10.1%)	16 (8.7%)	19 (11.5%)	5 (11.1%)	0.68
Head circumference (%tile) mean	49.7 ± 27.8	49.3 ± 27.6	50.3 ± 27.4	49.0 ± 30.8	0.94
Head circumference (<10th %tile)	45 (11.4%)	14 (7.6%)	20 (12.1%)	11 (24.4%)	<0.01
Length (%tile) mean	52.6 ± 26.3	52.2 ± 25.3	51.7 ± 27.8	58.0 ± 24.5	0.35
Length (<10th %tile)	28 (7.1%)	7 (3.8%)	17 (10.2%)	4 (8.9%)	0.06

629 Factors associated with SUD in pregnant individuals with reactive syphilis screening at a safety-net hospital

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OBJECTIVE: Substance use disorder (SUD) has been defined as a barrier to adequate maternal syphilis treatment. The objective of this study was to evaluate characteristics associated with SUD among those with reactive syphilis screening at a large safety-net healthcare system to identify opportunities for intervention.

STUDY DESIGN: Pregnant patients with syphilis before or during pregnancy from January 1, 2021 through December 31, 2022 were identified using reverse sequence screening in a large public healthcare system. Of these patients, those with SUD were identified via chart review. We compared maternal demographics, syphilis stage and initial nontreponemal titer, distance to prenatal clinic and preterm birth among those with and without SUD in pregnancy.

RESULTS: Of 499 patients with syphilis before or during pregnancy identified with reverse sequence screening, 98 (19.6%) had documented SUD. Compared to those without SUD, those diagnosed with SUD and syphilis were more likely to be non-Hispanic white, multiparous, and with late and limited prenatal care (Table). The distance to prenatal clinic (miles [IQR]) was greater for individuals with SUD (11.6 [6.8-17.9] vs 8.5 [4.1-14.8] miles, p=0.01). There was no difference in initial RPR titers or syphilis stage, with the majority having latent syphilis (unknown duration or late). Preterm delivery was significantly more frequent among those with SUD (30% vs 9%, p 0.002).

CONCLUSION: In a high-risk prenatal cohort referred for reactive syphilis testing in a safety-net healthcare system, increased distance to the prenatal clinic, late prenatal care and increased preterm birth characterized those with SUD during pregnancy. Early identification of SUD and syphilis through targeted linkage-to-care for syphilotherapy and SUD recovery may decrease barriers to adequate maternal syphilis treatment.

Table. Characteristics of patients with reactive reverse sequence syphilis screening with and without substance use disorders, January 1, 2021 through December 31, 2022

	SUD (n = 98)	No SUD (n = 401)	P value
Age, years	28.6 (5.4)	27.3 (6.0)	**0.03**
Race/ethnicity			**< 0.001**
Black, non-Hispanic	37 (38)	229 (57)	
White, non-Hispanic	34 (35)	34 (8)	
Hispanic	27 (28)	134 (33)	
Other	0 (0)	4 (1)	
Nulliparous	13 (13)	97 (24)	**0.02**
Prenatal visits	4 (0-8)	9 (3-13)	**< 0.001**
EGA first prenatal visit, wks	18.9 (10.8-27.9)	14.1 (10-23.8)	**0.02**
RPR, initial			0.93
<1:8	28 (29)	121 (30)	
≥1:8	36 (37)	140 (35)	
Nonreactive	34 (35)	140 (35)	
EGA RPR #1	27.3 (19.7-33.6)	15.6 (9.9-26.3)	**< 0.001**
Stage of syphilis			0.57
Early	6 (6)	35 (9)	
Latent unknown or late	55 (56)	205 (51)	
Prior to pregnancy	37 (38)	161 (40)	
HIV Reactive	5 (5)	10 (2)	0.19
Early pregnancy loss	2 (2)	8 (2)	> 0.99
High deprivation zip code	30 (31)	125 (31)	0.92
Distance to prenatal clinic, miles	11.6 (6.8-17.9)	8.5 (4.1-14.8)	**0.01**
Preterm delivery < 37 weeks*	10 (30)	16 (9)	**0.002**
Stillbirth*	1 (3)	1 (1)	0.29

Data shown as n (%) or median (Q1-Q3) as appropriate. EGA, estimated gestational age.
*Denominator includes n=33 among those with and n=181 without SUD who delivered at our institution.

630 Development and validation of a clinical risk prediction model for small-for-gestational age infants

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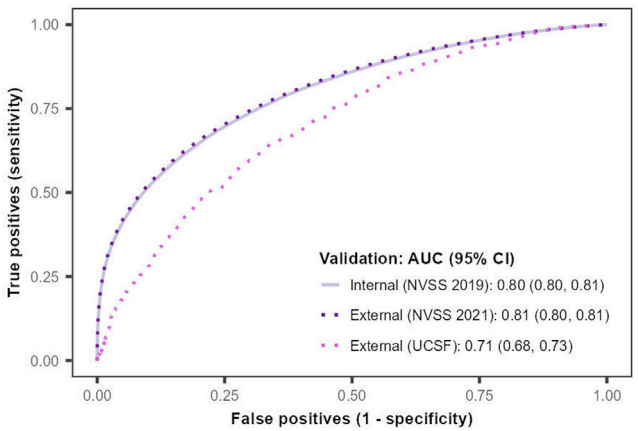
OBJECTIVE: Small for gestational age (SGA) is defined as a birth weight of < 10th percentile for gestational age and is associated with adverse neonatal risks and increased resource utilization. Prenatal prediction of SGA as late as birth hospitalization admission could assist with risk stratification and improved allocation of resources on labor units.

STUDY DESIGN: Data from the National Vital Statistics System (NVSS) Birth Certificate and clinical data from an academic medical center (AMC) were utilized for the development, internal, and external validations. Non-anomalous, singleton births at >= 35 weeks were included for this analysis with the outcome of SGA based on neonatal weight using Fenton growth charts. A predictive model was developed using a stochastic gradient boosting algorithm adjusting for demographic (age, race/ethnicity, payer), obstetrical (delivery gestational age (GA), parity), clinical (body mass index, gestational weight gain (GWG), pregestational weight, chronic hypertension, pregestational/gestational diabetes, hypertensive disorders of pregnancy), and neonatal sex. Data from the 2019 NVSS was used to train and internally validate two models predicting SGA at birth. External validation was conducted on AMC and 2021 NVSS birth data. Measures of model performance are expressed as areas under the receiver operator curve (AUC) and with 95% confidence intervals (CI).

RESULTS: Model development was performed using 3.3 million NVSS births from 2019 and externally validated on 8,557 AMC births and 3.3 million NVSS births from 2021 with an SGA prevalence of 7.9%, 4.2%, and 8.8%, respectively. Internal validation yielded an AUC of 0.80 (95% CI: 0.80, 0.81) with delivery GA, prepregnancy weight, and GWG as the most important predictors. External validation yielded AUCs of 0.71 (95% CI: 0.68, 0.73) and 0.81 (95% CI: 0.80-0.81) on AMC and 2021 NVSS data, respectively.

CONCLUSION: SGA can be satisfactorily predicted using this clinically deployable machine learning model which can be implemented up until birth admission to improve resource utilization and team preparation in anticipation of birth.

Figure 1. Receiver operating characteristic curves from stochastic gradiant boosting model predicting small-for-gestational-age neonates.



Note: AUC = Area under the curve; CI = Confidence interval; NVSS = National Vital Statistics System; UCSF = University of California, San Francisco

631 Clinical utility of antenatal cfDNA screening for autosomal dominant disorders in the general population

Thomas Westover[1], Nicole Rook[2], Sandra James[2], Dineli Lewke[2], Jess Murawsky[2]
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OBJECTIVE: We sought to evaluate the clinical utility and PPV of commercially available single gene cell free dna (sgNIPT) screening for autosomal dominant conditions in the general OB population.

STUDY DESIGN: MFM performs primary genetic screening/US in our USA regional perinatal ctr. From 2021-2023, we offered sgNIPT Natera Vistara to all singleton preg. Fetal/newborn DNA was assessed pre/postnatally after abnl US or abnl sgNIPT. Preg were classified as high or low risk for the mother or fetus to have a pathogenic dna variant in 30 prespecified genes. Small sample size precluded exact estimation of sgNIPT accuracy, statistical estimation yielded wide confidence intervals.

RESULTS: 4571 preg pts desired sgNIPT after prenatal counseling at median gest age 18 weeks (range 12-36). 12 preg pts had abnl sgNIPT (screen pos rate of 2.6/1000). 6 fetuses were high risk and 6 preg mothers were carriers (4 mosaic and 2 nonmosaic). No high risk pts had relevant personal/family history. 65/4571 assays were uninformative (1.4%). US, newborn physical exam and DNA data was available for all high risk preg whereas only US/newborn physical exam data was available for low risk preg precluding calculation of analytical sensitivity. PPV was 6/6 (100%) for an affected fetus (apert, thanatophoric, sotos, noonan, tuberous, OI). sgNIPT dxed 6/7 clinically affected fetuses (1 cornelia fetus had uninformative sgNIPT). 5/7 affected fetuses had abnl US. Two maternal full mutation carriers had normal fetal US with confirmed abnl fetal dna (OI). Four maternal "low mosaic" carriers (noonan tuberous cornelia) had normal fetal US/DNA; maternal leukocyte dna mutation analysis was normal suggesting presence of somatic tissue mosaicism.

CONCLUSION: sgNIPT screening in the general OB population allows for fetal risk assessment of dominant conditions but "false positive" results can occur due to the presence of maternal dna variants with variable expressivity, incomplete penetrance and somatic tissue mosaicism. Clinicians and families need to be aware of these issues. Ongoing research is needed to assess the sens/spec of sgNIPT for dominant disorders.

632 Barriers to providing training in opioid use disorder: a survey of OB/GYN residency program directors

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OBJECTIVE: Medication-assisted therapy (MAT) is recommended for pregnant patients with OUD. Few OB/GYN residency programs offer MAT training. We aimed to characterize training offered and identify perceived barriers to MAT training among OB/GYN program directors (PDs).

STUDY DESIGN: We administered a survey through email to all OB/GYN residency PDs asking whether they believe MAT is in-scope for OB/GYNs and perceived barriers in providing MAT training to residents. We collected PD demographic information including gender identity, race/ethnicity, age, and years as PD. We calculated number/percent for each response, and Fisher's exact test was used to determine associations between demographic, personal, or program information and MAT-related responses.

RESULTS: The overall response rate was 91.3%. The majority of PDs identified as female (73.9%) and white (74.3%), and 44.3% directed a university-based residency program. 62% of PDs agreed with the statement "Treating opioid use disorder with medication-assisted therapy is within the scope of practice of an OB/GYN." 40.1% of PDs reported no faculty in their department prescribe MAT, 36.4% have a colleague who does, and 15.1% of PDs themselves prescribe MAT. The leading reported barrier to providing training was lack of trained faculty (81.6%), followed by lack of faculty interest (42.7%). A greater proportion of PDs from programs with ≤ 4 residents per year (42.2%, p=0.001) reported provision of MAT training, compared to PDs from programs with more than 10 residents per year (6.21%, p=0.02). A greater percentage of PDs from programs having between 5 and 7 residents per year (50.7%, p=0.02) identified a lack of trained faculty as a barrier to providing MAT training, compared with PDs from programs with ≤ 4 residents per year (30.4%, p=0.03).

CONCLUSION: Although most PDs agree that MAT is in-scope for an OB/GYN, a minority prescribe MAT or have a colleague who prescribes MAT. Lack of trained faculty is a major barrier to providing MAT training, and focused efforts in faculty education may help address this barrier.

Table 1: Program director responses to questions about barriers to offering medication-assisted therapy training

What barriers prevent you from providing training in medication-assisted treatment of opioid use disorder using buprenorphine as part of your OB/GYN residency program? (select all that apply)*	Number of Program Directors selecting this response (%)
None – we currently provide this training	63 (61.2)
Low patient demand	38 (36.9)
Lack of resident interest	10 (9.7)
Lack of faculty interest	44 (42.7)
Lack of trained faculty	84 (81.6)
Lack of time in curriculum	36 (35.0)
Lack of training site for relevant clinical experience	38 (36.9)
Would like to do it, but just haven't prioritized it	36 (35.0)
Other barrier not listed	10 (9.7)

*Add up to more than 100% because respondents could select more than one response

633 Comparisons of three-tiered risk assessment tools for postpartum hemorrhage related morbidity

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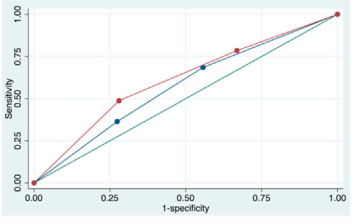
OBJECTIVE: In 2022, the California Maternal Quality Care Collaborative published Version 3 of the Hemorrhage Toolkit (CMQCC V3). We compared the likelihood of postpartum hemorrhagic morbidity (PPH-M) with CMQCC V3 risk assessment screen compared to the

classification schema promulgated by ACOG's Practice Bulletin (#183; published in 2017).

STUDY DESIGN: This was a retrospective cohort of all singletons delivered at ≥ 14 weeks at a Level IV center during 24 months. Chart abstraction was done by qualified medical staff, and the risk stratification was calculated at delivery. A composite PPH-M was defined as in Figure 1, and we assessed the predictive accuracies of the models by calculating AUC (area under the curve) for receiver-operating curves (ROC). A secondary analysis to examine risk of PPH-M with stratification by CMQCC V3 was compared, and adjusted risk ratios calculated using multivariable Poisson regression models.

RESULTS: Of 8,623 consecutive deliveries in the study period, 8,357 (97%) were singletons. For the CMQCC V3, 2,562 (31%) were low-, 3,084 (37%) were medium- and 2,711 (32%) were classified as high-risk. ACOG classified 3,475 (42%) as low-, 2,430 (29%) as medium- and 2,452 (29%) as high-risk. The models agreed approximately 55% of the time (kappa 0.33, "fair" agreement). Figure 1 shows the ROC curves in predicting PPH-M, with an AUC of 0.61 (95% CI 0.60 − 0.63) for CMQCC V3 and 0.57 (95% CI 0.56-0.59) for ACOG, which is significantly in favor of CMQCC (p< 0.001). The sensitivity of CMQCC was increased compared to ACOG (58% to 50%), but the specificity decreased (46% to 61%). A secondary analysis examined risk of PPH-M in CMQCC V3, and found that PPH-M was increased for high risk group when compared to low (aRR 1.88, 95% CI 1.65-2.14) or medium (aRR 1.78, 95% CI 1.59-1.99), but medium was not increased compared to low.

CONCLUSION: In our population, the CMQCC V3 is more likely to label patients at jeopardy for PPH-M as high-risk as compared to current ACOG risk stratification, however its utilization in clinical practice to improve outcomes remains uncertain.



	AUC	Sensitivity	Specificity	NPV	PPV
CMQCC	0.61	58.0%	46.0%	85.0%	17.3%
	0.60 - 0.63	56.7% - 59.3%	44.7% - 47.3%	84.0% - 85.9%	16.3%-18.2%
ACOG	0.57	50.4%	61.1%	83.8%	23.6%
	0.56 - 0.59	49.1% - 51.7%	59.8% - 62.3%	82.8% - 84.7%	22.5% - 24.7%

Figure 1. ROC Analysis of CMQCC V3 † Risk stratification tool compared to ACOG‡ Risk stratification tool using PPH-M*

*PPH-M composite: blood loss ≥ 1000 mL, use of uterotonics (excluding prophylactic oxytocin), mechanical tamponade, surgical intervention for atony (uterine artery ligation, uterine artery embolization, B-Lynch), transfusion, maternal venous thromboembolism, ICU admission, hysterectomy or maternal death

† CMQCC V3 California Maternal Quality Care Collaborative Risk Assessment Screen, version 3

‡ACOG Practice Bulletin on Postpartum Hemorrhage (#183)

AUC, area under the curve, NPV, negative predictive value, PPV positive predictive value

634 Echocardiography Parameters and Cardiac Geometry in Pregnancy by Race and Ethnicity

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OBJECTIVE: The study's objective was to assess normal transthoracic echocardiography (TTE) parameters and cardiac geometry among pregnant individuals by race and ethnicity.

STUDY DESIGN: We performed a retrospective cohort study of all pregnant individuals without cardiovascular disease who underwent a perinatal TTE considered normal at a single academic center between October 1, 2017 and May 1, 2022. Demographics and echocardiographic parameters were compared by self-reported race/ethnicity by Chi square, Fisher's exact, and analysis of variance test.

RESULTS: During the study period, 369 women had normal TTE in the perinatal period with a mean age of 31.8 ± 6.0 years old with a pre-gravid body mass index of 29.0 ± 7.0 kg/m^2. Subjects identified as 55.3% White, 24.7% as Hispanic, 14.1% as Black/African American, and 6.0% as Asian. Patients identifying as Black had higher rates of chronic hypertension (21.2%) compared to other races/ethnicities (p=0.02). TTE parameters of left ventricular (LV) ejection fraction, LV diastolic volume index, LV mass/mass index, LA volume index, tricuspid regurgitation peak gradient, septal and lateral e' differed by race/ethnicity (Table 1). There was a statistically significant difference in cardiac geometry by race and ethnicity (p=0.04).

CONCLUSION: While there were differences in TTE parameters by race and ethnicity, these differences may not be clinically significant as most mean values fall within the normal clinical ranges. There was an increase in concentric remodeling seen in Black/African American patients likely due to the increased rate of chronic hypertension seen in this population. Further larger, prospective studies are needed to better evaluate cardiac and perinatal outcomes associated with differences in cardiac geometry in pregnancy.

Table 1. Echocardiography Parameters in Pregnancy by Race and Ethnicity

	Reference Mean	Asian (n=22)	Black/African American (n=52)	Hispanic (n=91)	White (n=204)	P-Value
Systolic BP	N/A	118.8 (±19.2)	120.4 (±17.3)	117.2 (±14.7)	116.3 (±15.0)	0.32
Diastolic BP	N/A	73.7 (±12.1)	75.6 (±10.3)	71.8 (±10.2)	71.4 (±10.3)	0.81
Echo Heart Rate	N/A	100.8 (±24.2)	89.3 (±28.8)	87.9 (±15.9)	85.7 (±15.3)	**0.02**
LV Interval Diameter Diastole	4.5 (0.36)	4.5 (±0.4)	4.6 (±0.5)	4.6 (±0.4)	4.6 (±0.4)	0.43
LV Internal Diameter Systole	2.8 (0.33)	2.8 (±0.5)	2.9 (±0.4)	3.0 (±0.4)	3.0 (±0.4)	0.34
Interventricular septum	0.6-0.9	0.85 (±0.2)	0.90 (±0.2)	0.84 (±0.1)	0.82 (±0.1)	0.34
Posterior Wall	0.6-0.9	0.8 (±0.1)	0.9 (±0.2)	0.8 (±0.1)	0.8 (±0.1)	0.69
LV Ejection Fraction	64 (5)	64.4 (±4.9)	63.4 (±4.1)	60.8 (±7.7)	61.5 (±4.5)	**<0.001**
LV End Diastolic Volume (mL)	76 (15)	84.4 (±30.1)	105.4 (±30.4)	100.7 (±27.7)	102.9 (±26.5)	0.82
LV Diastolic Volume Index (mL/m^2)	45 (8)	48.9 (±12.6)	54.0 (±19.9)	54.8 (±19.4)	54.9 (±14.4)	**0.03**
LA Volume (cm^3)	N/A	38.1 (±10.7)	54.1 (±14.6)	46.9 (±12.6)	48.6 (±12.6)	0.58
LA Volume Index (mL/m^3)	16-34	23.4 (±6.2)	27.3 (±7.3)	25.9 (±9.5)	26.0 (±6.0)	**<0.001**
LV Mass (grams)	67-162	123.1 (±47.5)	134.9 (±31.8)	125.9 (±30.4)	123.7 (±31.2)	**0.04**
LV Mass Index	44-88	76.0 (±45.3)	66.9 (±16.3)	67.0 (±14.4)	64.6 (±14.1)	**<0.001**
Relative Wall Thickness	0.22-0.44	0.4 (±0.06)	0.4 (±0.08)	0.4 (±0.07)	0.4 (±0.07)	0.55
RA Pressure (mmHg)	3 (0-5)	3.0 (±2.0)	3.5 (±2.2)	3.8 (±2.2)	3.5 (±1.9)	0.23
TR Peak Gradient (mmHg)	N/A	19.3 (±1.7)	17.8 (±6.3)	20.4 (±7.5)	18.5 (±5.4)	**0.001**
E/A ratio	1.18 (0.33)	1.4 (±0.4)	1.3 (±0.5)	1.5 (±0.5)	1.4 (±0.4)	0.33
Septal e'	N/A	0.10 (±0.03)	0.09 (±0.03)	0.11 (±0.03)	0.11 (±0.02)	**<0.001**
Lateral e'	N/A	0.20 (±0.12)	0.14 (±0.08)	0.16 (±0.11)	0.16 (±0.06)	**<0.001**
Cardiac Geometry						
Normal Geometry	N/A	17 (77.3%)	40 (76.9%)	75 (82.4%)	169 (82.8%)	0.04
Concentric Hypertrophy	N/A	2 (9.1%)	2 (3.8%)	3 (3.2%)	3 (1.5%)	
Concentric Remodeling	N/A	3 (13.6%)	10 (19.2%)	12 (13.2%)	29 (14.2%)	
Eccentric hypertrophy	N/A	0 (0%)	0 (0%)	1 (1.1%)	3 (1.5%)	

Abbreviations: BP: blood pressure, LA: left atrium, LV: left ventricle, RV: right ventricle, RA: right atrium, TR: tricuspid regurgitation

All data are reported as mean (standard deviation) or n (%).

635 Effect of Medications on Postpartum Cerebral Autoregulation in Preeclampsia with Severe Features

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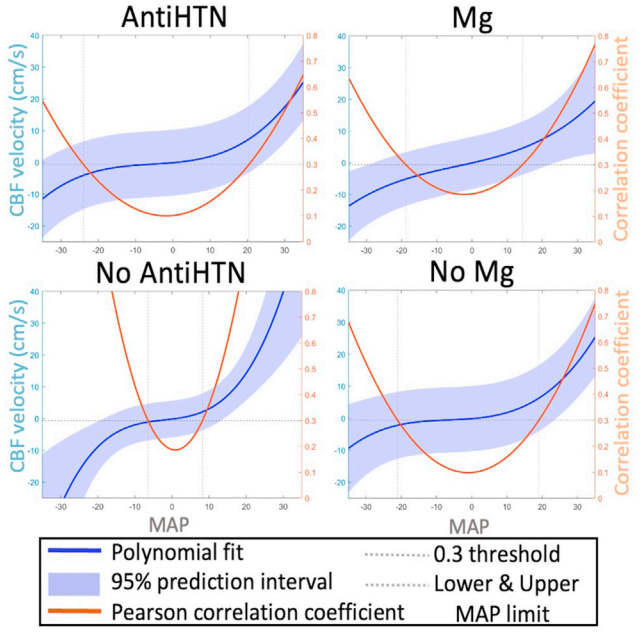
OBJECTIVE: Effective cerebral autoregulation (CA) typically maintains constant cerebral blood flow (CBF) within a mean arterial pressure (MAP) range of 50 − 150 mmHg in healthy adults. Impaired CA may contribute to increased risk of cerebrovascular complications in individuals with preeclampsia, due to preeclampsia-associated endothelial and autonomic dysfunction. We characterized CA curves in postpartum individuals treated for preeclampsia with severe features (PSF) and investigated the effects of recent treatment with intravenous magnesium (Mg) and antihypertensives (antiHTN).

STUDY DESIGN: We prospectively recruited individuals with PSF and measured CA using transcranial doppler (TCD) and finger plethysmography within 1 week of delivery. We constructed polynomial S-curves and calculated Pearson correlation coefficients to describe CA in patients who did and did not receive Mg or antiHTN within 24 hours prior to TCD. A correlation coefficient of > 0.3 indicates high correlation between MAP and CBF velocity, suggesting impaired CA.

RESULTS: We included 51 individuals with PSF, of whom 38 (75%) were treated with antiHTN, 3 (6%) were treated with Mg and 7 (14%) were treated with both antiHTN and Mg within the 24 hours prior to CA measurements. The CA S-curve in those recently treated with Mg appeared more linear with a less well-defined plateau, suggesting impaired CA. In the antiHTN group, the S-curve plateau was wider, compared with the non-antiHTN group (**Figure**).

CONCLUSION: Our results suggest that commonly used treatments for preeclampsia affect CA. Specifically, CA may function more effectively in PSF patients receiving antiHTN in the first week postpartum, compared to those not receiving antiHTN. In contrast, we observed impaired CA in those recently treated with Mg. These findings may have implications for clinical blood pressure management in the postpartum period in patients with PSF. Future studies should explore specific antiHTN medications and their interactions with Mg to better characterize their effects on CA.



636 Association between histological and clinical chorioamnionitis in patients with PPROM

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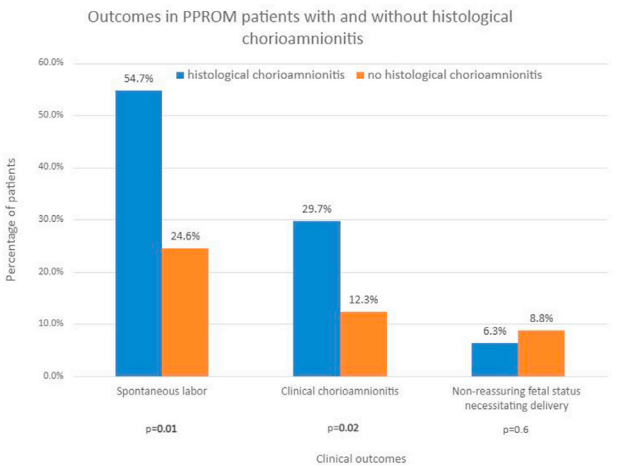
[1]Washington University in St. Louis, St. Louis, MO, [2]Washington University School of Medicine in St. Louis, St. Louis, MO, [3]Washington University School of Medicine in St. Louis, Barnes Jewish Hospital, St. Louis, MO

OBJECTIVE: Chorioamnionitis is a morbid complication and indication for early delivery in patients with preterm prelabor rupture of membranes (PPROM). Prior studies have shown wide variation and discordance in rates of histological versus clinical chorioamnionitis, and the clinical outcomes associated with histological chorioamnionitis (HCA) are unclear. We investigated outcomes in patients with HCA after PPROM.

STUDY DESIGN: This single-center retrospective cohort study included singleton gestations with PPROM between 24^{+0} and 33^{+6} weeks with at least 24 hours of latency after PPROM diagnosis from 2019-2021. We included all patients who had placental pathology evaluations performed. The primary outcome was clinical chorioamnionitis. Secondary outcomes were spontaneous labor and non-reassuring fetal status (NRFS). Outcomes were compared between patients with and without HCA, defined by chorioamnionitis, chorionitis, or funisitis of the amniotic membranes, chorionic plate, and/or umbilical cord as reported on placental pathology. Descriptive and bivariate analyses were used to compare outcomes.

RESULTS: Of the 125 patients meeting inclusion criteria, 121 (96.8%) had placental pathology performed and 64 (52.9%) had HCA. Patients with HCA were more likely to be diagnosed with clinical chorioamnionitis (29.7% vs. 12.3%, p=0.02) and spontaneous labor (54.7% vs. 24.6%, p=0.01) compared to patients without HCA. There was no difference in rates of delivery for NRFS between patients with and without HCA. Among patients delivered for clinical chorioamnionitis, 33.3% did not have HCA. Composite neonatal infectious morbidity did not differ with HCA (4.7% vs. 1.8%, p=0.37).

CONCLUSION: More than half of patients with PPROM have HCA. Although HCA was associated with a higher incidence of clinical chorioamnionitis, it appears to be a common pathologic diagnosis with < 30% that have clinical chorioamnionitis. The utility of routine placental evaluation after PPROM should be studied further.



637 Effects of universal intrauterine pressure monitoring on labor outcomes among patients with obesity

Eileen Xu[1], Nandini Raghuraman[2], Katherine H. Bligard[2], Jeannie C. Kelly[3], Ebony B. Carter[3], Alison G. Cahill[4], Antonina I. Frolova[2]

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OBJECTIVE: Labor in patients with obesity is associated with increased cesarean rates due to labor dystocia. Active labor management in this population is often complicated by suboptimal monitoring of uterine contractions using external tocodynamometry, contributing to over-diagnosis of labor dystocia. We hypothesized that universal intrauterine pressure catheter (IUPC) use in patients with obesity would result in decreased cesarean rates compared to provider-initiated IUPC use.

STUDY DESIGN: This was a secondary analysis of a prospective study which included nulliparous patients with a BMI≥30kg/m^2 delivering at ≥37 weeks gestation at a single tertiary care center. Patients in this study had universal IUPC insertion at time of amniotomy (Universal-IUPC cohort) and were enrolled between 2020 and 2021. Historic controls were selected from nulliparous patients with IUPC use only at discretion of provider (PRN-IUPC) delivering between 2010 and 2014 at the same institution. Matching was performed on BMI and gestational age week at delivery in a 1:4 ratio. The primary outcome was cesarean delivery rate. Secondary outcomes were oxytocin use and maximum oxytocin dose. Multivariable logistic regression was used to compare outcomes between the Universal-IUPC and PRN-IUPC cohorts.

RESULTS: The Universal-IUPC cohort had 100% IUPC use while 76.2% of the PRN-IUPC cohort had an IUPC placed during labor. BMI and gestational age at delivery were similar between groups. Universal-IUPC cohort was older (27.3 vs 23.8 years, p< 0.01) and had more patients undergoing induction of labor (100 vs 57.4%, p< 0.01). Cesarean delivery rates for Universal-IUPC cohort were significantly lower than that of the PRN-IUPC cohort after adjusting for labor induction (27.9% vs 37.7%; aOR 0.39, 95%CI 0.30-0.74). Oxytocin use and maximum dose were not significantly different between the two cohorts.

CONCLUSION: Among patients with obesity, universal IUPC use may decrease cesarean rates. Further studies evaluating methods of uterine contraction monitoring in patients with obesity may decrease obstetric morbidity for this patient population.

638 Assessment of Maternal and Neonatal Outcomes in Newly Diagnosed Intrapartum Gestational Hypertension

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OBJECTIVE: Hypertensive disorders, including gestational hypertension (HTN) are a leading cause of adverse perinatal outcomes. There are currently limited data assessing these same outcomes in individuals who are diagnosed with intrapartum HTN only. The objective of this study was to compare the rate of progression to preeclampsia (PET) in intrapartum HTN versus gestational HTN. Our hypothesis was that intrapartum HTN was associated with a lower rate of progression to PET.

STUDY DESIGN: A retrospective cohort study was performed comparing the rate of progression to PET between gestational HTN and intrapartum HTN (defined as at least two elevated BPs (140 mmHg systolic or 90 mmHg diastolic) at least 4 hours apart, occurring only during the intrapartum period and not in the current or prior pregnancies). 142 individuals were included in the gestational HTN group, and 25 in the intrapartum group. The primary outcome was defined as the rate of PET in each group. Secondary outcomes included mode of delivery, severe features and neonatal outcomes (NICU admission, hypoglycemia, respiratory support, mortality). Statistical analysis was performed using Fisher's Exact Test.

RESULTS: The two groups were similar in age, BMI, and demographics. The intrapartum HTN group was more likely to be nulliparous (80% vs 67.6%) and later in gestation (39.3 vs 37.0 weeks) compared with the gestational HTN group. The development of PET was higher with gestational HTN compared to intrapartum HTN (85.9% vs 64.0%, p=0.018). In the secondary outcomes NICU admissions were increased in gestational HTN compared with the intrapartum HTN (31.9% vs 8%, p=0.015).

CONCLUSION: Individuals with intrapartum HTN are less likely to progress to PET than those with gestational HTN. However, the rates of PET in both groups are quite high and limited outcomes for the patient and newborn were examined. As intrapartum HTN has not been extensively evaluated previously, more research is needed to further characterize the impact of this diagnosis and potential management strategies to improve outcomes.

Table 1	Gestational HTN (n=142)	Intrapartum HTN (n=25)	*P*
Preeclampsia	122 (85.9)	16 (64.0)	0.018
Severe features	87 (71.3)	14 (87.5)	0.235
Mg administration	98 (69.0)	12 (48.0)	0.065
Readmission for HTN	4 (2.8)	3 (12.0)	0.069
Neonatal			
NICU admission	43 (31.9)	2 (8.0)	0.015
Hypoglycemia	11 (8.2)	0 (0.0)	0.215
Respiratory support	28 (20.9)	5 (20.0)	1.0
Mortality	0 (0.0)	0 (0.0)	N/A

Table 1: Primary outcomes (preeclampsia) and secondary outcomes (severe features, readmission, neonatal) of groups: Gestational Hypertension (HTN) and Intrapartum Hypertension (HTN); Data are n (%). *P* was determined by Fisher's Exact Test.

639 Eclampsia and adverse effects: comparison between 1 versus 2 grams per hour intravenous magnesium sulfate

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OBJECTIVE: While magnesium sulfate (MgS) is recognized as effective treatment for prevention of eclampsia, there is no consensus regarding the appropriate maintenance dosage.

Our research compared the efficacy, serum Mg concentrations and adverse effects rate of a maintenance dose of 1 g/h and 2 g/h of MgS in the prevention of eclampsia.

STUDY DESIGN: A retrospective cohort study of all women with severe pre-eclampsia/eclampsia, who were treated with MgS between August 2005 and September 2019. Women received a loading dose of 4 g MgS sulfate for 20 minutes, after which MgS was administered at 2 g/h until July 2013 (N=375) and afterwards was given at 1 g/h (N=306). MgS was administered up to 48h before delivery and 24h after delivery. Serum Mg concentrations were measured every 8 hours. The primary outcomes were (1) the rate of eclampsia and (2) the rate of the total adverse effects. Assuming that the rate of eclampsia will be 0.5% and 3% in the 2g/h versus 1 g/h groups, 680 women were required (5% one sided alpha, 80% power). This sample size was sufficient to detect 10% difference in the rate of adverse effects between 2 g/h and 1 g/h (40% versus 30%, respectively, 5% one sided alpha, 86% power).

RESULTS: Groups' outcomes are presented in the table. While there was no difference between the 1 g/h versus 2 g/h groups regarding the rate of eclampsia (2 (0.7%) versus 1 (0.3%), respectively; P=0.45), patients treated with a maintenance dose of 1 g/h suffered from fewer adverse effects compared with 2 g/h (40 (13%) versus 162 (43%), respectively; P< 0.0001). Additionally, both maximal and mean serum magnesium levels were significantly lower in patients treated with 1 g/h, and more patients from this group did not reach a serum level of 4.8 mg/dL which is the accepted therapeutic level (48 (16%) versus 305 (81%) in the 1 g/h versus 2 g/h, respectively; P< 0.0001).

CONCLUSION: We conclude that 1 g/h is the preferred maintenance dose due to the lower rate of adverse effects and the same efficacy of treatment. Additionally, we concluded that the accepted therapeutic window for MgS needs to be re-evaluated.

Table: Study outcomes

Outcome	1 g/h (n=306)	2 g/h (n=375)	p value
Eclampsia during MgSO4 treatment	2 (0.7%)	1 (0.3%)	0.45
[a]Mean Serum MgSO4 levels (mg/dL)	3.7 (0.8)	5.1 (1.2)	<0.0001
[a]Maximal serum MgSO4 levels	4.2 (1.7)	6.0 (4.8)	<0.0001
[a]Serum MgSO4 level reached toxic level (≥8.4 mg/dL)	4 (1.3%)	7 (1.9%)	0.76
[a]Serum MgSO4 reached lower therapeutic level (≥4.8 mg/dL)	48 (16%)	305 (81%)	<0.0001
Lowered dose or early treatment termination	1 (0.3%)	44 (12%)	<0.0001
Adverse effects overall	40 (13%)	162 (43%)	<0.0001
Nausea and Vomiting	16 (5%)	30 (8%)	0.15
Dyspnea	7 (2%)	17 (5%)	0.11
Headache	23 (8%)	93 (25%)	<0.0001
Weak reflexes	0 (0%)	30 (8%)	<0.0001
Flushing	2 (0.6%)	17 (5%)	0.002
Fatigue	0 (0%)	18 (5%)	0.0001
Tremor	3 (1%)	5 (1.3%)	0.74
Dizziness	6 (2%)	13 (3%)	0.24
Confusion	0 (0%)	1 (0.2%)	1
Dry Mouth	0 (0%)	3 (0.8%)	0.26
Malaise	1 (0.3%)	9 (2%)	0.03

Values are presented as mean (SD) or number (percent).
MgSO4 Magnesium sulfate
[a]Serum MgSO4 levels were missing for 2 patients in the 1 g/h group, therefore n=304 for these variables

640 Do women with one abnormal value of oral-glucose-tolerance-test according to Carpenter and Coustan have gestational-diabetes-mellitus?

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OBJECTIVE: Gestational diabetes mellitus (GDM) is diagnosed by the two step strategy of performing 50g glucose challenge test (GCT) followed by 100g oral glucose tolerance test (OGTT). The accepted cutoffs for GDM diagnosis using the 100g OGTT are two elevated values according to the criteria of either Carpenter and Coustan (C&C) or the 1979 National Diabetes Data Group. In the present study we examined the effect of one OGTT abnormal value only according to C&C criteria on pregnancy outcomes.

STUDY DESIGN: A population based retrospective cohort study of women who delivered at Emek medical center in Israel between July 2013 and September 2021 was conducted. Women were divided to the following groups: (1) Women without GDM (either normal GCT or OGTT; N=14,450), (2) women with one abnormal OGTT value only according to C&C (fasting glucose 95-104, one hour 180-189, 2 hours 155-164 and 3 hours 140-144 mg/dL; N=661), and (3) women with GDM defined as at least two abnormal OGTT values according to C&C (N=904). Only the last group was treated for GDM. The primary outcome was the rate of large for gestational age (LGA) neonates.

RESULTS: Univariable and multivariable analyses are presented in the table. After controlling for background characteristics, one abnormal glucose value increased the risk, compared to the control group, for LGA (OR_{adj}1.9 95%CI[1.6-2.4]), macrosomia (2.4 [1.9-3.2]), hypertensive diseases of pregnancy (1.4 [1.07-1.9]) and shoulder dystocia (3 [1.2-7.8]). The risk for LGA and macrosomia was also higher in the one abnormal glucose value group compared to the two abnormal glucose values group (1.4 [1.1-1.9] and 2.1 [1.4-3.1], respectively).

CONCLUSION: Women with one abnormal OGTT value, according to the C&C only, had worse outcome than normo-glycemic women or women with GDM. Those women should be considered as having GDM.

Table. Pregnancy and neonatal outcomes

Univariable analysis			
Number of abnormal OGTT values	0 N=14,450	1 N=661	2 N=904
Delivery week	39.4 ±1.6	39.1 ±1.6	38.7 ±1.5
Preterm delivery	729 (5%)	40 (6%)	62 (7%)
Birth Weight	3252 ±479	3368 ±528	3234 ±494
LGA	1452 (10%)	138 (21%)	133 (15%)
Macrosomia	708 (5%)	76 (12%)	41 (5%)
Hypertensive disease of pregnancy	627 (4%)	54 (8%)	65 (7%)
CD	2394 (17%)	154 (23%)	221 (24%)
CD due to fetal distress	576 (4%)	27 (4%)	37 (4%)
CD due to labor dystocia	80 (0.6%)	7 (1.1%)	8 (0.9%)
Operative delivery	716 (5%)	28 (4%)	34 (4%)
Apgar score at 1 minute after birth	9.2 ±0.9	9.1 ±1	9.1 ±1
Apgar score at 1 minute after birth <7	128 (0.9%)	8 (1.3%)	8 (1%)
Apgar score at 5 minutes after birth	9.9 ±0.5	9.9 ±0.5	9.9 ±0.6
Apgar score at 5 minutes after birth <7	13 (0.1%)	0 (0%)	1 (0.1%)
Meconium	146 (1%)	8 (1.2%)	7 (0.8%)
Birth trauma	264 (1.8%)	13 (2%)	9 (1%)
Shoulder dystocia	45 (0.3%)	5 (0.8%)	2 (0.2%)
NICU	737 (5%)	41 (6%)	61 (7%)
hyperbilirubinemia	3350 (23%)	170 (26%)	265 (29%)
phototherapy	1690 (12%)	85 (13%)	146 (16%)
Neonatal hypoglycemia	81 (0.6%)	3 (0.5%)	13 (1.4%)
Polycitemia	26 (0.2%)	1 (0.2%)	8 (0.9%)
RDS	102 (0.7%)	3 (0.5%)	6 (0.7%)
Respiratory disorders	308 (2.1%)	11 (1.7%)	25 (2.8%)
Mechanical Ventilation	142 (1%)	4 (0.6%)	11 (1.2%)
Multivariable analysis			
	Adjusted OR 95% CI*		
Number of abnormal OGTT values	1 vs 0	1 vs 2	2 vs 0
LGA	1.9 [1.6-2.4]	1.4 [1.1-1.9]	1.4 [1.1-1.7]
Macrosomia	2.4 [1.9-3.2]	2.1 [1.4-3.1]	1.2 [0.8-1.7]
Cesarean delivery	1.1 [0.9-1.3]	1.1 [0.9-1.5]	0.9 [0.8-1.1]
Hypertensive disease of pregnancy	1.4 [1-1.9]	1.4 [0.9-2.1]	1 [0.8-1.3]
Neonatal hypoglycemia	0.6 [0.2-1.8]	0.3 [0.1-1.2]	1.7 [0.9-3]
NICU admission	1 [0.7-1.5]	1.1 [0.7-1.7]	1 [0.7-1.3]
Hyperbilirubinemia	1.1 [0.9-1.3]	1 [0.8-1.2]	1.1 [0.9-1.3]
Birth trauma**	1.2 [0.6-2.2]	2 [0.8-5]	0.6 [0.3-1.3]
Shoulder dystocia**	3 [1.2-7.8]	2.7 [0.5-14.3]	1.1 [0.3-4.7]

Values are presented as mean±SD or number (percent)
*Adjusted for maternal age, chronic hypertension, primiparity, pregnancy number, birth number, BMI and delivery Week
** Vaginal deliveries only
CD, Cesarean delivery; CI, confidence interval; LGA, large for gestational age; NICU, neonatal intensive care unit; OGTT, oral glucose tolerance test; OR, odds ratio; RDS, respiratory distress syndrome

641 Early versus late external cephalic version : A Retrospective Cohort Study

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OBJECTIVE: To compare the success rate and the cesarean delivery rate between early and late external cephalic version (ECV) in patients presenting with breech presentation at term.

STUDY DESIGN: This is a retrospective cohort study that included women undergoing a trial of external cephalic version (ECV). We included all patients with a singleton term pregnancy with a breech presentation who opted for ECV. We excluded patients with a nuchal cord, patients in labor, fetal heart rate abnormality, and patients with any contraindication for vaginal delivery. We compared the outcomes between ECV that was performed at 37+0 to 37+2 days (early ECV group) and ECV performed after 37+3 days (late ECV group). Our primary outcome was the rate of cesarean delivery among patients who had successful ECV. Secondary outcomes included success rate.

RESULTS: Between January 2021 and March 2023, a total of 100 patients had a trial of ECV, 45 in the early ECV group and 55 in the late ECV group. Baseline characteristics were similar between the two groups (Table 1). Late ECV group had significantly higher rate of successful version to cephalic presentation (82% vs. 60%, p=0.0156, OR-0.33, 95% CI 0.13-0.8) and significantly lower rate of cesarean delivery (34.6% vs 59.4%, p = 0.0202, OR 2.7, 95% CI 1.16-6.6) when compared to early ECV group.

CONCLUSION: External cephalic version performed at a later gestational age was associated with a higher rate of successful version to cephalic presentation and lower cesarean delivery rate.

Table 1: Patient characteristics and study outcomes

	Early ECV (n=45)	Late ECV (n=55)	P value	Effect size 95% CI
Maternal age	31.87 ± 4.65	31.93 ± 4.97	0.9	
Gestational age at ECV	37.2 ± 0.5	38.2 ± 0.8	0.0001	-0.9 (-1.2 - -0.7)
Gestational age at delivery after successful ECV	37.2±0.5	38.1± 0.7	**0.0001**	**-0.9 (-1.2-0.5)**
BMI	28.4 ±4.3	28.68 ± 4.1	0.81	N.S
Nulliparity	20 (44)	15 (27)	0.07	N.S
Prior cesarean	2 (4.4)	4 (7.2)	0.55	N.S
Cesarean delivery*	22 (59.4)	18 (34.6)	**0.0202**	**2.7 (1.16-6.6)**
Successful ECV	27 (60)	45 (82)	0.0156	0.33 (0.13-0.8)

Data presented as Mean +/- SD, n (%), the effect size presented as odds ratio
*Mode of delivery was calculated for patients who had successful ECV trial: early ECV: n=37. Late ECV: n=52)
ECV- external cephalic version, BMI-body mass index,

642 Coping mechanisms and support systems of Black women after preterm birth: a qualitative study

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OBJECTIVE: Spontaneous preterm birth (sPTB) can have lasting impacts on the birthing person and the delivered child. Black women endure a higher prevalence of sPTB; however, there is a lack of data on how they cope with having a sPTB and the support symptoms they rely on to recover. Our study aimed to reveal the perspectives of Black women on coping mechanisms and their support systems after sPTB.

STUDY DESIGN: We conducted a qualitative interview study of self-identified Black women who had a sPTB at a large teaching hospital. We enrolled participants who had a sPTB between 24w0d and 33w6d from July 2020 to July 2022, spoke English, and were at least 18 years old. Interview participants were interviewed until thematic saturation was achieved. Data were analyzed using an inductive coding approach. Interrater reliability testing was performed. Standardized questions captured participants' perceptions of mental health symptoms, coping mechanisms, and support structures leveraged after sPTB.

RESULTS: Of 47 eligible participants, 13 (27.7%) completed the screening and interview process. Inter-rater reliability scores showed almost perfect coding agreement (mean kappa 0.99 (SD 0.01)). Participants found that psychological and spiritual connections helped them cope with the mental impact of sPTB; significant

themes are noted in Table 1. Support from partners, family members, and community members aided in participants building resiliency. However, participants perceived a lack of understanding of the sPTB from their partners and family members as less support, which negatively impacted their mental health.

CONCLUSION: Black women who had a sPTB coped through psychological and spiritual connections with support networks aiding in the development of resiliency. However, the lack of understanding of the sPTB within their support network, made participants feel unsupported. Interventions geared towards including patients' spiritual preferences and support networks in their pregnancy and postpartum management could increase perceived support after sPTB and improve mental health.

Table 1: Representative themes and quotes

Significant Themes	Representative Quotes
Coping Mechanism	
Psychological support	"I have the therapist that I've had for some time, so she was important and just talking to friends and family, my partner, because it was important" "I did have a counselor come down and talk to me. She brought me a couple of things for my hospital stay to make sure I was comfortable being there."
Spiritual connection	"A lot of prayer. A lot of prayer. I think sometimes I feel like bad situations happen and they draw you closer to God. And I definitely think that's what happened in this case. And I really feel like if I didn't have my faith, I would have dealt with it in unhealthy ways."
Support	
Impact of receiving social support	"Basically it helps to know that I can share my experience with other people who go through this [sPTB]. Let them know that it's okay, it's not always a bad feeling delivering a preterm baby" "It made a great impact. It made me more sensitive in a way. People and their kids, I'm young so the group that I hang with they're young but they have kids. I understand more the responsibility and like the caution and like, oh, I can't come out tonight. It gave me more understanding to understand what they did."
Lack of understanding from social support system	"I don't really feel like anybody ever paid any mind to it. Like, I don't think anybody really cares about a preemie baby being born until they have their own and they understand. So, I think it was just kind of ignored." "[My partner] didn't understand the emotions or the time wave that I was going through surrounding my daughter's birth. He had no idea. He didn't even know how to support me because he had no idea-to him this [sPTB] was normal. "They don't really understand the emotions and the decisions and the feelings and everything that we feel during the process" "I really cannot tell because I had my son all by myself and nobody was there."

643 Functional gut microbiome variation impacts iron deficiency and responsiveness to iron supplementation: An Interventional Trial

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OBJECTIVE: Careful regulation of iron absorption in the gut is mediated by key host and microbe molecular pathways controlling cellular function, metabolism, and DNA processing. Inconsistent response to oral iron supplementation (IS) suggests varying function in these molecular pathways. We hypothesized that the inferred functional gut microbiome would vary between iron sufficient and deficient participants, and responders vs non-responders following IS.

STUDY DESIGN: People who menstruate without a known history of anemia or iron deficiency were included in our open label, prospective, interventional trial (n=26). Participants received 14 days of 65mg elemental iron. Blood (Days (D) 0 & 14) & stool (8 samples including D0 & D14) were collected for iron & anemia indices and microbiome analyses. Stool sample DNA underwent 16S amplicon sequencing and bioinformatic analysis of microbial ASVs (DADA2). To characterize the gut microbiome composition, taxonomic comparisons, & unsupervised clustering with Dirichlet multinomial mixtures (DMM) were performed. Participants who were iron deficient on D0 (n=17) were later subdivided into iron supplement responders (ferritin $\geq$ 30 ng/mL, n=4) and non-responders (ferritin $<$ 30 ng/mL, n=12), based on their D14 ferritin.

RESULTS: Inferred functional microbiome comparisons at D0 found 13 significantly differentially expressed functions whose taxonomic abundances differed significantly in association with responder class (**Figure 1A**). In the D0 iron deficient group, 67 inferred microbial functions were identified in relation to response status. Analysis of the 67 functions at D14 detected 4 significantly differentially expressed functions whose taxonomic contributions differed significantly in association with responder class (**Figure1B,C**).

CONCLUSION: These data show significant differences between the inferred functional microbiomes of iron deficient and sufficient participants, and between IS responders and non-responders. Our findings provide insight into the functional impact of gut microbiome composition on iron deficiency and responsiveness to IS.

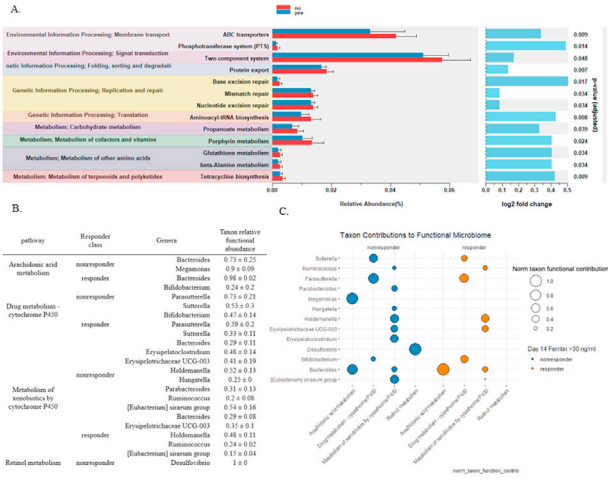

Figure 1. A) Heatmap represents the various microbial functions in individuals who were iron deficient at baseline (day 0) (<30 ng/mL). The x axis depicts the predicted and significant KEGG orthologs and the y axis is the samples. **B)** Taxon relative functional abundance in PICRUSt2 refers to the predicted proportion of functional genes present in a microbial community based on the relative abundance of taxonomic groups identified through 16S rRNA gene sequencing. **C)** x axis = significantly inferred functionally annotated microbiome KEGG pathways faceted by response to iron therapy defined at as Ferritin <30 ng/ml at Day 14. y axis = genera associated with significant contributions to the KEGG pathways.

Abstracts 644-918

644 Indicated versus universal third trimester ultrasound examination in low-risk pregnancies: a pre- and post-intervention trial

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OBJECTIVE: In low-risk pregnancies, third trimester ultrasound examination (USE) are indicated if there is discordance between fundal height vs. gestational age. The primary objective was to compare the composite neonatal adverse outcomes (CNAO) with routine care vs. universal third trimester USE in low-risk pregnancies. The secondary objective was to compare the composite maternal adverse outcomes (CMAO).

STUDY DESIGN: Our multi-site quality improvement trial included low-risk women, defined as without medical or fetal indications for USE in the third trimester. Compared to routine care in pre-implementation, in the post-implementation period all patients were scheduled for USE at 36-37 weeks. Clinicians intervened based on abnormalities identified with these USE. CNAO was a composite of Apgar score $\leq$ 5 at 5 min, birth trauma, intubation for >24 hours, seizure, sepsis, meconium aspiration syndrome, IVH, PVL, NEC, or death. CMAO included chorioamnionitis, wound infection, PPH, blood transfusion, DVT, ICU admission, or death. We used Bayesian statistics to estimate a sample size of 600 individuals in each arm to detect >75% probability of any risk reduction in CNAO, (80% power; 50% risk reduction with USE). Posterior probability of risk reduction, posterior median relative risk (pRR) with 95% credible intervals (CrI), and number needed to treat (NNT) were calculated.

RESULTS: The primary outcome occurred in 15 of 568 (2.6%) individuals in the pre- and 12 of 661 (1.8%) in the post-intervention group, with an 83% posterior probability of risk reduction in CNAO (pRR 0.69, 95% CrI 0.34-1.42). CMAO occurred in 8.6% in the pre- and 6.5% in post-intervention group, with a 90% posterior probability of risk reduction in CMAO (pRR of 0.74, 95% CrI 0.49-1.15). The NNT to reduce CNAO was 121, to reduce CMAO was 46, and to reduce primary CD was 43 (Table).

CONCLUSION: Among low-risk pregnancies, compared to routine care with indicated USE, implementation of a universal third-trimester USE at 36-37 weeks was associated with an improvement in composite neonatal and maternal adverse outcomes.

Table: Indicated versus universal third trimester ultrasound examination in low-risk pregnancies

Primary: Neonatal Adverse Outcomes	Pre-Intervention (N=567)	Post-Intervention (N=661)	Bayesian pRR (95% CrI)	Posterior Probability	NNT (95% CI)
Composite	15 (2.6)	12 (1.8)	0.69 (0.34 - 1.42)	83	121 (40 - 200)
5 min Apgar ≤ 5	3 (0.5)	3 (0.5)	0.91 (0.21 – 3.91)		
UA pH < 7.00*	3 (0.5)	2 (0.3)	0.66 (0.13 – 3.16)		
Meconium Aspiration	3 (0.5)	2 (0.3)	0.68 (0.14 - 2.96)		
Ventilated > 24 hrs.	5 (0.9)	3 (0.5)	0.56 (0.14 – 1.98)		
Neonatal Seizures	2 (0.4)	2 (0.3)	0.91 (0.16 – 5.19)		
Culture Pos Sepsis	2 (0.4)	1 (0.2)	0.60 (0.09 - 3.74)		
Birth Trauma~	0 (0)	1 (0.2)	2.01 (0.15 – 28.7)		
Stillbirth	2 (0.4)	1 (0.2)	0.57 (0.08 - 3.59)		
Neonatal Death	1 (0.2)	0 (0)	0.45 (0.03 - 4.99)		
Primary Cesarean	92 (16.2)	92 (13.9)	0.84 (0.61-1.14)	89	43 (25 - 61)
Secondary: Maternal Adverse Outcomes	**Pre-Intervention (N=568)**	**Post-Intervention (N=661)**	**Bayesian pRR (95% CrI)**	**Posterior Probability**	**NNT (95% CI)**
Composite	49 (8.6)	43 (6.5)	0.74 (0.49 - 1.15)	90	46 (19 - 74)
Chorioamnionitis	22 (3.9)	22 (3.3)	0.85 (0.47 - 1.55)		
EBL ≥ 1,000 mL	22 (3.9)	18 (2.7)	0.69 (0.38 - 1.32)		
Blood Transfusion	17 (3.0)	7 (1.1)	0.36 (0.15 - 0.83)		
DVT or PE	1 (0.2)	0 (0)	0.43 (0.03 – 4.75)		
Admission to ICU	1 (0.2)	1 (0.2)	0.89 (0.12 - 7.99)		

Data presented as N (%). pRR, posterior relative risk; CrI, credible interval; NNT, number needed to treat; CI, confidence intervals; 95% CrI = 95% credible interval; ᵖosterior probability is the probability that the relative risk of the outcome is < 1
DVT, deep venous thrombus; PE, pulmonary embolism; EBL, estimated blood loss; ICU, intensive care unit
~Birth trauma: neonatal brachial plexus injury or documented fracture
*Umbilical arterial pH were obtained in 281 (49%) of the pre-intervention and 264 (40%) of the post-intervention
No cases of intraventricular hemorrhage (IVH), necrotizing enterocolitis (NEC), periventricular leukomalacia (PVL)

645 Perinatal effects of maternal cannabis and nicotine co-use in pregnancy

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OBJECTIVE: Prenatal cannabis use in the United States is rising and half of pregnant individuals who use cannabis also use nicotine-products. However, there is limited data regarding the combined effects of both cannabis and nicotine-products on perinatal outcomes. This study aims to assess the perinatal outcomes associated with prenatal cannabis and nicotine-product co-use, and use of either substance alone.

STUDY DESIGN: This is a retrospective cohort study of California linked hospital discharge-vital statistics data from 2012-2019. We included singleton, live-born infants with gestational age of 23-42 weeks. Pregnant individuals were classified into four categories: no-use (neither cannabis nor nicotine; reference group), cannabis use only, nicotine-product use only, and co-use (use of both cannabis and nicotine-products). Chi-squared and multivariable logistic regression were utilized for statistical analyses.

RESULTS: A total of 3,356,676 pregnant individuals were included: 25,168 used cannabis only, 62,199 used nicotine-products only and 11,401 co-used cannabis and a nicotine-product during pregnancy. After adjusting for maternal demographics, with 'no-use' as the reference group, hypertensive disease was significantly higher in patients with cannabis use (aOR=1.33; 95% CI: 1.27, 1.38), nicotine use (aOR=1.09 (1.06, 1.12) and co-use of cannabis and nicotine (aOR=1.13 (1.07, 1.22). Similarly, preterm delivery (<37 weeks and < 32 weeks) and severe maternal morbidity were higher with cannabis or nicotine use, but not with co-use. Neonatal outcomes including NICU admission, small for gestational age, respiratory

distress syndrome, infant deaths, and others were also higher with cannabis and nicotine use (Table 1).

CONCLUSION: Our study suggests that prenatal cannabis and nicotine-products, both independently and with co-use are associated with increased odds of maternal and neonatal morbidity compared to non-users. Given the growing prevalence of prenatal cannabis and nicotine co-use, our findings can help guide provider counseling.

Table 1. Multivariable logistic regression models showing rate and adjusted odds ratios for perinatal outcomes, (n= 3,356,676)

	Cannabis use only		Nicotine-product use only		Co-use of cannabis and nicotine-products	
	N=25,168	aOR (95% CI)[a]	N=62,199	aOR (95% CI)[a]	N=11,401	aOR (95% CI)[a]
Maternal outcomes						
Hypertensive disease	3,089 (12.3%)	1.33 (1.27,1.38)	6,024 (9.7%)	1.09 (1.06,1.12)	1,269 (11.1%)	1.13 (1.07,1.22)
Preterm delivery (<37 weeks)	3,058 (12.2%)	1.37 (1.32,1.43)	7,520 (12.1%)	1.37 (1.33,1.41)	2,000 (17.5%)	1.57 (1.48,1.66)
Very preterm delivery (<32 weeks)	545 (2.2%)	1.49 (1.35,1.64)	1,102 (1.8%)	1.21 (1.12,1.30)	332 (2.9%)	1.39 (1.22,1.58)
Severe maternal morbidity (SMM)	569 (2.3%)	1.16 (1.06,1.27)	1,328 (2.1%)	1.18 (1.11,1.26)	304 (2.7%)	1.06 (0.93,1.20)
Neonatal outcomes						
NICU admission	3,901 (15.5%)	1.11 (1.07,1.15)	11,036 (17.7%)	1.32 (1.29,1.35)	2,578 (22.6%)	1.29 (1.23,1.36)
Small for gestational age	3,588 (14.3%)	1.49 (1.42,1.55)	8,552 (13.7%)	1.77 (1.72,1.81)	2,037 (17.9%)	2.01 (1.91,2.12)
Respiratory distress syndrome	1,479 (5.9%)	1.32 (1.24,1.39)	3,469 (5.6%)	1.18 (1.13,1.23)	878 (7.7%)	1.37 (1.27,1.48)
Infant deaths	169 (0.7%)	1.80 (1.53,2.13)	367 (0.6%)	1.52 (1.35,1.72)	117 (1.0%)	2.19 (1.78,2.69)
Hypoglycemia	876 (3.5%)	1.38 (1.28,1.48)	1,878 (3.0%)	1.17 (1.11,1.23)	432 (3.8%)	1.25 (1.13,1.39)
Transient tachypnea of the newborn	911 (3.6%)	1.12 (1.05,1.21)	2,575 (4.1%)	1.23 (1.18,1.29)	561 (4.9%)	1.24 (1.13,1.36)
Low birth weight	2,666 (10.6%)	1.60 (1.53,1.67)	2,666 (10.6%)	1.67 (1.62,1.72)	1,776 (15.6%)	2.05 (1.93,2.17)

aOR—Adjusted odds ratio, CI-Confidence interval ('no-use'—reference group)
[a]Adjusted for maternal race and ethnicity, age, education, pre-pregnancy BMI, insurance, parity, prenatal visits, chronic hypertension, pre-existing diabetes, substance use disorder and mental health disorders

646 Unintended consequences of inclusion of race in the TOLAC calculator, a birth certificate data study

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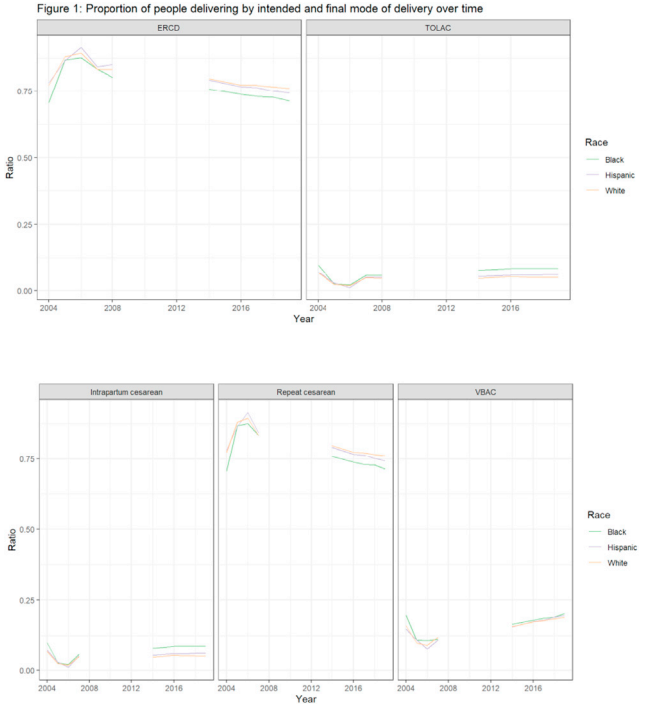
OBJECTIVE: In 2007, the Maternal Fetal Medicine Units Network published a widely available trial of labor after cesarean (TOLAC) calculator that included race as a data point. In 2021, the calculator was then revised to remove race from the calculator. The objective of this project was to determine if inclusion of race in the calculator changed TOLAC and vaginal birth after cesarean (VBAC) rates nationwide.

STUDY DESIGN: We conducted a retrospective study using data extracted from the Vital Statistics Natality Birth Data. Individuals were included if they delivered between 2003-2007 (the "early" group) or 2014-2019 (the "late" group), had a prior cesarean delivery, and were cephalic at the time of presentation. Patients delivering between 2008-2013 were excluded to allow for a washout period. Patients were also excluded if their TOLAC status was unknown. Three categories of race were analyzed: non-Hispanic White, Hispanic, and non-Hispanic Black. Statistical analysis was conducted using a Poisson regression and post-hoc testing with estimated marginal means in R.

RESULTS: 2,134,498 births met criteria during the two study periods, 22% of whom were in the early group and 78% were in the late group. Rates of TOLAC increased in all three groups, though the effect size was largest in the Hispanic population (P=0.01). Although intrapartum cesarean rates were not significantly different between race categories in the early group, Black patients were more likely to undergo intrapartum cesareans compared to White patients in the late group (p< 0.01). Likewise, Hispanic patients were more likely to undergo intrapartum cesareans in the late group (p=0.01). Figure 1 demonstrates the trend in intended and actual mode of delivery over time.

CONCLUSION: Nationally, intrapartum cesarean rates for Black and Hispanic patients significantly increased after original TOLAC calculator was released without increasing the rates of planned cesarean deliveries or changing the intrapartum cesarean rates in White patients. These findings highlight new, unintended bias associated with tools intended to enhanced clinical decision-making.



647 Patient cost willingness for diagnostic prenatal testing in a region with poor insurance coverage

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OBJECTIVE: Various tiers of diagnostic prenatal testing with karyotype, chromosomal microarray (CMA), next-generation sequencing (NGS) panels and whole exome/genome sequencing (WES/WGS) are available; however, insurance coverage for these tests is variable. We evaluated the costs that pregnant individuals were willing to pay for these various tests and compared costs by insurance and genetic-risk status.

STUDY DESIGN: We performed a prospective study of individuals seeking prenatal care at a large urban US academic center (3/2020-8/2022). Consenting persons were administered an electronic survey introducing the test types (i.e. karyotype, CMA, NGS, WES) and then assessing their attitudes regarding various levels of genetic information and willingness to obtain these tests, including costs. The primary outcome was cost range participants were willing to pay for karyotype, CMA, NGS panel, or WES/WGS (Figure). Frequencies of

cost ranges for each test were computed for the study population, and compared between insurance types (private vs public) and genetic risk levels (low vs high-risk [i.e. abnormal genetic screening, fetal anomalies]).

RESULTS: Of 1596 individuals approached for this study, 895 enrolled - 776 low-risk (54% public insurance) and 119 high-risk (55% public insurance). Our cohort was on average 27 ± 6yrs, primarily Black (55%) with ≥ high school education (92%). Most respondents (>50%) reported willingness to get any of the tests only if covered by insurance (Figure). This was similar for low and high-risk groups (p >0.05 for all test types). Publicly and privately insured patients had different cost willingness (all p< 0.001). While the majority of both groups were willing to get testing only if covered by insurance, >25% of publicly insured participants reported they would never get testing, regardless of cost. Others with public insurance were twice as likely to be willing to pay any cost vs. those with private insurance (Figure).

CONCLUSION: Financial willingness to obtain various diagnostic prenatal tests is based on insurance coverage, thus, efforts to universally improve coverage are needed.

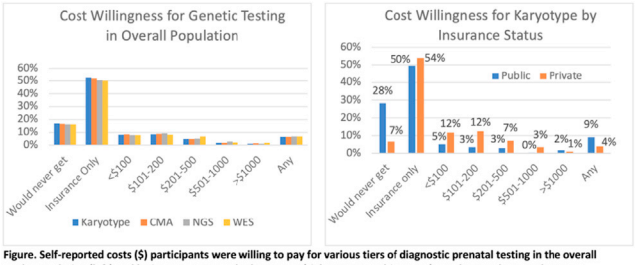

Figure. Self-reported costs ($) participants were willing to pay for various tiers of diagnostic prenatal testing in the overall study population (left) and by insurance status for karyotype (right, p<0.001 Chi-square) are shown. The costs by payor status for other testing (CMA, NGS, WES) are not shown but are consistent with karyotype as depicted on the right (p<0.001).

648 Indications for antenatal late preterm steroids and childhood neurodevelopmental outcomes

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OBJECTIVE: Indications for late preterm steroids are heterogeneous. To evaluate whether there is an association between specific indications for late preterm steroids and adverse childhood neurodevelopment.

STUDY DESIGN: Secondary analysis of a prospective follow-up study of children ≥ 6 years old delivered without anomalies in the Antenatal Late Preterm Steroids trial. Indications included preterm labor with intact membranes (PTL), preterm PROM (PPROM), hypertensive disorders of pregnancy (HDPs), and fetal growth restriction or oligohydramnios without HDP (FGR/OLIGO). Certified psychologists performed neurocognitive testing using the Differential Ability Scales (DAS-II) core components of general conceptual ability (GCA): verbal, non-verbal reasoning, and spatial ability. The primary outcome was GCA score < 85 (-1 SD) and secondary outcomes were mean GCA and component scores, Social Responsiveness Scale, and Child Behavior Checklist (Table). Primary and secondary outcomes were compared in children with each indication relative to all others. Log-binomial regression calculated relative risks (RR) and mixed linear models and quantile regression estimated mean or median differences, respectively.

RESULTS: Among the 1,018 children, indications were as follows: 260 PTL, 267 PPROM, 353 HDPs and 60 FGR/OLIGO. Median GA at delivery was 36 weeks and age at follow-up was 7 years. The primary outcome, GCA < 85 (22.3%, 15.8%, 16.5% and 28.3%, for the respective indications) was not associated with any indication after adjustment (Table). Mean GCA and other secondary outcomes were associated with higher verbal ability for HDPs, worse externalizing behavior score for PTL, better anxious/depressed score for PPROM, and worse aggressive behavior score for both PTL and FGR/OLIGO.

CONCLUSION: Indications for late preterm steroids were not associated with the primary outcome (GCA) and most secondary outcomes. Some indications were associated with secondary outcomes but were inconsistent and few in number; given the number of comparisons, these associations may be due to chance.

Table. Adjusted primary and secondary outcome results by indication for late preterm steroids

Outcome	PTL (n=260)	PPROM (n=267)	HDPs (n=353)	FGR/OLIGO (n=60)
GCA < 85*	1.11 (0.80,1.53)	1.17 (0.83,1.66)	0.81 (0.56,1.16)	1.37 (0.89,2.12)
GCA	-1.27 (-3.20,0.65)	-0.15 (-2.03,1.72)	0.69 (-1.23,2.60)	-1.74 (-4.96,1.48)
Verbal ability	-0.84 (-3.70,2.03)	-0.42 (-3.22,2.38)	**3.25 (0.41,6.10)**	-4.54 (-9.17,0.09)
Nonverbal reasoning	-0.93 (-3.26,1.40)	-1.07 (-3.34,1.20)	-0.08 (-2.40,2.24)	0.79 (-3.24,4.82)
Spatial ability	-1.75 (-3.92,0.41)	1.11 (-1.01,3.22)	-1.45 (-3.61,0.70)	-1.40 (-5.05,2.25)
SRS t-score > 65*	1.00 (0.67,1.48)	0.80 (0.53,1.20)	0.94 (0.63,1.41)	1.32 (0.75,2.33)
CBCL				
Total problems t-score	0.79 (-0.93,2.52)	-0.95 (-2.63,0.73)	0.76 (-0.96,2.49)	1.55 (-1.41,4.50)
Internalizing behavior t-score	0.84 (-1.07,2.75)	-1.57 (-3.57,0.44)	0.13 (-2.08,2.34)	0.78 (-1.35,2.91)
Externalizing behavior t-score	**2.36 (0.31,4.41)**	-1.51 (-3.41,0.39)	0.73 (-1.35,2.82)	0.76 (-2.27,3.80)
Dysregulation profile t-score	1.47 (-0.97,3.91)	-1.76 (-3.82,0.29)	0.93 (-1.35,3.21)	2.10 (-0.49,4.68)
Anxious/depressed t-score	0.09 (-0.26,0.43)	**-0.42 (-0.79,-0.06)**	0.18 (-0.25,0.60)	0.36 (-0.27,0.99)
Attention problems t-score	0.08 (-0.57,0.73)	-0.31 (-0.92,0.29)	0.31 (-0.39,1.01)	0.69 (-0.58,1.96)
Aggressive behavior t-score	**0.69 (0.10,1.27)**	-0.17 (-0.53,0.19)	-0.08 (-0.52,0.36)	**1.00 (0.07,1.93)**

GCA denotes General Conceptual Ability, SRS Social Responsiveness Scale, and CBCL Child Behavior Checklist.
Data are adjusted RR (95% CI)* for categorical and mean or median difference (95% CI) for continuous outcomes. Adjusted for treatment assignment, maternal age, delivery GA, child's age, child sex, maternal education and if relevant for differences in pre-pregnancy BMI, chronic HTN, gestational DM, magnesium use, mode of delivery and NICU admission.

649 Intrapartum oral azithromycin to prevent maternal postpartum hemorrhage

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OBJECTIVE: A single oral dose of azithromycin (AZI) given during labor in women planning a vaginal delivery reduced maternal infections including sepsis and the effect was stronger in Africa than Asia. Since maternal infection contributes to labor dysfunction and postpartum hemorrhage (PPH), we evaluated the association between AZI and PPH.

STUDY DESIGN: Secondary analysis of the A-PLUS trial in which women in labor at ≥28 weeks' gestation were randomized to either 2g AZI or placebo at 8 sites in 7 low- and middle-income countries (LMICs). The outcomes were: 1) PPH based on clinician diagnoses, and 2) postpartum blood transfusion, prior to hospital discharge. We compared rates of the outcomes and computed RR (95% CI) using Poisson regression as relevant. We also implemented subgroup analyses by Africa vs. Asia.

RESULTS: Of 29,278 participants randomized, 14590 to AZI and 14688 to placebo, 99.6% were followed to 42 days postpartum. Baseline characteristics were balanced between groups including overall from Africa (40%), Asia (55%) and Latin America (5%), nulliparous (43%) and labor induction (18%). PPH and blood transfusion did not differ significantly between groups (Table). The effect on blood transfusion appeared to be beneficial in Africa (RR=0.2; 0.07-0.59) but not in Asia (RR=1.22; 0.72-1.78); p-value for interaction = 0.002.

CONCLUSION: A single intrapartum oral dose of AZI did not significantly reduce the risk of PPH or blood transfusion. Further studies are needed to confirm whether there are benefits in Africa where use

of antibiotics in routine clinical care is less prevalent.

Table. Maternal Postpartum Hemorrhage and Blood Transfusion by Treatment

	Azithromycin	Placebo	RR (95% CI) or p-value
Maternal Outcome			
Postpartum hemorrhage	203/14,588 (1.4)	232/14,687 (1.6)	0.88 (0.73, 1.07)
Blood transfusion	68/14,588 (0.5)	76/14,687 (0.5)	0.90 (0.65, 1.25)
Number of packed red blood cells or whole blood units	66	74	
Median (P25, P75)	1.00 (1.00, 2.00)	1.00 (1.00, 2.00)	0.53

650 Reticulocyte hemoglobin equivalent in the iron deficiency spectrum

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OBJECTIVE: Insufficient iron can lead to a spectrum of disorders including iron deficiency (ID) and iron deficiency anemia (IDA). IDA in pregnancy is associated with low birth weight, preterm birth and perinatal mortality. Screening all pregnant women for ID allows for timely iron supplementation before IDA develops. Ferritin, the gold standard for diagnosing ID, is an acute phase reactant, often leading to false elevations. Reticulocyte hemoglobin equivalent (Ret-He), the measure of functional iron in hemoglobin (Hgb) of reticulocytes, is rapid, cost effective and can be done on the same autoanalyzer as a complete blood count (CBC). Our objective was to describe the Ret-He values across the ID spectrum in the different trimesters of pregnancy.

STUDY DESIGN: Prospective cohort study which included 200 pregnant women recruited at any trimester if a CBC was drawn as part of routine prenatal care. Participants had their blood collected for Ret-He and ferritin at the same time. A ferritin level below 30 ng/mL was defined as ID and Hgb below 11 mg/dL (1st and 3rd trimesters) or 10.5 mg/dL (2nd trimester) was defined as anemia. Based on ferritin and Hgb values women were classified as having no ID, ID alone or IDA. Women were excluded for the following: age < 18, multifetal gestations, abnormal Hgb electrophoresis and anemia due to other etiologies than ID (n=4). A one-way ANOVA with post-hoc analysis was used to calculate the difference between groups.

RESULTS: Of 196 pregnant women included 35, 114 and 47 had no ID, ID and IDA, respectively. The rate of ID and IDA were 71% and 21% in the 1st trimester, 71% and 17% in the 2nd trimester, and 56% and 39% in the 3rd trimester. Across all trimesters Ret-He was statistically different between the three groups. Post-hoc analysis in all trimesters showed the Ret-He was significantly lower in the IDA compared to the ID group. However, there was only a trend of lower Ret-He in the ID compared to the non-ID group (except in the first trimester).

CONCLUSION: Ret-He may be useful in detecting severe ID resulting in anemia but not a mild iron deficient state resulting in ID only.

Table 1 – Reticulocyte hemoglobin equivalent levels in the iron deficiency spectrum groups across gestation

Trimester	None	Iron deficiency	Iron deficiency Anemia	P-value	Post-hoc analysis		
					None vs ID	ID vs IDA	None vs IDA
1 *(n)*	33.8 [2.9] *(2)*	34.0 [2.3] *(20)*	30.8 [2.7] *(6)*	**0.035**	0.7717	**0.0091**	**0.0282**
2 *(n)*	33.2 [2.2] *(8)*	32.6 [2.5] *(50)*	29.7 [4.6] *(12)*	**0.007**	0.5228	**0.0038**	0.0609
3 *(n)*	33.8 [2.9] (2)	33.0 [2.6] *(44)*	26.7 [4.7] *(29)*	**<.0001**	0.2038	**<.0001**	0.2765
All *(n)*	33.5 [2.9] *(35)*	33.0 [2.5] *(114)*	28.0 [4.7] *(47)*	**<.0001**	0.3828	**<.0001**	**<.0001**

Data are presented as mean [standard deviation]
ID – iron deficiency, IDA – iron deficiency anemia

651 Lung size and doppler velocimetry after serial amnioinfusions in fetuses with renal agenesis/ dysplastic kidneys

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OBJECTIVE: To evaluate changes in fetal lung size/volume and intrapulmonary (IP) circulation after serial amnioinfusions (AI) in fetuses with bilateral renal agenesis/dysplasia and anhydramnios.

STUDY DESIGN: Seven fetuses with anhydramnios due to renal agenesis (n=4) or renal dysplasia (n=3) were managed with serial AI. Each AI targeted an AFI 15-17 cm and was repeated when AFI fell to 5-8 cm until the decision of delivery or PPROM occurred. Lungs size was measured before each AI via observed/expected lung-to-head (O/E LHR) and cardiothoracic ratios (CTR). Pulsatility index (PI) of the IP artery was also obtained. Expectation was to achieve O/E LHR 100% with 5th and 95th percentiles 67% and 133%. CTR, IP-IP values were plotted against reference standards.

RESULTS: No intrauterine deaths; 105 total (Median/case 16: range 11-21) AIs were performed between 17-32 weeks. PPROM occurred in one fetus at 28 weeks and in all others >31 weeks of gestation. All fetuses were born ≥32 weeks; 3/7 newborns (42.9%) survived and were discharged on dialysis until renal transplant. At first AI, all fetuses had low O/E LHR in both lungs (average left 64.2% [11.4]; right 61.4% [13.5]), which improved with repeated AI; however, the left O/E LHR was < 100% in 93.8% of subsequent AIs and < 5th percentile in 37.5% of measurements, and the right O/E LHR was < 100% in, 99% of measurements and < 5th percentile in 53.3% of subsequent AIs. CTR reduced after first AI but remained >90th percentile in 75% (89/120) of the evaluations (Fig. 1). Four fetuses had high IP-PI (>95th percentile) before first AI, which normalized after the second; in two fetuses, IP-PI increased >95th percentile after PPROM. Survivors had larger LHR and lower CTR than non-survivors (O/E LHR left 78.2 vs. 72.05%; right 71.4 vs 63.5%; CTR 0.56 vs. 0.58, respectively).

CONCLUSION: Fetal lung size increased after AI but remained below the expected mean for gestational age. Anhydramnios with severe

thoracic compression in the second trimester of pregnancy may reduce lung plasticity, limiting growth potential.

652 Opportunities to reduce inadequate treatment of syphilis in pregnancy associated with substance use disorder

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OBJECTIVE: Substance use disorder (SUD) has been identified as a barrier to adequate maternal syphilis treatment. The objective of this study was to evaluate missed opportunities in adequate treatment for syphilis in an urban, safety-net hospital system with a consistent practice of screening and referral for clinical staging and treatment.

STUDY DESIGN: We identified pregnant individuals with syphilis before or during pregnancy using reverse sequence screening followed by referral. Clinical staging for maternal syphilis, fetal evaluation, and treatment occurred in a specialized clinic for infectious diseases in pregnancy according to consistent protocol-driven practices across the healthcare system. SUD was identified by chart review and universal screening. We compared timing of penicillin treatment initiation among individuals with and without SUD. Groups included those treated prior to pregnancy, less than 30 or 30 or more days before delivery, or individuals lost to follow up before clinical staging.

RESULTS: From January 1, 2021 until December 31, 2022, 499 individuals were identified with syphilis prior to or during pregnancy, and 98(19.6%) had SUD. Primary substances used included 35 (35.7%) opioids, 19(19.4%) methamphetamines or stimulants, 19(19.4%) cocaine, 19(19.4%) cannabis, 5(5.1%) alcohol, and 1(1%) benzodiazepines. Compared to individuals without SUD, the frequency of treatment initiation less than 30 days before delivery, defined as inadequate maternal treatment, and the frequency of loss to follow up after referral was higher in individuals with SUD (Table). Among 8 with SUD lost to follow up before clinical staging evaluation and treatment initiation, 3 (38%) used methamphetamines, 3 (38%) opioids, and 2 (25%) cocaine.

CONCLUSION: Among individuals with syphilis prior to or during pregnancy identified in an urban, safety-net healthcare system, 20% have substance use disorders. Despite uniform referral and treatment services for syphilis in pregnancy, facilitating expedited linkages to clinical care for this group may help reduce missed treatment opportunities.

Table. Timing of treatment of syphilis prior to or during pregnancy according to presence of substance use disorder.

	No SUD	*SUD*	*P-value*
Treatment timing of syphilis			0.012
Treated prior to pregnancy	161 (40)	37 (38)	
Treated <30 days before delivery	39 (10)	14 (14)	
Treated 30 or more days before delivery	193 (48)	39 (40)	
Lost to follow up before clinical staging or treatment	8 (2)	8 (8)	
Total	401	98	

Data recorded as n(%). SUD, substance use disorder.

653 Timing of antenatal placenta accreta spectrum diagnosis and impact on clinical outcomes: a multicenter study

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OBJECTIVE: We sought to assess the impact of timing of antenatal diagnosis on management and outcomes in patients with placenta accreta spectrum (PAS).

STUDY DESIGN: This was a multicenter historic cohort of all patients $\geq$ 23 weeks with antenatal suspicion and histopathological confirmation of PAS at four tertiary care institutions from 1/2013 - 6/2022. Gravidas with suspected PAS on ultrasound at 20 weeks or less (early diagnosis) were compared to those diagnosed after 20 weeks (late diagnosis). Primary outcome was planned delivery by multidisciplinary specialists' team. Secondary outcomes were hemorrhage at delivery (defined as estimated blood loss $>$ 1,500L) and massive transfusion (defined as transfusion of 4+ units of packed red blood cells). Chi-square and Fisher's exact test were used as well as a multivariable logistic regression analysis.

RESULTS: 401 cases of histopathologically confirmed PAS were identified during the study period. Of them, 222 (55.36%) were diagnosed antenatally: 65 (29.3%) had early diagnosis and 157 (70.7%) late diagnosis, with mean gestational age at diagnosis of 24.8 weeks. Overall, 180 (44.9%) gravidas had ultrasound for placental assessment in the first trimester and 371 (92.5%) in the second or third trimester. PAS detection rate improved from 13/180 patients (7.2%) in first trimester to 131/341 (38.4%) in second trimester ($p < 0.01$). Pregnancy by assisted reproductive technology (ART) was the only predictor of early antenatal diagnosis (aOR 4.24, 95% CI 1.08-16.67, p=0.03). Delivery was planned in 71.2% of patients with prenatal PAS diagnosis. Patients with early prenatal diagnosis had similar rates of planned delivery (63.1% vs 73.5%, p=0.08), hemorrhage (70.8% vs 58.6%, p=0.08) and massive transfusion (46.2% vs 38.2%, p=0.2), compared to those diagnosed after 20 weeks.

CONCLUSION: In this historic cohort, most patients with antenatal diagnosis of PAS were diagnosed after 20 weeks. Approximately two thirds of patients with a prenatal PAS diagnosis had a planned delivery; diagnosis before 20 weeks did not appear to affect rates of planned delivery or adverse maternal outcomes.

654 Hemoglobin electrophoresis versus kleihauer betke to determine bone marrow suppression in fetuses undergoing intrauterine transfusion

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OBJECTIVE: The mainstay therapy for fetuses affected by red cell alloimmunization is serial intrauterine transfusions (IUTs). Confirmatory testing to determine when the fetal red cell pool has been replaced with donor cells historically involves the use of the Kleihauer-Betke (KB) stain. Hemoglobin (Hgb) electrophoresis testing may be more rapid with a reduced cost of analysis. We aim to determine the correlation between fetal Hgb electrophoresis versus the traditional KB stain.

STUDY DESIGN: This is a prospective cohort of all alloimmunized singleton pregnancies undergoing IUT between 1/1/2021 and 7/1/2023. Maternal and fetal characteristics were collected along with indication for IUT. A final fetal blood sample was obtained at the conclusion of each transfusion and sent for KB and Hgb electrophoresis. The primary outcome was the assessment of these parameters in their ability to predict replacement of the fetal circulating red cell population with donor cells. Linear regression analysis and repeated measures analysis of variance were performed, P values less than 0.05 were considered significant.

RESULTS: A total of 56 IUTs were performed in 16 patients. There were 39 (69.6%) final KB stain values collected and compared to 30 (53.6%) final Hgb electrophoresis values. Hgb electrophoresis when compared to the KB stain demonstrated a significant correlation (R^2 = 0.93; 95% CI, 0.61-0.76; P < 0.001). This same finding held true when examining correlation at each individual IUT as well. The final KB stain and Hgb electrophoresis value significantly decreased with each transfusion (P=0.003). A predominance of adult donor blood was noted by the third transfusion for both lab indices.

CONCLUSION: Fetal Hgb electrophoresis obtained at time of IUT demonstrates a significant correlation with the traditional KB stain. Given the increased cost, training, and time necessary to obtain a KB stain; substitution for an automated Hgb electrophoresis should be considered with comparable results.

Lab Indices per IUT Attempt								
Variable	1st IUT	2nd IUT	3rd IUT	4th IUT	5th IUT	6th IUT	7th IUT	P value
KB Stain [a]	19.90 (12.10)	9.14 (7.83)	1.78 (3.78)	0.64 (0.86)	1.36 (1.70)	3.86 (-)	0.03 (0.04)	0.003
Hgb Electrophoresis [b]	27.26 (7.21)	13.35 (10.61)	3.40 (6.80)	0.33 (0.70)	1.35 (1.61)	3.7 (-)	0 (-)	0.003

[a] *expressed as percentage of fetal cells (mean, standard deviation)*

[b] *expressed as percentage of fetal hemoglobin (mean, standard deviation)*

655 Inpatient early postpartum glucose tolerance testing in a large community hospital

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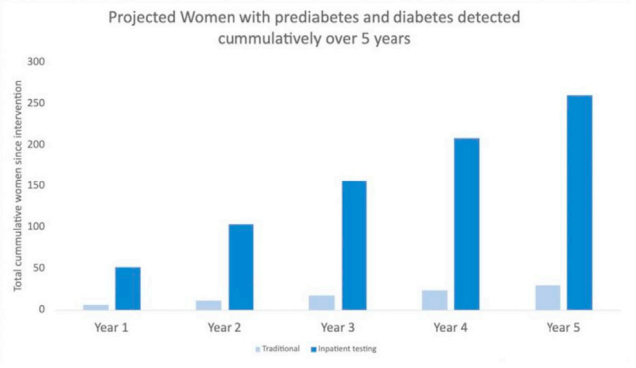
OBJECTIVE: Screening for gestational diabetes (GDM) in the postpartum period helps identify a population at risk for diabetes. To achieve greater compliance, it has been proposed that a 2-hour glucose tolerance test be performed inpatient on postpartum day 2. We hypothesize that implementation of this practice in a community hospital will improve postpartum testing compliance rates. The primary outcome is to compare pre-implementation compliance rates to post-implementation compliance rates. Secondary outcomes include determining the percentage of pre-diabetes and diabetes identified, and calculating the anticipated missed patients from previous testing strategies.

STUDY DESIGN: This is a retrospective cohort study performed after the completion of a quality improvement project. Patients included were diagnosed with GDM and delivered between 10/01/21 and 3/26/2023. The study was powered to detect a 10% or greater improvement rate (alpha =0.05, beta= 80%). The pre-intervention group included 437 patients and the post-intervention group included 203 patients. Data reports were obtained from the EMR and statistical analysis performed.

RESULTS: The pre-intervention group had a compliance rate of 15.3% and the post-intervention group had a compliance rate of 50.3% (p= 0.001). The pre-intervention group diagnosed 9% of women with pre-diabetes and diabetes whereas the post-intervention group diagnosed 26.4% (p= 0.004). Extrapolation of this data reveals that over a 5-year period, 240 patients with abnormal glucose metabolism may be missed utilizing only the previous testing strategy. Non-compliance with inpatient testing was associated with vaginal delivery (p=0.002) and increased gravidity and parity (p= 0.02 and p=0.001).

CONCLUSION: There was a greater than 300% improvement in compliance after implementation of an inpatient postpartum glucose tolerance test, and 9 times more women were diagnosed with abnormal glucose metabolism. While the compliance rate significantly improved, it is lower than pilot studies. This is likely multifactorial and further research is necessary to discern reasons for non-compliance.



656 Vasa previa management: analysis of maternal and neonatal outcomes between inpatient and outpatient approaches

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OBJECTIVE: Vasa previa (VP) patients are commonly offered antenatal hospitalization because of the increased risk of fetal mortality. We aimed to compare obstetric and neonatal outcomes for VP patients managed inpatient and outpatient.

STUDY DESIGN: This is a retrospective study on singleton patients diagnosed with VP at a single institution over 5 years comparing obstetric history, transvaginal cervical length (TVCL) ultrasound measurements, and neonatal outcomes between inpatient and outpatient management groups determined by risk factors for preterm birth.

RESULTS: There were 42 patients with singleton pregnancies that had a VP diagnosis. Of these, 22 were managed inpatient and 20 managed outpatient. The groups had a statistically significant difference in history of PTD (7 vs 1; p=0.0471). Average TVCL measurements at 20-24 weeks and 30-34 weeks between the inpatient (39.7 ± 5.7 and 39.2 ± 6.0 mm) and outpatient groups (41.2 ± 9.0 and 36.7 ± 6.6 mm) were not statistically different (p=0.56 and 0.27). However, inpatients were delivered earlier than outpatients (34.4 vs 35.0 weeks, p< 0.0001) and had significantly smaller infants (2.37 kg vs 2.82 kg, p=0.001). More neonatal complications occurred in the inpatient group compared to the outpatient group (64% vs 30%, p=0.029) and the length of stay in the neonatal intensive care unit (NICU) was greater in the inpatient than outpatient group (16 vs 3 days, p=0.0013). See Table 1.

CONCLUSION: Our study found a higher risk of composite neonatal complications and a clinically significant difference in NICU length of stay in the inpatient group. A statistically significant difference in history of preterm delivery was noted between inpatient and outpatient managed VP patients which could have been an important factor in the incidence of complications noted in the inpatient group. Careful selection of candidates for outpatient management could be a favorable clinical approach based on this study's results.

Clinical Course and Neonatal Outcomes of Patients Managed Inpatient Vs. Outpatient for Vasa Previa

Variables	Inpatient (n=22)	Outpatient (n=20)	p-value
Maternal age (years)	32.4 ± 5.4	31.6 ± 4.0	0.5628
Gravida	3 [2, 4]	2 [1, 4]	0.3411
Parity	1 [0, 2]	1 [0, 1.5]	0.6434
History of PTD	7	1	0.0471
TVCL 20-24 weeks	N=19 39.7 ± 5.7	N=15 41.2 ± 9.0	0.5574
TVCL 30-34 weeks	N=17 39.2 ± 6.0	N=15 36.7 ± 6.6	0.2709
Gestational age at delivery (years)	34.4 [33.7, 34.9]	35 [35, 36.6]	<0.0001
Unscheduled Cesarean Section	8 (36%)	3 (15%)	0.1158
Infant birth weight (grams)	2366.6 ± 380.3	2821.6 ± 464.7	0.0012
Neonatal complications	14 (64%)	6 (30%)	0.0293
Neonatal age of discharge	16 [7, 23]	3 [3, 12.5]	0.0013

657 Timing of insulin initiation in Gestational Diabetes and fetal growth curves

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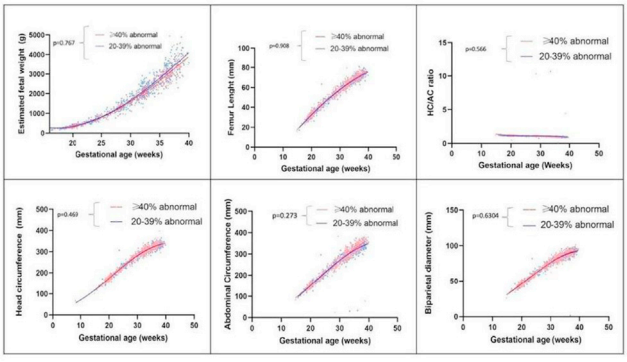
OBJECTIVE: There is a large variation in clinical practices regarding the optimal insulin management of gestational diabetes (GDM). Data suggests earlier and tighter pharmacotherapy improves maternal and neonatal outcomes but can have different implications on fetal growth. We sought to explore the association between lower threshold for insulin initiation in GDM and fetal growth curves throughout pregnancy.

STUDY DESIGN: Retrospective cohort study comparing 2 groups of patients with GDM requiring insulin 2011-2019 in a single academic center. Group 1 was started on insulin when ≥ 40% of capillary blood glucose (CBG) values were above goal, and Group 2 when 20-39% of CBG values were above goal. Patients who received less than two ultrasounds (US) in the third trimester, GDMA1, and those who received oral antidiabetic medications were excluded. The primary outcome was estimated fetal weight using the Hadlock formula. Secondary outcomes were individual biometry indices (head circumference, biparietal diameter, abdominal circumference, and femur length) obtained during serial growth ultrasounds. Generalized linear models were used to model and compare the change in estimated fetal weight and in individual biometry indices as a function of gestational age between the two groups of GDM patients.

RESULTS: A total of 401 participants met all inclusion criteria. There were no significant differences in baseline maternal characteristics, gestational age at insulin initiation, or number of US performed throughout pregnancy between the groups. Estimated fetal weight and biometry indices were similar between the groups (Figure). The abdominal circumference curve demonstrated slower growth in the late third trimester in Group 2, the earlier insulin initiation group, but the difference did not reach statistical significance.

CONCLUSION: Tighter insulin therapy does not affect fetal growth curves throughout pregnancy. The effect of earlier insulin initiation on reducing the growth of the abdominal circumference should be examined in larger cohorts.

Figure: Fetal growth indices as a function of gestational age by two groups of insulin initiation in GDM: ≥ 40% vs. 20-39% abnormal CBG*.



*CBG: Capillary Blood Glucose

658 Impact of an SMME committee on all cause and preventable maternal morbidity

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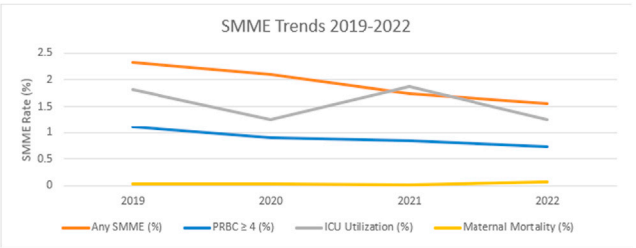
OBJECTIVE: An excess burden of maternal morbidity is experienced by pregnant people in the American south compared to other regions of the US. Implementation of a high fidelity, multidisciplinary severe maternal morbidity event (SMME) review committee may be

associated with reductions in preventable events over time. Our objective was to measure temporal changes in SMME at the state's largest delivery hospital after SMME committee implementation. We hypothesized that preventable SMME rates would decrease over time.

STUDY DESIGN: A cross-sectional study of cases reviewed at SMME committee from 2019-2022, including pregnant or postpartum people who received ≥4 units of PRBCs, had unplanned ICU admission, were diagnosed with eclampsia, were diagnosed with an infection with opportunity for improvement, underwent an unplanned hysterectomy, or were referred for review. We compared the rates of patients receiving ≥ 4 units of PRBCs, ICU utilization, and maternal mortality across years using Mann Kendall Trend Tests.chi squared trend tests.

RESULTS: 316 cases of SMME out of 16,501 total deliveries are included in this analysis (SMME rate, 1.9%). There was a significant reduction in the rate of SMME from 2019-2022 (p=0.04). The most common causes of SMME were postpartum hemorrhage (30.0%); "other events" including DKA, renal failure, solid organ arterial aneurysm rupture, and respiratory failure (21.8%); and pre-eclampsia/eclampsia (12.7%). The rate of ICU utilization significantly decreased over time (p=0.02), but blood product utilization did not. Forty-one percent of cases were considered preventable (n=130) and opportunity for improvement was identified largely at the provider level (30.8%, n=40) and combination provider-system level (13.8%, n=18). The rate of preventability did not change over the 4 years.

CONCLUSION: The implementation of an SMME review committee was associated with significant reductions in absolute SMME rate and ICU utilization over time.



659 Yield of serial prenatal ultrasounds for detection of congenital heart block in SSA/SSB antibody-positive patients

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OBJECTIVE: Serial prenatal screening for fetal congenital heart block (CHB) has been suggested for gravidas with anti-Sjogren's syndrome-related antibody A (SSA) or B (SSB) by the American Heart Association. Recent guidelines released by the Society for Maternal and Fetal Medicine (SMFM) recommend against routine screening. This study sought to assess the yield of screening patients with SSA/SSB antibodies with fetal echo for the diagnosis of CHB.

STUDY DESIGN: This is a historical cohort study of all patients with positive SSA or SSB antibodies from 1/2010 to 10/2022 . Patients had ≥1 fetal mechanical Doppler PR interval screen and were followed to ≥ 34 weeks. Multiple gestations or known fetal anomalies were excluded. Screening protocol consisted of weekly screens from 16 to 28 weeks and monthly afterwards. A prolonged PR interval was >140 milliseconds and, if identified, a corticosteroid course was offered. The primary outcome was the diagnostic yield of screening for the diagnosis of at least first-degree CHB.

RESULTS: 124 patients met inclusion criteria and had a total of 1,628 ultrasounds for PR interval. The majority (69.4%) had systemic lupus erythematosus and 22.6% had Sjogren's syndrome. Median number of ultrasounds per patient was 10 (IQR 10). Three of 124 patients had prolonged PR intervals (2.4%). The false negative rate was 0%. There needed to be 43 patients screened and 542 ultrasounds done to detect one CHB case. Table 1 shows the outcomes of the screened positive patients. One patient was diagnosed with third-degree CHB and elected for termination. The other two had first-degree CHB, were treated with corticosteroids, did not progress to complete CHB and had healthy neonates with asymptomatic first-degree CHB.

CONCLUSION: In our historic cohort, the screen positive rate was 2.4%, similar to previous reports. Fetuses diagnosed with a first degree block had a successful therapeutic intervention. In light of conflicting recommendations from different organizations, large prospective studies are needed to evaluate PR interval screening for CHB and the effectiveness of treatment with corticosteroids.

Table 1. Characteristics and outcome of patients with positive PR interval screening

Patient	Age	Autoimmune disease	Gestational age at diagnosis	Fetal echocardiography finding	Intervention	Outcome
1	21	Systemic lupus	20 weeks	3rd degree AV block	Dexamethasone	Elective termination at 22 weeks gestation
2	29	Systemic lupus	31 weeks	1st degree AV block	Dexamethasone	Persisted after treatment. No progression to complete block. Delivered at 34 weeks, neonate with asymptomatic 1st degree block
3	33	Systemic lupus	33 weeks	1st degree AV block	Dexamethasone	Improved after treatment. Delivered at full-term, neonate with asymptomatic 1st degree block

660 Offspring long-term infectious morbidity following pregnancies with cervical cerclage

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OBJECTIVE: Cervical cerclage is an acceptable procedure in women with cervical insufficiency and known as effective in prevention of preterm delivery. Since the presence of foreign body during pregnancy may change the vaginal microbiom, we aimed to study whether a cervical cerclage is associated with long-term infectious morbidity of the offspring.

STUDY DESIGN: A population-based cohort study was performed at a tertiary medical center, including all singleton deliveries between the years 1991-2023. Long-term infectious morbidity was compared among offspring after pregnancies with and without cervical. A Cox proportional hazards model was used to control for confounders.

RESULTS: Out of 354,940 offspring included in the analysis, 0.4% (n=1416) were following pregnancies with cervical cerclage. Total infectious morbidity was comparable between the two study groups (OR 1.0, 95% CI 0.9 − 1.1; p = 0.369, Table). However, while controlling for confounders such as gestational age and mode of delivery, a significant association between cervical cerclage

placement during pregnancy and long term offspring's infectious morbidities **risk reduction** was demonstrated (adjusted HR 0.9, 95% CI 0.87 − 0.99, $p = 0.036$).

CONCLUSION: Cervical cerclage placement during pregnancy might have a protective effect for long-term infectious morbidity of the offspring. Further investigation regarding the influence of cervical cerclage on vaginal microbiome may be valuable.

Offspring long-term infectious morbidity after pregnancy with and without cervical cerclage

Infectious Morbidity	No Cerclage n = 354940	Cerclage n = 1416	OR (95% CI)	P Value
Respiratory infections	176546 (51.6)	730 (49.7)	1.1 (.09 – 1.2)	0.173
Viral infections	11450 (3.2)	42 (3.0)	0.9 (0.7 – 1.2)	0.581
Ophthalmic infections	6197 (1.7)	25 (1.8)	1.0 (0.7 – 1.5)	0.955
Skin infections	15672 (4.4)	63 (4.4)	1.0 (0.8 – 1.3)	0.951
Bacterial infections	5171 (3.0)	20 (3.2)	0.9 (0.7 – 1.2)	0.889
Neonatal infections	4637 (1.5)	21 (1.3)	1.1 (0.7 – 1.7)	0.559
Bacteremia/Septicemia	3181 (0.9)	11 (0.8)	0.9 (0.5 – 1.6)	0.634
Central nervous system infections	1849 (0.6)	8 (0.5)	1.0 (0.5 – 2.1)	0.818
Ear, nose and throat infections	23028 (6.5)	110 (7.8)	1.2 (0.9 – 1.4)	0.051
Gastrointestinal infections	10494 (3.0)	48 (3.4)	1.1 (0.9 – 1.5)	0.337
Total infectious hospitalization	195557 (56.3)	797 (55.1)	1.0 (0.9 – 1.1)	0.369

661 Offspring long-term morbidities in pregnancies with cervical cerclage

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OBJECTIVE: Cervical cerclage is a standard procedure used to reinforce the cervix in order to reduce pregnancy loss and preterm birth in patients with cervical insufficiency. Although cerclage is an accepted practice and profoundly investigated procedure, there is limited evidence regarding cerclage consequences on long-term neonatal outcomes. The present study was aimed to investigate the long-term morbidities of offspring following pregnancies with cervical cerclage.

STUDY DESIGN: A population-based cohort study was performed in a tertiary medical center including all deliveries between the years 1991-2023. Long-term neurological, endocrine, gastrointestinal and cardiac morbidities among offspring following pregnancy with and without cervical cerclage were compared. Diagnoses were predefined based on ICD-9 codes, as recorded in the hospital medical files. Multiple gestations and pregnancies with chromosomal abnormalities were excluded. Kaplan-Meier survival curves were used for cumulative long term morbidities over time and Cox proportional hazards models were constructed to control for confounders.

RESULTS: Out of 354,940 offspring included in the analyses, 0.4% (n=1416) were following pregnancies with cervical cerclage. The crude rates of long-term neurological morbidity (OR 1.4, 95% CI 1.3 − 1.6; p = 0.001), endocrine morbidity (OR 1.4, 95% CI 1.1 − 1.7; p = 0.001) and gastrointestinal morbidity (OR 1.3, 95% CI 1.1 − 1.4; p = 0.001) were ***higher*** among offspring following pregnancies with cervical cerclage. However, using Kaplan-Meier survival curve analyses, the association between cervical cerclage and all long-term morbidities was not significant (Table). Likewise, using Cox regression models, controlling for confounders such as gestational age, cervical cerclage was **not** associated with long-term neurological, endocrine, gastrointestinal and cardiac morbidities of the offspring (Table).

CONCLUSION: Cervical cerclage placement is not an independent risk factor for long-term neurological, endocrine, gastrointestinal and cardiac morbidities of the offspring.

Table. The association between cervical cerclage placement during pregnancy and offspring long-term morbidity

Morbidities	Cerclage n = 1416	No Cerclage n = 354940	P Value	Kaplan Meier Log-Rank Test	Adjusted HR* (95% CI)
Neurological Morbidities (%)	279 (19.7)	51465 (14.5)	0.001	0.13	1.07 (0.95 – 1.20)
Cardiac Morbidities (%)	24 (1.7)	7622 (2.1)	0.241	0.25	0.7 (0.47 – 1.05)
Endocrine Morbidities (%)	97 (6.9)	17703 (5.0)	0.001	0.48	1.02 (0.83 – 1.25)
Gastrointestinal Morbidities (%)	377 (26.6)	77919 (22.0)	0.001	0.55	0.93 (0.84-1.03)

*Models controlled for gestational age and ethnicity.

663 ChatGPT promises but fails to correctly calculate pregnancy due dates

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OBJECTIVE: "ChatGPT" refers to models in OpenAI's Generative Pre-trained Transformer (GPT) series that are designed for natural language understanding and generation. ChatGPT has swept the world since its launch in November 2022 and has quickly become the most disruptive and fastest growing new innovation including in medicine. When we asked ChatGPT if it was good in calculating the pregnancy due date, it answered: "I can provide general calculations for pregnancy due dates based on common methods, such as the date of the last menstrual period, ovulation date, conception date, or IVF transfer date." The objective of this study was to assess ChatGPT's ability to perform obstetric calculations, specifically calculating the estimated pregnancy due date (EDD).

STUDY DESIGN: Prospective study asking ChatGPT to calculate the EDD based on different parameters including the first day of the last menstrual period (LMP), different number of cycle days and LMP, fertilization day, ovulation day, implantation day, IVF transfer day of 5-day embryo. The same calculations were regenerated 10 times and the EDD calculated by ChatGPT as within 3 days of the correct EDD was deemed correct.

RESULTS: ChatGPT always calculated an EDD. though it calculated the EDD only 67.5% of the time correctly. Its accuracy was highest calculating the EDD by fertilization, conception, and IVF transfer dates, and lowest by LMP with different menstrual cycle lengths and by implantation date. Some of the estimated due dates which ChatGPT calculated were over 5 months inaccurate from the actual EDD.

CONCLUSION: It is no surprise that ChatGPT is not perfect. It all instances, ChatGPT returned a EDD using different ways and methods and explanations to arrive at its results, even fully explaining incorrect methods to calculate the incorrect EDD. ChatGPT is known to fail at basic math, and also can't seem to answer simple logic questions, arguing completely incorrect facts. In conclusion, we we have shown that ChatGPT users should not fully rely on its answers.

Due Date calculation based on	Correct due date calculated % (Correct/Total)
First day last menstrual period (LMP)	70% (7/10)
LMP and 21 cycle days	30 % (3/10)
LMP and 35 cycle days	0% (0/10)
Fertilization date	100% (10/10)
Ovulation date	80% (8/10)
Conception date	100% (10/10)
Implantation day	60% (6/10)
IVF transfer day	100% (10/10)
TOTAL	**67.5% (54/80)**

664 Occipital posterior vacuum assisted delivery: primiparity's impact on maternal and neonatal outcomes

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OBJECTIVE: Occipital posterior (OP) position presents unique challenges during delivery. Women with persistent OP facing vacuum-assisted delivery (VAD) are at a higher risk of failure and maternal and neonatal adverse outcomes. The precise impact of parity on the outcomes of VADs in the occipital posterior position remains an area of interest and requires in-depth investigation. We aimed to explore the influence of parity on VAD outcomes in fetuses presenting in the OP position.

STUDY DESIGN: Retrospective cohort study at a single tertiary center between 2012 and 2022 included 3,913 primiparous and 1,109 multiparous women who underwent VAD. The primary outcome was failed VAD. Secondary outcomes included maternal complications (postpartum hemorrhage, blood product transfusion, OASIS) and neonatal outcomes (umbilical cord pH $<$ 7.1, 5-minute Apgar score $<$ 7, NICU admission). Outcomes were compared between occiput anterior (OA) and OP vertex positions. Univariate analysis and multiple logistic regression were performed to identify independent predictors of the primary outcome.

RESULTS: 977 parturients in the Primiparous OP group (prim-OP) and 411 in the multiparous OP group (multi-OP) were compared to 2936 parturients in the prim- OA and 698 in the multi- OA group. Prim-OP had higher BMI, higher rates of spontaneous pregnancy, and higher birth weight than prim-OA ($p< 0.001$; $p=0.018$; $p=0.029$, respectively). Additionally, women in the prim- and multi-OP groups were significantly younger ($p< 0.001$; $p=0.039$) than their equivalents in the OA groups. The second stage of labor was longer in both OP groups compared to OA ($p< 0.001$). The prim-OP group demonstrated a higher rate of failed VAD and composite adverse maternal and maternal-neonatal outcomes (adjusted odds ratio 2.039, 95% CI 1.270 - 3.274; aOR 1.273, 95% CI 1.028 - 1.57; aOR 1.335, 95% CI 1.099 - 1.621, respectively). This effect was not observed in the multiparous OP group.

CONCLUSION: OP position during VAD in primiparous women is linked to higher failure risk and adverse outcomes for both mother and neonate, while no such effect is seen in multiparous women.

Table 1: Baseline characteristics and adverse pregnancy outcomes for occiput posterior versus occiput anterior in primiparous vs multiparous women

Variable	Primiparous				Multiparous			
	Occiput Anterior n=2,936	Occiput Posterior n=977	p-value	Adjusted OR (95% CI)	Occiput Anterior n = 698	Occiput Posterior n = 411	p-value	Adjusted OR (95% CI)
Maternal Age, years	29.00 (26.00, 32.00)	28.00 (25.00, 31.00)	<0.001		33.00 (30.00, 36.00)	32.00 (29.00, 35.00)	0.039	
Body Mass Index, Kg/m2	22.04 (19.84, 24.72)	22.77 (20.81, 25.95)	<0.001		22.46 (20.11, 25.76)	22.98 (20.55, 25.77)	0.389	
Spontaneous Conception	2,369 / 2,701 (88%)	821 / 906 (91%)	0.018		596 / 632 (94%)	350 / 375 (93%)	0.533	
Second stage Duration, min	161.00 (82.00, 195.00)	175.00 (107.00, 199.00)	<0.001		32.00 (11.00, 112.00)	78.50 (26.00, 126.00)	<0.001	
Birthweight, grams	3,212.00 (2,939.00, 3,500.00)	3,250.00 (2,979.00, 3,516.00)	0.029		3,342.00 (3,072.50, 3,621.50)	3,394.00 (3,110.00, 3,655.00)	0.185	
Failed Vacuum	43 (1.5%)	39 (4.0%)	<0.001	2.039. 95% CI (1.270 - 3.274)	5 (0.7%)	7 (1.7%)	0.141	1.602. 95% CI (0.405 - 6.343)
Maternal Outcome								
Post Partam Hemorrhage	229 (7.8%)	93 (9.5%)	0.099	1.139 (95% CI: 0.875 - 1.483)	36 (5.2%)	13 (3.2%)	0.119	0.485 (95% CI: 0.244 - 0.962)
Blood Products Transfusion	165 (5.6%)	80 (8.2%)	0.004	1.402 (95% CI: 1.049 -1.875)	25 (3.6%)	11 (2.7%)	0.411	0.642 (95% CI: 0.298 - 1.386)
OASIS	36 (1.2%)	11 (1.1%)	0.803	0.851 (95% CI: 0.424 - 1.708)	5 (0.7%)	4 (1.0%)	0.733	1.248 (95% CI: 0.324 - 4.805)
Composite Maternal Outcome	358 (12%)	154 (16%)	0.004	1.273 (95% CI: 1.028 - 1.576)	52 (7.4%)	26 (6.3%)	0.480	0.687 (95% CI: 0.409 - 1.153)
Neonatal Outcomes								
5-min Apgar <7	29 (1.0%)	12 (1.2%)	0.522	1.099 (95% CI: 0.523 - 2.309)	8 (1.1%)	8 (1.9%)	0.280	1.696 (95% CI: 0.569 - 5.055)
Umbilical Cord pH <7.1	41 / 2,263 (1.8%)	13 / 727 (1.8%)	0.967	1.121 (95% CI: 0.570 - 2.203)	13 / 536 (2.4%)	6 / 313 (1.9%)	0.629	1.004 (95% CI: 0.349 - 2.891)
NICU Admission	128 / 2,908 (4.4%)	55 / 968 (5.7%)	0.104	1.294 (95% CI: 0.920 – 1.820)	26 / 690 (3.8%)	17 / 407 (4.2%)	0.736	1.212 (95% CI: 0.604 – 2.432)
Composite Neonatal Outcome	171 / 2,271 (7.5%)	64 / 731 (8.8%)	0.283	1.215 (95% CI: 0.885 – 1.668)	35 / 534 (6.6%)	23 / 315 (7.3%)	0.677	1.222 (95% CI: 0.664 – 2.247)
Composite Maternal and Neonatal Outcome	506 / 2,348 (22%)	212 / 774 (27%)	<0.001	1.335 (95% CI: 1.099 – 1.621)	78 / 546 (14%)	46 / 322 (14%)	>0.999	0.851 (95% CI: 0.554 – 1.308

Median (IQR) or Frequency (%)
Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test
Composite neonatal includes 5-min Apgar <7, Umbilical Cord pH<7.1 and NICU admission.
Composite maternal includes PPH, blood products transfusion and OASIS.
Composite maternal and neonatal includes 5-min Apgar <7, Umbilical Cord pH<7.1, NICU admission, PPH, blood products transfusion and OASIS

665 Widespread maternal immunity to RSV suggests naturally-occurring antibodies provide incomplete neonatal protection: implications for vaccination

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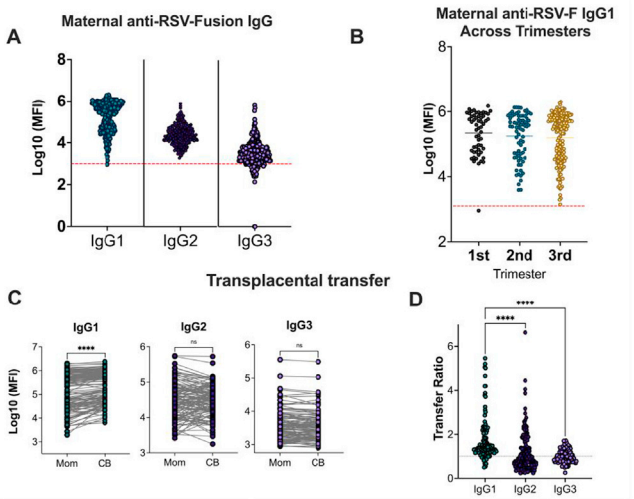
OBJECTIVE: RSV vaccination in pregnancy was recently demonstrated to significantly reduce neonatal morbidity and mortality from RSV infection. The known vulnerability of neonates to severe RSV disease suggests that either many pregnant individuals do not have anti-RSV antibodies, or the antibodies from natural infection do not confer protection against severe disease for all infants. Understanding maternal antibody response is critical to informing vaccination strategies that optimize neonatal protection, we sought to evaluate maternal immunity and transplacental transfer of maternal IgG from natural RSV infection in a large cohort of pregnant individuals.

STUDY DESIGN: Antibodies against RSV subtypes A and B pre-and post-fusion protein (RSV-F) were assayed in the plasma of 303 pregnant participants from geographically-distinct pregnancy cohorts, spanning all 3 trimesters of pregnancy, with a Luminex assay. In a subset of 126 participants, transplacental transfer of maternal anti-RSV IgG was assessed in paired maternal-cord plasma. Differences between IgG levels in maternal-cord pairs was determined by Wilcoxon signed rank tests.

RESULTS: Anti-RSV-F IgG1 was detectable in 99.6% (302/303) maternal and 100% (126/126) cord samples. All anti-RSV-F IgG subclasses were present in the majority of mothers (Fig 1A). IgG levels were stable across trimesters of pregnancy (Fig 1B). In the 126 maternal-cord pairs, anti-RSV IgG was efficiently transferred across the placenta in 99.2% (125/126) of pairs (Fig 1C). IgG1 transferred most efficiently (mean cord:maternal ratio of 1.7, Fig 1D).

CONCLUSION: Across multiple pregnancy cohorts, nearly all pregnant individuals have anti-RSV-F IgG that crosses the placenta and is detectable in cord blood. These findings suggest that naturally-acquired maternal antibodies do not confer complete protection to neonates. Understanding how antibody characteristics differ between naturally-acquired infection and vaccination in pregnant individuals is critical for the future optimization of maternal vaccination aimed at neonatal health.



(A) Maternal Log_{10}MFI levels of IgG subclasses against RSV-F. Red dashed line indicates detection level, which is defined as 5 SD above the PBS background. (B) Maternal anti-RSV-F IgG1 titers across trimesters of pregnancy. Red dashed line indicates 5 SD above the PBS background. (C) Dot plots demonstrate the relative RSV-F-specific IgG levels in maternal (M)-cord blood (CB) pairs. Significance was determined by Wilcoxon signed-rank test, ****p<0.0001. ns: not significant. (D) Cord:maternal transfer ratios for RSV-F-specific IgG subclasses. Gray line indicates expected/efficient transfer (transfer ratio ≥ 1). Significance was determined by Kruskal-Wallis test followed by Dunn's post-hoc comparisons. ****p<0.0001.

666 Improving compliance with umbilical cord management in vigorous term infants through a quality improvement initiative

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OBJECTIVE: Despite ACOG's recommendations in 2012, the implementation of delayed umbilical cord clamping (DCC) in term infants for at least 30-60 seconds as opposed to immediate cord clamping (ICC) < 30 seconds has not been universally adopted by providers. We sought to improve provider compliance with DCC among vigorous term infants.

STUDY DESIGN: Prospective cohort quality improvement study completed in two phases involving vigorous term infants (≥ 37 weeks). Patients with suspected placenta accreta spectrum and twin gestations were excluded. Pre-intervention data were collected from 4/1/2022-9/30/2022. Phase 1 was conducted from 10/1/2022-2/28/2023 and included implementing DCC of 30-60 seconds. Phase 2 was conducted from 3/1/2023-5/31/2023 and included implementing DCC of >60 seconds. We provided monthly education for providers and a multidisciplinary team reviewed outcomes and process measure data throughout the study. Our SMART aim was to decrease the relative rate of ICC of term infants by 75%. Our global aim was to decrease rates of NICU admission and unexpected need for pediatric providers at delivery. Mitigating maternal and neonatal factors that may deter providers from performing DCC were tracked. Comparisons between categorical and continuous variables were made with Chi-squared, ANOVA, and exact test as appropriate.

RESULTS: Of the 3303 term singleton deliveries during the study period, 282 infants were excluded due to non-vigorous status at delivery (8.4% pre-intervention, 9.0% Phase 1, 8.0% Phase 2, p=0.7). Thus, a total of 3021 patients were included in the analysis. No differences were seen in baseline characteristics (age, race, insurance status, mode of delivery, type of anesthesia) across the study period. The rate of ICC decreased by 91% from the baseline rate over 8 months (74.6% pre versus to 6.6% post). Maternal and neonatal outcome did not differ over the study period (Table).

CONCLUSION: We successfully implemented delayed cord clamping in vigorous term infants through a quality improvement initiative focused on provider education. The rate of ICC was decreased from baseline by 91%.

	Preintervention (n=1271)	Phase 1 (n=1096)	Phase 2 (n=654)	P-value
SMART AIM				
Immediate cord clamping (< 30 seconds)	948 (74.6)	168 (15.3)	43 (6.6)	<0.01
Delayed cord clamping (30-60 seconds)	228 (17.9)	760 (69.3)	80 (12.2)	
Delayed cord clamping (> 60 seconds)	95 (7.5)	168 (15.3)	531 (81.2)	
GLOBAL AIM				
Pediatrician present after delivery	105 (8.3)	86 (7.9)	58 (8.9)	0.74
NICU admission	224 (17.6)	197 (18.0)	132 (20.2)	0.37
MITIGATING FACTORS				
Manual placental extraction	19 (1.5)	15 (1.4)	9 (1.4)	0.96
Required D&C	3 (0.2)	3 (0.3)	1 (0.2)	1.00
EBL (mean ± SD)	448.1 (269)	439.8 (350)	416.0 (242)	0.08
Postpartum hemorrhage	87 (6.9)	71 (6.5)	42 (6.4)	0.91
Chorioamnionitis	39 (3.1)	32 (2.9)	20 (3.1)	0.98
Arterial cord PH ≤ 7.0	0 (0)	0 (0)	0 (0)	-
Apgar: 5 minutes	8.8 (0.6)	8.6 (0.7)	8.7 (0.8)	0.07
Transcutaneous Bilirubin	9.3 (3.2)	9.3 (3.4)	9.0 (3.1)	0.31
First infant temperature (mean ± SD)	98.3 (0.8)	98.3 (0.8)	98.1 (3.7)	0.14
Required Phototherapy	110 (8.7)	95 (8.7)	39 (6.0)	0.08

Data presented as n (%) unless otherwise indicated

667 Timing of postpartum pharmacologic thromboprophylaxis relative to delivery and anesthesia

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OBJECTIVE: To describe the rate of adherence to obstetric (OB) and anesthesia (ANE) guidelines for timing of postpartum pharmacologic prophylaxis initiation. Secondarily, to evaluate the association between guideline adherence and venous thromboembolism (VTE) and complications.

STUDY DESIGN: Retrospective cohort of patients delivering at a single academic center from 2015-2023 receiving postpartum low molecular weight heparin (LMWH) prophylaxis. Those with an antepartum VTE or on therapeutic anticoagulation were excluded. OB guideline adherence was defined as LMWH initiation within 4-6 hours after vaginal, or 6-12 hours after cesarean, delivery. ANE guideline adherence was defined as LMWH initiation ≥12 hours post-neuraxial ANE placement and ≥4 hours post-neuraxial removal. Secondary outcomes included VTE (pulmonary embolism

or deep vein thrombosis), readmission, reoperation, and wound complications (hematoma, seroma, or infection) within 6 weeks postpartum. Median time from delivery and neuraxial ANE to LMWH initiation, and rate of adherence to guidelines was assessed. Multivariable models estimated the association between guideline adherence and outcomes.

RESULTS: Of 7,414 included, 4,894 (66%) underwent cesarean and 5,985 (95.8%) received neuraxial ANE. Median time from delivery to LMWH initiation was 15 hours (IQR 12-21) post-cesarean and 14 hours (IQR 11-20) post-vaginal delivery. Time from neuraxial placement and removal to LMWH initiation after cesarean was 21 hours (IQR 14-29) and 13 hours (IQR 9-17), respectively, and after vaginal was 24 hours (IQR 17-30) and 12 hours (IQR 8-18), respectively. Overall, 1,177 (16%) were OB guideline adherent, 4,816 (81%) ANE guideline adherent, and 739 (10%) both OB and ANE adherent. OB guideline adherence was associated with decreased readmission and wound complications, but no difference in VTE or reoperation (Table). ANE guideline or combined guideline adherence was not associated with any outcomes.

CONCLUSION: Adherence to OB and ANE guidelines for timing of postpartum pharmacologic prophylaxis was low. OB guideline adherence was associated with lower complications.

Table. Obstetric and anesthesia guideline adherence and the association between guideline adherence compared to non-adherence and outcomes

Guideline	Guideline Adherence		Adherence vs Non-Adherence	
Obstetric	**Yes (N= 1,177)**	**No (N= 6,237)**	**OR (95% CI)**	**aOR (95% CI)**
Venous thromboembolism	2 (0.2)	13 (0.2)	0.82 (0.18-3.62)	–
Readmission	17 (1.4)	177 (2.8)	0.50 (0.30-0.83)	0.52 (0.31-0.87)
Reoperation	10 (0.8)	64 (1.0)	0.83 (0.42-1.61)	1.26 (0.60-2.65)
Wound complication*	23/N=1098 (2.1)	126/N=3796 (3.3)	0.62 (0.40-0.98)	0.61 (0.39-0.96)
Anesthesia	**Yes (N= 4,816)**	**No (N= 1,160)**		
Venous thromboembolism	7 (0.1)	4 (0.3)	0.42 (0.12-1.44)	–
Readmission	123 (2.6)	26 (2.2)	1.14 (0.75-1.75)	1.29 (0.82-2.02)
Reoperation	50 (1.0)	10 (0.9)	1.21 (0.61-2.39)	1.08 (0.53-2.23)
Wound complication*	88/N=3183 (2.8)	24/N=774 (3.1)	0.89 (0.56-1.41)	1.02 (0.63-1.64)
Both obstetric & anesthesia	**Yes (N= 739)**	**No (N= 6,675)**		
Venous thromboembolism	1 (0.1)	14 (0.2)	0.64 (0.08-4.91)	–
Readmission	11 (1.5)	183 (2.7)	0.54 (0.29-0.99)	0.59 (0.32-1.11)
Reoperation	7 (0.9)	67 (1.0)	0.94 (0.43-2.06)	1.30 (0.54-3.10)
Wound complication*	13 /N=686 (1.9)	136/N=4208 (3.2)	0.58 (0.33-1.03)	0.60 (0.34-1.07)

Odds ratio (OR); adjusted odds ratio (aOR)
Modeling adjusted for age, body mass index, cesarean delivery, and time
Adjusted modeling not presented for venous thromboembolism due to low frequency
*Wound complication considered only among cesarean deliveries

668 Validation of an extended maternal comorbidity index (MCI) for prediction of severe maternal morbidity

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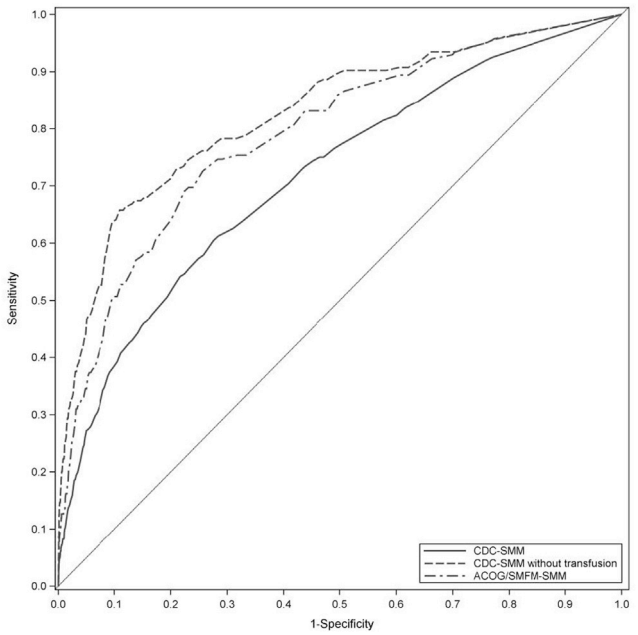
OBJECTIVE: The expanded maternal comorbidity index (MCI) developed by Leonard et al uses pre-existing maternal health conditions (e.g., hypertension, asthma, etc.) to produce a risk score that predicts severe maternal morbidity (SMM). This tool has been adopted into clinical and research use without external validation in a data source not reliant on administrative codes. We assessed the validity of the MCI to predict SMM in a modern obstetric cohort with detailed medical record abstraction.

STUDY DESIGN: Secondary analysis of a multicenter cohort of patients delivering on randomly selected days at 17 U.S. hospitals from 2019 through 2020. Data were manually abstracted from the medical record by trained staff. The MCI risk score was applied to all individuals within the cohort. The primary outcome was SMM as defined by the Centers for Disease Control and Prevention (CDC-SMM). Secondary outcomes included SMM without blood transfusion and the ACOG/SMFM definition of SMM (i.e., transfusion of ≥4 units of blood or intensive care unit admission). The median MCI score was calculated for the cohort, and the performance of the MCI risk score to predict SMM was assessed using the area under the receiver operating curve (AUC).

RESULTS: Of 20,898 eligible patients, 668 (3.2%, 95% CI 3.0-3.4%) experienced CDC-SMM, 184 (0.9%, 95% CI 0.8-1.0%) experienced CDC-SMM without transfusion, and 142 (0.7%, 95% CI 0.6-0.8%) experienced ACOG/SMFM-SMM. In this cohort, the most common comorbidities were anemia (22.7%), maternal age at least 35 years (22.2%), and previous cesarean delivery (18.4%). The median MCI score in the cohort was 57.5 (IQR 47.5-71.5), which corresponded to a SMM risk of 7.9% (IQR 5.3-13.5%). The AUC for the MCI to predict CDC-SMM was 0.72 (95% CI 0.70-0.74; compared to AUC 0.78 in Leonard et al), CDC-SMM without transfusion was 0.83 (95% CI 0.79-0.86) and ACOG/SMFM-SMM was 0.79 (95% CI 0.75-0.83; Figure).

CONCLUSION: We externally validated the expanded MCI for prediction of SMM in a contemporary obstetric cohort. These findings support the ongoing use of this tool in research and clinical settings.



669 National trends and outcomes for births requiring maternal transfers

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OBJECTIVE: With an increase in maternal care deserts expected data on maternal transfers prior to birth is critical. Using national data, we sought to assess national trends, epidemiology, and adverse outcomes in this cohort.

STUDY DESIGN: Birth hospitalizations were identified in the 2010-2020 Nationwide Readmissions Database for this cross-sectional analysis. Transfers were defined as admissions to a separate hospital with a patient disposition of hospital transfer immediately prior to

birth hospitalization. Trends analysis of maternal transport, outcomes by transfer status, and transfers to larger or teaching facilities was conducted using Joinpoint regression and expressed as annual average percent change (AAPC) and 95% confidence intervals (CI). Unadjusted and adjusted logistic regression models were fit to assess transfer status's association with adverse clinical outcomes adjusting from demographic, clinical, and hospital characteristics.

RESULTS: Of 37.4 million birth hospitalizations, 3,521 (9.4 per 100,000 births) births required transfer prior to birth at a stable rate of 8.4 to 8.9 transfers per 100,000 births from 2010 to 2020. Rates of transfers to larger hospitals increased from 15.7% to 23.6% (AAPC 5.7%, 95% CI: 1.8%, 10.4%) while transfers to teaching hospitals decreased from 65.6% to 45.3% (AAPC -3.4%, 95% CI: -4.6%, -2.4%) during this time. Births requiring transfers had higher rates of clinical factors such as hypertensive disorders of pregnancy (38% vs. 10%), multiple gestation (8% vs. 2%) and obesity (19% vs. 8%). Transferred birth hospitalizations had higher prevalence and adjusted odds of complications including non-transfusion severe maternal morbidity, needing critical care procedures, and shock/sepsis (Table).

CONCLUSION: Maternal transfers prior to birth are uncommon with a decreased trend of transfer to academic centers and disproportionate burden of adverse outcomes. As care continues to regionalize, maternal levels of care can aid in streamlining transfers and mitigating morbidity by enhancing coordination and appropriate resource allocation.

Table: Outcome Demographics and Analysis by Transport Status

	No Transfer		Transfer		Unadjusted		Adjusted	
Outcome	N	%	N	%	OR	95% CI	aOR	95% CI
Non-transfusion severe maternal morbidity	296,642	0.8%	243	6.9%	9.28	7.52, 11.47	3.00	2.36, 3.82
Transfusion	429,295	1.2%	194	5.5%	5.02	4.08, 6.18	2.03	1.63, 2.53
Intrauterine infection	1,121,604	3.0%	319	9.1%	3.22	2.68, 3.86	1.92	1.58, 2.34
Cesarean delivery	12,241,049	32.7%	1,933	54.9%	2.51	2.25, 2.80	1.93	1.69, 2.21
Placental abruption	532,015	1.4%	322	9.2%	7.05	5.92, 8.39	2.05	1.69, 2.50
Critical care procedure	33,089	0.1%	52	1.5%	16.92	10.95, 26.13	3.64	2.36, 5.61
Postpartum hemorrhage	1,263,126	3.4%	254	7.2%	2.23	1.79, 2.78	1.64	1.31, 2.06
Shock/sepsis	40,781	0.1%	44	1.3%	11.77	7.88, 17.57	3.91	2.58, 5.94

OR = odds ratio, aOR = adjusted odds ratio, CI = confidence interval
Reference group for analysis are transfers versus no transfers

670 Peripartum factors associated with breastfeeding after cesarean birth

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OBJECTIVE: Cesarean birth has been associated with lower rates of breastfeeding (BF) initiation, yet it is unknown what specific peripartum clinical factors are associated with likelihood of BF following a cesarean. Our objective was to analyze a large prospective and diverse contemporary cohort of cesarean births in the US and identify what factors among patients who had a cesarean are associated with lower rates of BF initiation. We hypothesized that perioperative anemia and postpartum hemorrhage (PPH) will be positively associated, and that receipt of tranexamic acid (TXA) will not be associated with BF initiation following cesarean birth.

STUDY DESIGN: Secondary analysis of participants with BF data who were enrolled in a randomized trial of tranexamic acid for prevention of postpartum hemorrhage at the time of cesarean. Those who experienced neonatal death within 24 hours of birth, delivery < 34 weeks, or had multifetal gestations were excluded. The primary exposures included third-trimester anemia (hemoglobin < 10g/dL), PPH (defined as estimated blood loss at >1L or receipt of packed RBCs intraoperatively), and receipt of TXA as the study drug. Multivariable logistic regression was performed adjusting for baseline maternal covariates and available social determinants of health.

RESULTS: Of 10,293 participants included in this analysis, 8119 (78.9%) initiated BF in the hospital. Those who did were older, more likely to be nulliparous, married, of White race, Hispanic ethnicity, and privately insured (p< 0.001 for all). Among those with third trimester anemia (n=915), the rate of starting BF in the hospital was 66.7% versus 80.1% among those without anemia (n=9371). In multivariable modeling, third-trimester anemia was associated with lower frequency of BF initiation (adjusted OR 0.68, 95% CI 0.58-0.80). Receipt of TXA and PPH were not (Table).

CONCLUSION: Third-trimester anemia, a modifiable risk factor, was associated with 32% lower odds of BF initiation after cesarean birth, but PPH and receipt of TXA were not.

Table. Peripartum factors associated with breastfeeding initiation in the hospital

	Breastfeeding started in hospital (n=8119)	No Breastfeeding in hospital (n=2174)	Unadjusted OR (95% CI)	Adjusted OR[1] (95% CI)
Third trimester anemia (Hb <10 g/dL)	610 (7.5)	305 (14.0)	0.50 (0.43, 0.58)	**0.68 (0.58, 0.80)**
Postpartum hemorrhage[2]	532 (7.9)	156 (8.4)	0.93 (0.77, 1.12)	0.97 (0.79, 1.18)
Receipt of tranexamic acid	4062 (50.0)	1113 (51.2)	0.95 (0.87, 1.05)	0.98 (0.89, 1.08)

CI, confidence interval; Hb, hemoglobin
1. Multivariable models were adjusted for maternal age, body mass index, race, ethnicity, nulliparous status, marital status, use of private insurance, tobacco use during pregnancy, scheduled vs. unscheduled cesarean status, hypertensive disorders of pregnancy, diabetes, gestational age at delivery, and anesthesia.
2. Postpartum hemorrhage was defined as intraoperative estimated blood loss >1L or receipt of packed red blood cells intraoperatively.

671 Impact of amniotomy timing after foley bulb on induction of labor outcomes in obese patients

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OBJECTIVE: Patients with obesity are less likely to spontaneously labor and more likely to require induction of labor (IOL) for pregnancy-related and comorbid conditions. Optimal timing of amniotomy in patients with obesity undergoing IOL is not well described and provider preference varies. We therefore aimed to describe the impact of timing of artificial rupture of membranes (AROM) on labor outcomes.

STUDY DESIGN: This retrospective cohort study involved nulliparous patients with term, singleton, vertex pregnancies undergoing IOL at a single academic center from January 2020-May 2021. Patients with pre-pregnancy body mass index (BMI) > 30 kg/m2 undergoing cervical ripening with a foley bulb were included. Patients were grouped into quartiles by timing of amniotomy, defined as the earliest 25th percentile to the later 75th percentile. The primary outcome was total induction time, defined as time of foley bulb placement to delivery. Additional secondary outcomes were measured for the first quartile of amniotomy timing in comparison to the remaining three quartiles (Table 1). Fisher's Exact, Two-Sided or Pearson Chi-Square tests were used for data analysis with p < .05 used to define significance.

RESULTS: Overall, 104 deliveries were analyzed with 26 patients in each quartile of amniotomy timing. Early amniotomy was associated with significantly less total induction time. There were no significant differences in rates of cesarean delivery, prolonged rupture of membranes, or chorioamnionitis (Table 1).

CONCLUSION: Among patients with a pre-pregnancy BMI > 30, earlier amniotomy may be associated with shorter overall induction times without increasing adverse outcomes. While retrospective, these data provide insight into the importance of amniotomy for

labor induction and suggest amniotomy should not be delayed out of concern for predisposing patients to chorioamnionitis or cesarean delivery. Future work should include rates of obstetric hemorrhage and NICU admission. Ultimately, randomized controlled trials should be performed to better guide decisions for amniotomy timing in patients with obesity.

Table 1: Labor outcomes by amniotomy quartile

Outcome	Early Amniotomy (<25th percentile; n=26)	Early-Mid Amniotomy (26th to 50th percentile; n=26)	Mid-Early Amniotomy (50th – 75th percentile n=26)	Mid-Late Amniotomy (>75th percentile; n=26)	P
Method of Delivery					1.000
Primary CD	7 (26.9%)	7 (26.9%)	7 (26.9%)	7 (26.9%)	
Vaginal	19 (73.1%)	19 (73.1%)	19 (73.1%)	19 (73.1%)	
Total Induction Time (min)	1,089.4± 375.9	1,196.8± 484.6	1,396.2± 404.3	1,693.1± 467.4	<.001
Total time of foley bulb in place (min)	168.5±103.1	158.4±92.4	175.3± 83.2	143.5± 81.4	.613
Prolonged Rupture (defined as >18 hours)	5 (19.2%)	5 (23.1%)	4 (15.4%)	3 (11.5%)	.719
Chorioamnionitis	0 (0%)	2 (7.7%)	1 (3.8%)	1 (3.8%)	.556
ROM to Delivery Time (mins)	810.3± 342.1	784.1± 406.6	827.2± 323.3	790.9± 362.7	.973

Data are presented in mean ± standard deviation
ROM, Rupture of membranes

672 Outcomes of operative vaginal deliveries by hospital volume status

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OBJECTIVE: It is unknown whether outcomes after operative vaginal delivery (OVD) differ by hospital characteristics, such as volume of operative vaginal deliveries in a hospital. Therefore, we sought to assess whether outcomes after OVD differ significantly between hospitals of different volumes of OVD.

STUDY DESIGN: This was a retrospective cohort study of singleton, non-anomalous, term deliveries in California between 2007 and 2019. We stratified hospitals into three categories based on proportion of OVD among all deliveries; the categories were low volume (< 5%), medium volume (5-7%) and high volume (≥7%). Chi-squared and multivariable logistic regression analyses were utilized to assess an association between OVD and adverse perinatal outcomes, among three hospital volumes separately.

RESULTS: In this study, we included 4,629,808 births, of which 31.7% were in low volume hospitals, 34.8% in medium-volume and 33.5% in high volume hospitals. Among low volume hospitals, OVD were associated with higher odds of obstetrics anal sphincter injuries (aOR=5.85 (5.68, 6.03)), cervical lacerations (1.33 (1.13, 1.56)), postpartum hemorrhage (1.21 (1.17, 1.26)), shoulder dystocia (3.81 (3.63, 4.00)), Apgar scores of < 7 at 5 minutes (1.92 (1.80 , 2.06)), NICU admissions (1.35 (1.31, 1.39)), facial nerve palsy (4.68 (3.18, 6.91)), scalp birth injuries (3.96 (3.85, 4.08)), and brachial plexus injury (5.07 (4.38, 5.87)). Medium-volume and high-volume hospitals had similar higher odds of perinatal outcomes too.

CONCLUSION: We found that obstetric outcomes were similar among births via OVD at hospitals of differing volumes. These findings illustrate the importance of ensuring providers at hospitals of all sizes are trained in operative deliveries, as low-volume settings can have outcomes consistent with hospitals of medium and high

v

Table 1: Perinatal Outcomes in Operative Vaginal Deliveries, stratified by hospitals volume of operative vaginal deliveries.

	Hospitals with low proportion of operative vaginal deliveries (<5%)			Hospitals with medium volume of operative vaginal deliveries (5-7%)			Hospitals with high volume of operative vaginal deliveries (≥7%)		
	No OVD	OVD	aOR (95% CI)	No OVD	OVD	aOR (95% CI)	No OVD	OVD	aOR (95% CI)
N	1,409,327	60,314		1,507,157	104,551		1,386,595	161,864	
Obstetric anal sphincter lacerations	1.57%	12.10%	5.85 (5.68, 6.03)	1.54%	11.19%	5.36 (5.23, 5.50)	1.78%	9.64%	4.26 (4.17, 4.36)
Cervical lacerations	0.17%	0.29%	1.33 (1.13, 1.56)	0.15%	0.27%	1.41 (1.24, 1.61)	0.11%	0.20%	1.44 (1.27, 1.63)
Postpartum hemorrhage	3.80%	5.24%	1.21 (1.17, 1.26)	3.34%	4.28%	1.12 (1.08, 1.16)	2.51%	3.66%	1.22 (1.18, 1.25)
Shoulder Dystocia	1.20%	3.61%	3.81 (3.63, 4.00)	1.20%	3.38%	3.46 (3.33, 3.61)	0.98%	2.88%	3.67 (3.54, 3.81)
Apgar scores at 5 minutes (<7)	0.70%	1.75%	1.92 (1.80, 2.06)	0.62%	1.38%	1.77 (1.67, 1.88)	0.53%	1.02%	1.51 (1.43, 1.59)
NICU admission	8.39%	11.01%	1.35 (1.31, 1.39)	8.15%	10.23%	1.32 (1.28, 1.35)	7.73%	9.38%	1.23 (1.21, 1.25)
Subdual hemorrhage	0.01%	0.03%	2.61 (1.56, 4.38)	0.01%	0.04%	4.36 (3.00, 6.29)	0.01%	0.03%	2.74 (1.90, 3.97)
Subgaleal hemorrhage	0.03%	0.30%	7.42 (6.17, 8.93)	0.01%	0.19%	8.85 (7.27, 10.89)	0.01%	0.08%	6.36 (4.93, 8.19)
Intracranial hemorrhage	0.01%	0.03%	2.48 (1.54, 3.98)	0.01%	0.05%	3.63 (2.58, 5.11)	0.01%	0.03%	2.48 (1.78, 3.46)
Facial nerve palsy	0.01%	0.05%	4.68 (3.18, 6.91)	0.01%	0.04%	3.70 (2.55, 5.37)	0.01%	0.03%	2.19 (1.55, 3.09)
Newborn fractures- skull, clavicle or humerus	0.20%	0.52%	3.01 (2.66, 3.41)	0.19%	0.50%	3.07 (2.78, 3.38)	0.14%	0.38%	3.16 (2.87, 3.48)
Birth injury to scalp	2.35%	10.84%	3.96 (3.85, 4.08)	2.60%	11.57%	3.86 (3.78, 3.95)	2.76%	11.12%	3.54 (3.46, 3.61)
Brachial plexus injury	0.09%	0.40%	5.07 (4.38, 5.87)	0.08%	0.30%	4.15 (3.64, 4.74)	0.05%	0.22%	5.86 (5.10, 6.73)

673 Mental health needs after preterm birth: A qualitative assessment of Black women's experiences

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OBJECTIVE: Black women (BW) face higher rates of spontaneous preterm birth (sPTB) than their White counterparts. BW endure a higher prevalence of perinatal mental health conditions with more debilitating symptoms; however, these often go unaddressed. Our study sought to reveal the perspectives of BW on the impact of sPTB on their mental health and their desired interventions.

STUDY DESIGN: We conducted a qualitative interview study of self-identified BW who delivered at one teaching hospital, had a sPTB between 24w0d and 33w6d from July 2020 to July 2022, spoke English, and were at least 18 years old. Interview participants were recruited and interviewed until thematic saturation was achieved. Data were analyzed through inductive coding. Interrater reliability testing was performed. Standardized questions captured participants' perceptions of mental health symptoms, barriers and facilitators to care seeking, and recommendations for improving mental health after sPTB.

RESULTS: Of 47 eligible participants, 13 (27.7%) completed screening and interviews. Interrater reliability scores showed almost perfect coding agreement (mean kappa 0.99 (SD 0.01)). Participants experienced self-blame, isolation, and prolonged duration of mental health symptoms (Table 1). Participants noted disrespectful communication and a lack of mental health resources. They felt dismissed and neglected while seeking care and experienced medical racism. These barriers negatively impacted their mental health and decreased their desire to re-engage with the healthcare system. Personalized care, family-centered communication, and racial representation facilitated care. Participants recommended improved

patient-provider communication, specialized mental health providers, support groups, and culturally sensitive care.

CONCLUSION: Black women with a sPTB endured prolonged mental health sequelae, worsened by neglect, dismissiveness, and medical racism. Implementing explanatory communication models, providing culturally responsive care, support groups, and sPTB-trained mental health providers are needed.

Table 1: Representative themes and quotes

Significant Themes	Representative Quotes
Mental Health Impact	
Self-Blame	"I didn't know what did I do wrong for my son to be born prematurely. I just felt like everything was my fault. Even though it wasn't, I had to learn that it wasn't my fault" "I kept asking, what did I do differently that I was able to have my son with no issues and then now I'm having my daughter at 32 weeks?"
Isolation	"I didn't really share it much with many people. There weren't really many people to talk to about it. And, yeah, I think I spoke to my doula about it. Sort of to my therapist. … the people that I pay to listen [to me], basically."
Prolonged duration of symptoms	"Still to this day. It was always that question of 'why me?' It's still like a mental battle to this day." "So it was a lot for me emotionally because I am still dealing with it at the moment, but at that time it was definitely overwhelming."
Barriers	
Neglect	"I sat in the waiting room and I literally had to scream at them, 'get me somewhere!' I was contracting, the pain was awful. I got rolled into the emergency department and they just left me there. I'm like yo, I'm literally pregnant. I'm in pain. Why is that not a red flag? Anything could be happening with my daughter on the inside. Why is it not a red flag?"
Dismissiveness	"I've given birthed five kids. So, I know when it's a contraction. So, I was telling her and she's like, 'Well, you're too -- you're too early to have contractions, ma'am. You're not having contractions.' Mind you, I had my daughter like an hour later."
Medical racism	"And yeah, I just felt like a lot of that could have been prevented, had leading up to it, they just checked me out in person. Or I also wonder if I was a white mom, if I told them that I felt like I was having contractions because I gave birth before I know what a contraction is. If they would have told me to just come in and just check just to see [what was happening]"
Facilitators	
Family-centered communication	"Just the amount of time that they spend with each of the babies and the families, explain the certain things. I think one night I left, she was burped in an incubator regularly and then the next day I came back and she had on goggles with a light on and the nurse said and explained to me her [bilirubin] levels, she helped me read the numbers. She explained to me why she was on the machine."
Personalized care	"I had one doctor…I felt she was amazing. She was calling on me. She was checking in on me. She was actually the one that was for NICU moms"
Racial representation	"[I connected to] a Black social worker, who I didn't feel like would've tried to make me feel badly or question what I did to cause this."
Recommendations	
Improved provider-patient communication	"I'd say just being a little more transparent. I guess [sometimes they think] withholding information…, it's easier. Because you don't know how some patients would react, but that wasn't the case for me. Uncertainty actually makes me more anxious than knowing what I face. So, I think it shouldn't be like a blanket response. I felt like it was a blanket response. They gave information [only] as needed."
Specialized mental health providers	"…Certain therapists that have been through [PTB] so they can really get deep and talk about it because I still got unfinished questions and answers - all of that in my head - that I want to talk to my therapist about, but she's no longer my therapist."
Support groups	"…maybe like a moms group for women who have had preterm labor or just some type of resources to connect to women who have already been there and experienced this. Because it's very isolating. I think that would have been the biggest help for me because I felt like I was like winging it a lot on my own."
Cultural sensitivity	"Labor itself especially being an African American woman is scary. My entire pregnancy I was explaining to my kids and I was explaining to my husband, this is life or death for me. There's not a guarantee that I'm going to walk out of this hospital after I have her, so I think just that in general is I just need them to be more understanding with the position that Black women are in." "Definitely a more diverse staff, not just in nursing, but in all aspects [would have helped me]"

674 Mean arterial pressure as an early predictor of preeclampsia: A retrospective cohort study

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OBJECTIVE: To estimate the utility of early pregnancy mean arterial pressure (MAP) for predicting later preeclampsia diagnosis, and to compare the predictive ability of MAP with that of the risk categories recommended by the United States Preventive Services Task Force (USPSTF).

STUDY DESIGN: A retrospective cohort study of all pregnant patients with a first prenatal visit by 16 weeks' gestation and delivered in our system from 1/2021 – 12/2022. MAP was calculated using data captured at the initial visit. Patients' preeclampsia risk was assigned based on 2021 USPSTF guidance, in which elevated risk was defined as having 1 high risk or 2 or more moderate risk factors for the condition and low risk was defined as having none. The primary outcome was diagnosis of preeclampsia. The predictive abilities of MAP and the USPSTF risk categories were estimated using area under the receiver operating characteristic curves (AUROC). The Youden index was used to identify an optimal MAP cut-point, and the predictive characteristics of this value were compared to those associated with an elevated USPSTF risk category.

RESULTS: Of 1325 patients, 146 (11.0%) developed preeclampsia. MAP outperformed the USPSTF risk categories with respect to predicting this diagnosis, as evidenced by an AUROC of 0.73 compared to 0.64 ($X^2 = 2.70$, p = 0.10). The optimal MAP cut-point for predicting preeclampsia was 88.5 mm Hg. Contrasted with an elevated USPSTF risk category, MAP predicted preeclampsia with improved sensitivity (74.7 vs 61.6%), comparable specificity (62.3 vs 66.6%), and improved positive and negative predictive values (19.7 vs 18.6%; 95.2 vs 93.3%). MAP was similarly predictive of preeclampsia regardless of a patient's determined risk for the condition.

CONCLUSION: Early pregnancy MAP is a modest predictor of preeclampsia and has improved characteristics as a screening test relative to application of the USPSTF risk categories. Particularly among low-risk patients – who might not otherwise be prescribed aspirin for preeclampsia prophylaxis – early pregnancy MAP may be considered as an adjunct for preeclampsia risk stratification.

Predictive characteristics of 'optimal cut-points' of mean arterial pressure for predicting preeclampsia

Characteristic	Preeclampsia, any EGA	Preeclampsia, severe	Preeclampsia, ≤37w0d	Preeclampsia, ≤34w0d
Optimal cut-point, mm Hg	88.5	90.5	88.5	86.5
Area under ROC curve	0.73	0.67	0.72	0.69
Sensitivity (95% CI)	74.7% (66.8 – 81.5)	64.9% (52.9 – 75.6)	84.8% (71.1-93.7)	88.9% (51.8 – 99.7)
Specificity (95% CI)	62.3% (59.4 – 65.0)	68.4% (65.8 – 71.0)	59.7% (56.9 – 62.4)	48.3% (45.6 – 51.0)
Positive predictive value (95% CI)	19.7% (17.9 – 21.6)	10.8% (9.2 – 12.8)	7.0% (6.2 – 8.0)	1.2% (0.9 – 1.5)
Negative predictive value (95% CI)	95.2% (93.7 – 96.3)	97.1% (96.1 – 97.8)	99.1% (98.2 – 99.5)	99.8% (99.0 – 99.9)
Positive likelihood ratio (95% CI)	1.98 (1.76 – 2.23)	2.05 (1.70 – 2.48)	2.10 (1.83 – 2.42)	1.72 (1.36 – 2.18)
Negative likelihood ratio (95% CI)	0.41 (0.31 – 0.54)	0.51 (0.38 – 0.70)	0.25 (0.13 – 0.51)	0.23 (0.04 – 1.46)

675 Understanding Fluid Shifts in Hypertension: Postpartum Point-of-Care Ultrasound of the Inferior Vena Cava and Aorta

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OBJECTIVE: Assessment of the inferior vena cava (IVC) and aorta using point-of-care ultrasound to estimate central venous pressure (CVP) is a commonly used practice across medical specialties. Our objective is to study postpartum fluid dynamics using IVC collapsibility and aorto-caval (IVC:Ao) indices measured on postpartum days (PPD) 1-3; and to compare changes in IVC collapsibility and IVC:Ao indices between postpartum patients with and without hypertensive disorders of pregnancy (HDP). Our hypothesis is postpartum patients with HDP will have lower IVC collapsibility and higher IVC:Ao indices than controls, signifying hypervolemia.

STUDY DESIGN: Prospective cohort study of postpartum singleton pregnancies delivered 24 to 41+6 weeks gestation with and without HDP conducted from 2020-23. Standardized ultrasound measurements of the IVC and aorta were performed daily starting PPD1 through PPD3. The primary outcomes were IVC collapsibility and IVC:Ao index. Individual IVC and aorta measurements were secondarily evaluated.

RESULTS: 123 (62 control and 61 HDP) postpartum participants were included in our analysis. HDP patients received more IV fluids than controls. IVC collapsibility was similar between groups across PPD 1-3. IVC:Ao index was significantly lower in hypertensive patients on PPD 1 (1.25 ± 0.3 vs 1.1 ± 0.3; p=0.003). HDP patients had significantly smaller IVC maximum diameter on PPD 1 (2.0 ± 0.4 cm vs 1.78 ± 0.5 cm; p=0.004). Indices between the two groups did not differ on PPD 2 and 3. Secondary analysis showed patients with preeclampsia with severe features had lower IVC:Ao indices compared to controls (1.25 ± 0.3 vs 1.03 ± 0.4; p=0.006).

CONCLUSION: Postpartum patients with HDP showed a lower IVC:Ao index and smaller IVC diameters on PPD 1, correlating with a lower CVP compared to controls despite receiving more IV fluids. The indices increased on PPD 2 and 3, which may signify fluid mobilizing to the intravascular space. Bedside point-of-care evaluation of the IVC and aorta can help providers understand postpartum fluid dynamics and may help identify candidates for diuresis.

Point-of-care Assessment of IVC and IVC:Aorta Indices from Postpartum Day 1 to 3

Postpartum Day 1			
	Control (n=62)	Hypertension (n=61)	p-value
IVC Collapsibility (%)	29.3 ± 12.3	30.1 ± 17.5	0.78
IVC:Ao Index	1.25 ± 0.3	1.1 ± 0.3	0.003
IVC maximum (cm)	2.0 ± 0.4	1.78 ± 0.5	0.004
Aorta (cm)	1.6 ± 0.2	1.6 ± 0.2	0.52
Postpartum Day 2			
	Control (n=60)	Hypertension (n=61)	p-value
IVC Collapsibility (%)	32.7 ± 16.8	31.3 ± 17.6	0.66
IVC:Ao Index	1.27 ± 0.3	1.2 ± 0.3	0.2
IVC maximum (cm)	1.96 ± 0.5	1.91 ± 0.5	0.53
Aorta (cm)	1.56 ± 0.2	1.63 ± 0.2	0.06
Postpartum Day 3			
	Control (n=6)	Hypertension (n=11)	p-value
IVC Collapsibility (%)	20.5 ± 13.8	33.2 ± 18	0.15
IVC:Ao Index	1.38 ± 0.3	1.14 ± 0.3	0.14
IVC maximum (cm)	2.13 ± 0.4	1.89 ± 0.5	0.37
Aorta (cm)	1.57 ± 0.2	1.65 ± 0.2	0.47

Reported as Mean ± SD

676 White coat hypertension validated on home blood pressure monitoring as predictor of adverse pregnancy outcomes

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OBJECTIVE: White coat hypertension (WCH) is a common hypertensive disorder associated with cardiac morbidity in the non-pregnant population. Less described is WCH's impact on pregnancy outcomes. The advent of home blood pressure monitoring (HBPM) allows for comprehensive blood pressure assessment throughout pregnancy. Among pregnant patients undergoing HBPM, we aim to determine the impact of WCH on subsequent diagnosis of hypertensive disorders of pregnancy (HDP) and neonatal morbidity.

STUDY DESIGN: We performed a retrospective cohort study of singleton pregnancies receiving prenatal care and delivering in a large regional health system from October 2016 to March 2022. Documented pre-pregnancy chronic hypertension, antihypertensive use, severe BP elevations before 20 weeks gestation (EGA), multiple gestations, and any elevations on HBPM warranted exclusion. WCH was defined as clinic BP of either 140-159 mmHg systolic or 90-109 mmHg diastolic on two separate occasions prior to 20 weeks EGA without elevations on HBPM. The comparison group had no elevated BP in clinic or at home prior to 20 weeks EGA. Our primary outcome was diagnosis of HDP. Secondary outcomes included 5-minute Apgar score < 5, neonatal intensive care admission, small for gestational age (SGA), stillbirth, and preterm birth < 37 weeks EGA. Regression analyses controlling for obesity, maternal age, pre-gestational diabetes, and payer status generated adjusted odds ratios with 95% confidence intervals.

RESULTS: Of 18,916 eligible pregnancies, 3,177 (17%) were classified as WCH while 15,739 (83%) were classified as normotensive. WCH patients had higher median age and body mass index, and were more likely to have pre-gestational diabetes. HDP occurred in 33% of the WCH group compared to 13% in the normotensive group (aOR 2.97, 95% CI 2.71-3.26). Stillbirth, SGA, and preeclampsia with severe features were all increased in the WCH group (Table).

CONCLUSION: WCH, as defined by mild BP elevations early in pregnancy not-replicated on HBPM, was associated with increased risk for HDP and perinatal morbidity.

Table. Secondary outcomes by white coat hypertension status

	Normotensive	White Coat Hypertension	
	15,739	3,177	Odds Ratio
	N (%)	N (%)	(95% CI)
Gestational hypertension	1,418 (9.0%)	767 (24.1%)	**3.22 (2.92-3.55)**
Preeclampsia	1,090 (6.9%)	565 (17.8%)	**2.91 (2.61-3.25)**
Preeclampsia with severe features	603 (3.8%)	357 (11.2%)	**3.18 (2.77-3.65)**
5-minute Apgar < 5	264 (1.7%)	92 (3.0%)	**1.76 (1.38-2.24)**
Neonatal intensive care	766 (4.9%)	296 (9.3%)	**2.01 (1.75-2.31)**
Stillbirth	115 (0.7%)	49 (1.5%)	**2.13 (1.52-2.98)**
Small for gestational age	1,126 (7.2%)	315 (10.1%)	**1.45 (1.27-1.65)**
Preterm delivery	1,528 (9.7%)	597 (18.8%)	**2.15 (1.94-2.39)**

CI, confidence interval

677 Unusual presentation of renal tubular dysgenesis: a case report and review of current literature

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OBJECTIVE: Renal tubular dysgenesis (RTD) is a rare disorder that arises from disruption of the renin-angiotensin system. This condition can result from maternal use of RAS-blocking agents or, more rarely, from a mutation in the genes encoding its components. The most common genes implicated include ACE, REN, AGT, and AGTR1. This condition typically presents as severe oligohydramnios or anhydramnios prior to 22-weeks gestation with subsequent pulmonary hypoplasia and associated Potter sequence.

STUDY DESIGN: In this report, we present a case of a novel mutation in the Angiotensin II Receptor Type 1 (AGTR1) gene and a review of the current literature.

RESULTS: A female infant born at 36-weeks to a multigravida mother with a history of two prior neonatal demises. The pregnancy was complicated by intrauterine growth restriction and anhydramnios beginning at 28-weeks gestation. Fetal kidneys, renal arteries, and bladder had all been unremarkable on previous imaging. However, upon further review, the fetal kidneys appeared homogenous with poorly differentiated calyces. At birth, the infant was anuric, and renal ultrasound revealed poor corticomedullary differentiation with increased bilateral renal echogenicity. Genetic evaluation of the infant revealed a novel mutation in the AGTR1 gene (c.704dup (p.Asn235Lysfs*28)) as the likely cause of Autosomal-recessive renal tubular dysgenesis (AR-RTD). This mutation is currently a variant of undetermined significance. Parental and sibling genetic analysis is

currently pending. However, if this mutation is present, it would reclassify this variant as pathogenic.

CONCLUSION: RTD most often presents with severe oligohydramnios prior to 22-weeks gestation, leading to severe pulmonary hypoplasia and Potter sequence. This, however, is not universal. A better understanding of the correlation between genotype and phenotype could help guide medical decision making and treatment for these infants. A potential new pathogenic mutation for AR-RTD may also be recognized.

678 Impact of body mass index and gestational weight-gain on neonatal outcomes in polycystic ovarian syndrome

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OBJECTIVE: Previous studies have shown that women with PCOS are more susceptible to overweight/obesity and experience higher gestational weight gain (GWG), however, none of the studies examined the interaction effect of BMI and GWG on adverse outcomes. In this study, we will examine association of BMI and GWG with neonatal outcomes in patients with PCOS.

STUDY DESIGN: This is a retrospective cohort study using California's linked vital statistics-hospital discharge data (2008-2019). We included patients with singleton births and gestational age of 37-42 weeks. Patients with PCOS were determined using ICD-9 and ICD-10 codes. GWG was used to group the subjects into below, within or above IOM guidelines. Multivariable logistic regression analyses were used to examine interaction between BMI and GWG; adjusted predicted probabilities were calculated and reported as cases per 1,000 births.

RESULTS: A total of 14,201 patients with PCOS were included, of whom 4,201 (29.6%) were normal weight, 3,676 (25.9%) were overweight and 6,324 (44.5%) were obese. In obese patients with GWG above guidelines, probability of macrosomia (204, 95% CI: 190, 218) vs 74, 95% CI: 62, 87) cases per 1000 births), large for gestational weight gain (215 (201, 228)) vs 68 (56, 80)), and shoulder dystocia (24 (18, 29) vs. 13 (7, 18)) were higher as compared to normal weight patients with GWG within guidelines (Table). Although obesity as well as GWG above guidelines were risk factors independently; however, when combined together, the risk of adverse outcomes was much higher.

CONCLUSION: Our study shows that excessive weight gain is associated with adverse neonatal outcomes. These results might be helpful for providers to provide counselling during pregnancy in PCOS patients.

Table: Multivariable logistic regression showing predicted probabilities from interaction term of pre-pregnancy BMI and gestational weight gain on the neonatal outcomes among PCOS patients in California (2008-2019).

	Macrosomia Cases per 1000 births (95% CI) *	Large for gestational age Cases per 1000 births (95% CI) *	Shoulder dystocia Cases per 1000 births (95% CI) *
Normal weight & below guidelines	43 (30, 56)	36 (24, 47)	12 (6, 19)
Normal weight & within guidelines	74 (62, 87)	68 (56, 80)	13 (7, 18)
Normal weight & over guidelines	134 (117, 152)	125 (108, 143)	27 (18, 35)
Overweight & below guidelines	41 (22, 60)	45 (25, 64)	25 (10, 39)
Overweight & within guidelines	82 (65, 100)	76 (59, 92)	18 (10, 27)
Overweight & over guidelines	153 (138, 168)	155 (140, 170)	15 (10, 21)
Obese & below guidelines	96 (80, 111)	105 (89, 121)	19 (9, 22)
Obese & within guidelines	138 (121, 155)	145 (128, 162)	21 (14, 29)
Obese & over guidelines	204 (190, 218)	215 (201, 228)	24 (18,29)

*Adjusted for maternal race and ethnicity, age, education, insurance, parity and smoking status.

679 Impact of amnioinfusions on the ultrastructure of the amnion in a rodent model

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OBJECTIVE: Amnioinfusions are an important part of many fetal therapy procedures. Prior research has shown that in vitro, amnioinfusions with normal saline (NS) and lactated ringer's (LR) leads to apoptosis of human amniotic membranes when compared with a novel synthetic amniotic fluid. We sought to evaluate the effect of amnioinfusions with commercially available fluids compared to a novel synthetic amniotic fluid ***in vivo*** in a rodent model.

STUDY DESIGN: This study was IACUC approved through Cincinnati Children's Hospital Medical Center. At day E17.5, pregnant rats underwent midline laparotomy to amnio exchange with removal of amniotic fluid around the rat fetus and 1 to 1 replacement of fluid with NS, LR, or a synthetic amniotic fluid, termed "amnio-well" (AW). As a control, some fetuses in each pregnant rat did not undergo amnio-exchange. Rats were harvested at day E20.5 and uterus and amnion specimens were evaluated via electron microscopy for ultrastructure changes as well as the rat amnions evaluating for matrix metalloproteinase 9 (MMP9) expression (a known executor of collagenase and amnion degradation in rodents) via Western Blot. Vinculin was used as a loading control. Western Blot images were analyzed via ImageJ® Software.

RESULTS: Under scanning electron microscopy, there was an increase in amniotic microfractures, as well as amniotic epithelial cellular shrinkage, signs indicative of impending rupture of membranes. These changes were not seen with amnio well nor control (Figure). The MMP9/Vinculin expression was noted to be 1.53 (IQR 1.09, 2.27) in control, compared with , with 2.82 (IQR 2.01, 3.09, $p = 0.072$) in NS, 5.86 (IQR 1.06, 6.72, $p = 0.038$) in LR and 1.58 (IQR 1.41, 1.74, $p = 0.395$) in AW.

CONCLUSION: The ultrastructure of the amnion, after amnio exchange with normal saline and lactated ringers, was notable for increased microfractures and cellular shrinkage, compared to use of a synthetic amniotic fluid. Increased MMP9 production was noted in LR when compared with control. Further study into the impact of amnioinfusions on the amniotic membrane is warranted.

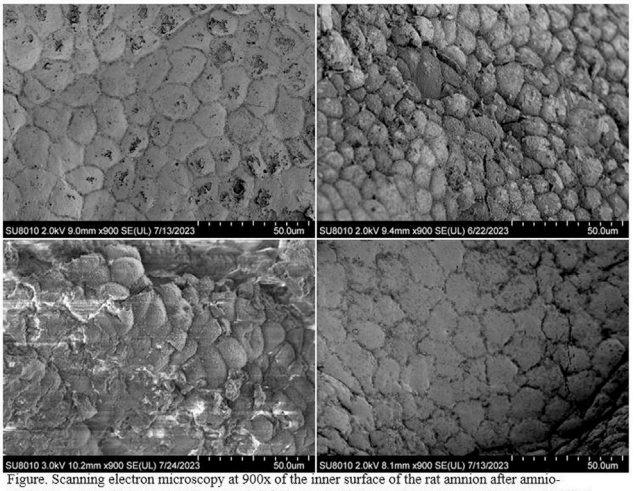

Figure. Scanning electron microscopy at 900x of the inner surface of the rat amnion after amnio-exchange. Top Left- Control without amnioinfusion. Top Right- amnio-exchange with Normal Saline (NS). Bottom Left- amnio-exchange with Lactated Ringer's (LR). Bottom Right- amnio-exchange with Amnio-well. Cells after exposure to NS and LR exhibit shrinking as well as microfractures between cells, with greater shrinkage in NS and greater microfractures in LR.

680 Impact of obesity class on unscheduled cesarean delivery outcomes

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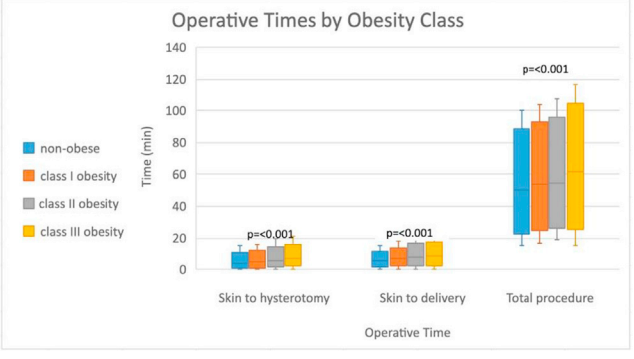
OBJECTIVE: Obesity is a known risk factor for unplanned cesarean delivery (CD). In patients with obesity, perceived technical and surgical difficulty may influence decision-making on when to perform the CD. We sought to evaluate the impact of class of obesity on unscheduled CD outcomes.

STUDY DESIGN: This is a retrospective cohort study of all singleton, non-anomalous gestations delivered by unscheduled CD at a tertiary care center from 2018-2021. The primary outcome was time from skin incision to delivery. Secondary outcomes were composite measures of maternal (postpartum hemorrhage, transfusion, endomyometritis, ICU admission, readmission, wound complication requiring a hospital encounter, or bowel/bladder injury) and neonatal (NICU admission, respiratory support, therapeutic hypothermia, fetal acidemia) morbidity. We stratified patients according to obesity class (class I, class II, and class III at time of CD) and compared outcomes to non-obese patients. Multivariate logistic regression was used to control for potential confounders.

RESULTS: Of 1856 unscheduled CD, 569 (30.1%) were performed in non-obese patients and 452 (24.4%), 347 (18.7%), and 488 (26.3%) were in patients with class I, II, and III obesity, respectively. Operative times to delivery were significantly longer in patients with obesity (6 [IQR 3-9] min. in non-obese vs 7 [IQR 4-10], 8 [IQR 4-11], and 9 [IQR 5-12] min ($p< 0.001$). in patients with class I, II and II obesity respectively). Patients with Class I and II obesity had similar rates of composite maternal morbidity as non-obese patients. Patients with Class III obesity had a significantly increased risk of maternal morbidity compared to non-obese patients. (40.4 vs. 31.8%, aRR 1.19 95%CI 1.01-1.38.) Class of obesity was not significantly associated with neonatal morbidity.

CONCLUSION: Although maternal obesity was associated with longer operative times during unscheduled CD, the absolute difference in incision to delivery time of 1-2 minutes is unlikely to be clinically impactful as neonatal outcomes are similar. Maternal morbidity is only increased in patients with class III obesity.



681 Mifepristone pretreatment for second trimester induction, to wait or not to wait?

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OBJECTIVE: Mifepristone is administered 24 hours (hrs) before initiation of nonviable induction of labor in the second trimester (NIST) to reduce time from induction start to delivery. NIST is often performed in emergent cases, where expeditious care is vital. We hypothesized that mifepristone pretreatment compared misoprostol only would reduce time to delivery, time in labor, and need for dilation and curettage (D&C).

STUDY DESIGN: We conducted a retrospective chart review of patients with previable PPROM, IUFD, fetal anomalies, and maternal contraindications to pregnancy presenting at a single tertiary academic center for NISTs from 2018 to 2022. We compared the time to delivery, in labor, and need for D&C between those who received misoprostol only or mifepristone pretreatment. Stratification by time from first misoprostol or mifepristone pretreatment and an analysis excluding PPROM patients were performed.

RESULTS: Of 103 patients, 37 received mifepristone pretreatment, while 66 received misoprostol alone, and 56% of patients underwent NIST for IUFD. Comparing time from first NIST medication (misoprostol only or mifepristone pretreatment) to completion of delivery, there was a statistically significant increase in time when mifepristone was given (11.0 hrs [7.4, 20.0] vs. 34.4 hrs [28.7, 45.3], $p< 0.001$). There was a nonsignificant decrease in labor time ($p=0.91$) when mifepristone pretreatment time was excluded without a difference in need for D&C (12% vs. 13.5%, $p=1.00$). Stratification by time from no pretreatment or mifepristone pretreatment (< 24hrs or >24hrs) showed no difference in time in labor; but there was a statistically significant difference in total time from first medication to delivery (Table). Exclusion of PPROM patients did not change the results.

CONCLUSION: Mifepristone pretreatment increases the total time from first medication to delivery without a significant difference in labor duration. Our data suggests shortening the time from mifepristone to first dose of misoprostol administration could further expedite NIST care.

Table: Time to fetal and placental delivery from initiation of nonviable induction in the second trimester (hrs)

All Induction Indications*				
First medication administration (mifepristone pretreatment or misoprostol)	**Fetal Delivery**	**P value**	**Placental Delivery**	**P value**
No Mifepristone	10.9 hrs [6.1, 17.6]	**<0.001**	11.0 hrs [7.4, 20.0]	**<0.001**
Mifepristone >24hrs	41.7 hrs [35.8, 47.8]		44.0 hrs [35.8, 48.8]	
Mifepristone <24hrs	28.7 hrs [20.3, 41.4]		29.7 hrs [20.3, 41.5]	
First misoprostol administration	**Fetal Delivery**	**P value**	**Placental Delivery**	**P value**
No Mifepristone	10.9 hrs [6.1, 17.6]	0.28	11.0 hrs [7.4, 20.0]	0.36
Mifepristone >24hrs	12.5 hrs [7.4, 20.0]		13.4 hrs [7.5, 21.3]	
Mifepristone <24hrs	6.9 hrs [6.1, 20.7]		6.9 hrs [6.1, 27.2]	
Induction Indications excluding previable PPROM*				
First medication administration (mifepristone pretreatment or misoprostol)	**Fetal Delivery**	**P value**	**Placental Delivery**	**P value**
No Mifepristone	14.8 hrs [8.7, 21.1]	**<0.0001**	15.6 hrs [10.1, 21.7]	**<0.0001**
Mifepristone >24hrs	41.7 hrs [35.8, 47.8]		44.0 hrs [35.8, 48.8]	
Mifepristone <24hrs	30.2 hrs [27.3, 41.5]		30.7 hrs [27.6, 45.0]	
First misoprostol administration	**Fetal Delivery**	**P value**	**Placental Delivery**	**P value**
No Mifepristone	14.8 hrs [8.7, 21.1]	0.58	15.6 hrs [10.1, 21.7]	0.36
Mifepristone >24hrs	12.5 hrs [7.4, 20.0]		13.4 hrs [7.5, 21.3]	
Mifepristone <24hrs	15.1 hrs [6.3, 27.1]		15.7 hrs [6.3, 29.7]	

*Data shown as median [IQR]

682 Neighborhood, race, or both? Impact on maternal and neonatal adverse outcomes

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OBJECTIVE: Area deprivation index (ADI) is a measure that identifies neighborhoods experiencing socioeconomic disadvantage by considering factors independent of race such as income and education. We tested the hypothesis that patients living in deprived neighborhoods are at increased risk of adverse pregnancy outcomes and that this association is modified by race due to exposure to racism.

STUDY DESIGN: This is a secondary analysis of a prospective cohort study of singleton pregnancies at our academic center from 2017 to 2020. The parent study excluded non-English speaking patients and IVF pregnancies. The primary outcome for this analysis was composite adverse obstetric outcomes. The secondary outcome was composite neonatal adverse outcomes (Table). These outcomes were compared between patients with low ADI (< 75th percentile, representing affluence/ prosperity) and high ADI (≥75th percentile with cutoff of ADI≥9, adversity/ deprivation). Stratified analysis by race (Black vs. White), and interaction testing of ADI and race were performed.

RESULTS: Of 1260 birthing people, 1029 had ADI data for analysis. The median ADI for the cohort was 7 (IQR 3-9). Patients with high ADI were more likely to have composite adverse obstetric outcomes compared to those with lower ADI (aRR 1.17, 95%CI [1.02, 1.33]). There was no difference in composite neonatal adverse outcomes. After stratifying by race, there was no difference in risk of adverse outcomes in Black patients with low ADI vs. Black patients with high ADI. However, the p-value for interaction between race, ADI, and composite adverse obstetric outcome was significant (p=0.001) demonstrating that the association between ADI and adverse outcomes is modified by race, where Black patients are at higher risk than White patients.

CONCLUSION: More than half of patients living in deprived neighborhoods experience an adverse pregnancy outcome. Race modifies this risk where Black patients in deprived neighborhoods are at higher risk than White patients. Our results suggest that factors other than socioeconomics alone, such as systemic racism, contribute to adverse outcomes.

Table: Risk of composite obstetric and neonatal adverse outcomes by ADI and race

	Low ADI (less deprived) N= 663 Ref	**High ADI** (more deprived) N=366	**RR (95% CI)**	**aRR* (95% CI)**
Composite adverse obstetric outcome	290 (44%)	191 (52%)	1.19 (1.05, 1.36)	**1.17 (1.02, 1.33)**
Neonatal composite adverse outcome	166 (25%)	85 (23%)	0.93 (0.74, 1.17)	0.90 (0.71 ,1.14)
Black patients N=584				
Composite adverse obstetric outcome	136 (51%)	173 (54%)	1.06 (0.91, 1.23)	1.07 (0.93, 1.26)
White patients N=407				
Composite adverse obstetric outcome	140 (38%)	136 (38%)	0.99 (0.66, 1.49)	0.94 (0.59, 1.37)

P for interaction between race, ADI, and composite adverse obstetric outcome= 0.001
Composite OB outcome=hemorrhage or transfusion, wound infection, infectious endomyometritis, hypertensive disorder of pregnancy, unscheduled cesarean section, preterm delivery <37 weeks, maternal death, small for gestational age, stillbirth
Neonatal composite outcome=NICU admission, Umbilical artery pH <7.1, APGAR <7 at 5 mins, respiratory distress syndrome, hypoxic ischemic encephalopathy, neonatal death within 28 days.
*Adjusted RR: adjusted for age and obesity.

683 One year later: Comparison of care for nonviable second trimester pregnancies pre- and post-Dobbs decision

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OBJECTIVE: The Dobbs v. Jackson Women's Health Organization (Dobbs) decision may affect the care provision of patients with second trimester nonviable pregnancies (STNPs). We sought to compare differences in type of, indications for, and access to care of STNPs in the year before and after the Dobbs decision.

STUDY DESIGN: We conducted a retrospective cohort study of all patients who delivered following care for STNPs between 06/2021-07/2023 at a single, tertiary care center in a state where abortion became illegal, except in cases of medical emergency, immediately following Dobbs. We assigned patients to pre-Dobbs (June 2021-2022) or post-Dobbs (July 2022-2023) eras based on date of delivery. We compared differences in indication for care and procedure type pre- and post-Dobbs. We used multivariate logistic regression to determine the odds of obtaining a dilation and evacuation (D&E) pre- and post-Dobbs, adjusting for confounders.

RESULTS: We included 318 patients in the analysis (n=195 pre-Dobbs, n=123 post-Dobbs). There was no difference in gestational age between the groups (19.5 vs. 19.0, p=0.27), and no difference in distance traveled (24 vs. 21 miles, p=0.42). There was a significant difference in indication for care, with 0 STNP deliveries for fetal anomalies post-Dobbs (p< 0.001). There was also a significant decrease in D&Es post-Dobbs (p=0.01, Table). Patients receiving care post-Dobbs had 53% lower odds of obtaining D&E (aOR 0.47, 95% CI 0.29-0.78). When stratified by indication, there was no difference in odds for obtaining D&E for intrauterine fetal demise (IUFD) (aOR 0.81, 95% CI 0.42-1.56), but patients with an indication of medical emergency had an 83% lower odds of obtaining D&E post-Dobbs (aOR 0.17, 95% CI 0.06-0.47).

CONCLUSION: Provision of care for STNPs in the one year since the Dobbs decision in an abortion-restrictive state has significantly changed for patients with fetal anomalies and medical emergencies, but remains similar to the pre-Dobbs era for patients with IUFDs. Continued surveillance is necessary to understand how the evolving legal landscape may affect patients.

Table: Comparison of nonviable second trimester terminations (NSTT) by era

	Pre-Dobbs N=195 (Ref)	Post-Dobbs N=123	P-value
Gestational age (median [range]) Cohort: 19.2 [17.0-21.4]	19.5 [17.0-21.6]	19.0 [17.0-21.2]	0.27
State			
Missouri	147 (75.4)	95 (77.2)	0.27
Illinois	40 (20.5)	27 (22)	
Other	8 (4.1)	1 (0.8)	
Indication for NSTT			
Fetal anomaly	47 (24.1)	0	**<0.001**
IUFD	91 (46.7)	85 (69.1)	
Medical emergency	57 (29.2)	38 (30.9)	
Distance traveled (miles) (median [range]) Cohort: 23 [11-84]	24 [13-91]	21 [9-70]	0.42
< 50	126 (64.6)	85 (69.1)	0.49
≥ 50-100	24 (12.3)	12 (9.8)	
> 100-200	28 (14.4)	20 (16.3)	
> 200	17 (8.7)	6 (4.9)	
Mode of delivery			
IOL	70 (35.9)	62 (50.4)	**0.01**
D&E	125 (64.1)	61 (49.6)	
D&E indications			
Fetal anomaly	30 (24.0)	0	**<0.001**
IUFD	56 (44.8)	48 (78.7)	
Medical emergency	39 (31.2)	13 (21.3)	
IOL indications			
Fetal anomaly	17 (24.3)	0	**<0.001**
IUFD	35 (50.0)	37 (59.7)	
Medical emergency	18 (25.7)	25 (40.3)	

Data are n (%) unless otherwise specified.
IOL: induction of labor. D&E: dilation and curettage. IUFD: intrauterine fetal demise.

684 Natural Language Processing Analysis of TikTok's Most Popular #Pitocin Videos

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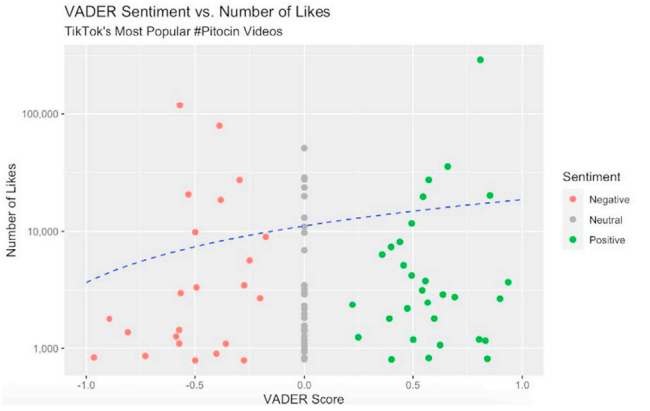
OBJECTIVE: Among TikTok's 150 million American users, an estimated 90 million reportedly consult the app for healthcare advice before seeing a physician. Patients may therefore rely on TikTok as a source of information on intravenous (IV) oxytocin use in labor, however, no studies exist describing the tone of popular TikTok videos available on this topic. We, therefore, used a natural-language processing tool to evaluate the tone and sentiment of popular TikTok videos tagged #Pitocin.

STUDY DESIGN: The application Apify was used to compile information about the most-liked videos with the #Pitocin tag on April 26th, 2023. Two reviewers assessed 169 videos for eligibility and excluded 73 videos due to irrelevance or unavailability, resulting in 96 videos for analysis. We used a natural language processing tool, Valence Aware Dictionary for sEntiment Reasoner (VADER) to assess the polarity (positive/negative) and intensity (strength) of emotion of the video description text. The VADER score range was -1 to 1, with -1 indicating a highly negative sentiment, and 1 indicating a highly positive sentiment. Regression modeling was performed with VADER score as the exposure variable and the number of likes on the video as the response variable.

RESULTS: The 96 reviewed videos with the #Pitocin tag had a total of 19,430,700 plays and 1,882,839 likes and averaged 60.4 seconds in length. 8 videos were removed from VADER analysis due to absent captions. Of the 88 video descriptions analyzed, 30 (34.1%) had values greater than 0, 23 (26.1%) had values less than 0, and 35 (39.8%) had values equivalent to 0. The adjusted R-squared value was equivalent to -0.002. VADER score did not significantly predict the number of likes on videos ($\beta_1 = 7463$, p-value = 0.89).

CONCLUSION: More than a quarter of the most popular TikTok videos tagged #Pitocin had negative sentiments regarding IV oxytocin infusion, based on video descriptions. There was no statistical association between the popularity of a video and its sentiment score.



685 Patient Perceptions Post Dobbs Decision

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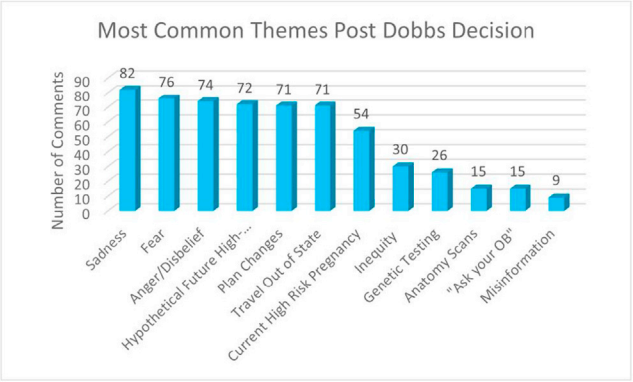
OBJECTIVE: In June 2022, the Supreme Court ruled in Dobbs v. Jackson's Women's Health Organization that the constitution does not confer a right to abortion. The objective of this study was to evaluate patients' perceptions and concerns regarding this ruling.

STUDY DESIGN: Reddit, a website for user-generated content and discussions, was searched for all communities specifically related to pregnancy. Each community was then searched for posts relating to the Dobbs v. Jackson case using key words "Roe v Wade" and "Dobbs." Thematic analysis was then performed using qualitative data analysis software.

RESULTS: A total of 5 posts with 1,061 associated comments were included. 102 commenters were currently pregnant. The most common emotions mentioned were sadness (82 posts), fear (76), and anger or disbelief (74). Many commented on uncertainties regarding the meaning of the new laws and possible future effects. Inequity and financial privilege were mentioned often (30), specifically relating to some not being able to travel outside of their state to receive necessary care. Many women currently or previously had high-risk pregnancies (54) and the maternal risks in a hypothetical future high-risk pregnancy was noted frequently (72). Many posts discussed plan changes (71), including moving to different states and decreasing family size goals. Additional common posts related to traveling out of state for abortion or emergency care (50), and others reported interest in moving before pursuing pregnancy (17). Fifteen posters listed a concern of lack of autonomy to pursue abortion if a severe anomaly was seen on early ultrasound. Posts including misinformation were rare (9) and few users urged others to speak to their obstetrician for clarification (15).

CONCLUSION: Patients feel afraid, angry, and sad after the Dobbs v. Jackson decision. Inequity, uncertainty, and hypothetical future high-risk pregnancies were discussed often. Unintended effects

include families electing to move to different states or changing their family planning goals.



686 Histopathologic placental findings in SARS-CoV-2 exposed gravida compared to unexposed controls

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OBJECTIVE: To estimate if SARS-CoV-2 maternal infection during pregnancy is associated with higher rates of placental abnormalities compared to unexposed controls.

STUDY DESIGN: We designed a single center retrospective cohort study of delivered patients with placental histopathologic results in exposed and unexposed to prenatal SARS-CoV-2 infection. Primary outcomes included select placental malperfusion abnormalities. Secondary outcomes included desired pregnancy outcomes. Data was obtained through automated chart extraction and verified manually. Bivariate and multivariable logistic regression analyses were performed. Subanalyses examined the effect of gestational timing and disease severity of SARS-CoV-2 infection on placental outcomes. Sensitivity analyses were performed to assess for confounding by indication.

RESULTS: Among the 1,923 pregnant patients in the cohort, 490 (25.5%) had prenatal SARS-CoV-2 infection. Study groups differed on several baseline characteristics, including higher rates of preterm birth, obesity, hypertension, fetal growth restriction, and fetal congenital anomalies in the unexposed group. In the unadjusted analysis, placental abnormalities, including MVM, FVM and inflammation, were similar between SARS-CoV-2 exposed and unexposed pregnant individuals. Findings were largely confirmed in the multivariable analyses adjusting for relevant confounding variables. Gestational timing and severity of infection did not appear to impact placental injury. However, a sub-cohort sensitivity analysis restricting to patients without potential confounding variables related to indications for ordering placental pathology revealed a higher rate of MVM in the SARS-CoV-2 exposed group.

CONCLUSION: Rates of specified placental histopathologic abnormalities were not increased in SARS-CoV-2 infection during pregnancy in this high-risk cohort. However, there is evidence of confounding by indication that may be masking an association between SARS-CoV-2 prenatal exposure and increased placental pathology.

Primary Placental Outcomes comparing SARS-coV2 prenatally exposed versus unexposed individuals

Variables	SARS-CoV-2 Exposed N= 490, n(%)	SARS-CoV-2 Unexposed N=1,433, n(%)	Unadjusted Relative Risk (95% CI)	Adjusted Odds Ratio (95% CI)
MATERNAL VASCULAR MALPERFUSION (MVM)	139 (28.4)	503 (34.8)	0.81 (0.69 - 0.95)	1.00 (0.79 - 1.28*)
Decidual arteriopathy	10 (2)	65 (4.5)		
Placental infarctions	53 (10.8)	201 (13.9)		
Ischemia	96 (19.6)	390 (27)		
Round Intraplacental hematoma	2 (0.4)	13 (0.9)		
FETAL VASCULAR MALPERFUSION (FVM)	88 (18)	265 (18.3)	0.97 (0.78 - 1.21)	0.97 (0.74 - 1.27)**
Avascular villi/Villous stromal karyorrhexis	24 (4.9)	97 (6.7)		
Chorionic plate thrombosis/Stem villous thrombosis	72 (14.7)	202 (14.5)		
INFLAMMATORY LESIONS	120 (24.5)	358 (24.9)	0.98 (0.82 - 1.17)	0.88 (0.7 - 1.13)***
Maternal anniotic inflammatory response	95 (19.4)	310 (21.6)		
Fetal inflammatory response	87 (17.8)	272 (18.9)		

*Multivariable model includes gestational and chronic hypertensive disorders and low birth weight
**No variables significantly impacted the association between SARS-CoV-2 and FVM
*** Multivariable model includes gestational and chronic hypertensive disorders

687 Immune Clock of Pregnancy: A Longitudinal Evaluation of Cervicovaginal Inflammation

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OBJECTIVE: Timed changes in circulating immune mediators have been reported to play a critical role in fetal tolerance and fetal growth while providing anti-microbial protection. However, similar longitudinal adaptations occurring in the cervicovaginal space are less well understood. Our goal was to evaluate inflammatory changes over time utilizing cervicovaginal lavage (CVL) in a normal patient population.

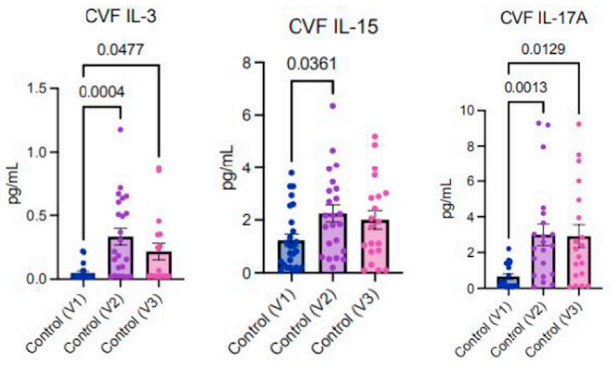
STUDY DESIGN: This is a single center, prospective case-control cohort study of pregnant patients at risk for spontaneous preterm birth (sPTB). The control cohort consists of nulliparous patients without a short cervix or symptoms of sPTB. All patients included were delivered at term. Enrollment occurred between 18-24 weeks (V1) with follow up at 27-29 weeks (V2) and 33-35 weeks (V3). CVL was obtained using 3cc of normal saline placed on the anterior lip of the cervix and collected in the posterior fornix of the vagina after 30 seconds. Twenty-eight CVL biomarkers were analyzed via Luminex platform. Statistical analysis utilized t-test and Mann-Whitney test to compare groups between time points.

RESULTS: 32 patients were included. Three cytokines varied significantly over the second and third trimester: IL-3, a colony stimulating factor promoting differentiation and a progesterone-responsive cytokine; IL-17A, a product of IL-6 /TGFb transformed Th17 lymphocytes; and IL-15, a regulator of NK cell activity demonstrated statistically significant differences when comparing the three visits. The first two cytokines demonstrated similar patterns with increases in IL-3 and IL-17A at V2 and V3 compared to V1, See Figure 1. IL-15 was higher at V2 compared to V1 (p=0.036). Although these

differences were statistically significant, the magnitude of the concentration change was modest using this methodology.

CONCLUSION: Modulation in the immune system was seen during pregnancy in this low-risk cohort in the cervicovaginal space. These changes appear hormonally mediated, in part, and were primarily evident during the midtrimester. These data should be considered as baseline for interpretations of further research.

Figure 1: Cervicovaginal Lavage Cytokine Changes Throughout Pregnancy



688 Impact of skin incision type on operative morbidity in cesarean hysterectomy for placenta accreta spectrum

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OBJECTIVE: Vertical skin incision is often used for a planned cesarean hysterectomy (C-Hyst) for its improved visualization and conceivably fewer surgical complications. This study was designed to determine whether surgical complications for planned C-Hyst differ by skin incision type.

STUDY DESIGN: Cohort study of patients with planned C-Hyst for placenta accreta spectrum (PAS) stratified by skin incision (LT or vertical) from 2012-2023. Primary outcome was a composite of transfusion $\geq$ 4 units, intraoperative bowel or bladder injury, intensive care unit admission or wound complication. Comparisons performed using χ^2, t-test, rank sum test and multivariable logistic regression as appropriate.

RESULTS: We identified 53 patients with planned C-Hyst for PAS, of whom 37 (70%) had LT skin incision and 16 (30%) had vertical skin incision. Patients with LT incision were more likely to be $\geq$ 35 years old (76% vs 44%, P=0.02), have an antenatal diagnosis of accreta only (68% vs 38%, P=0.04) and deliver at a later gestational age (34.9 vs 33.7 weeks, P=0.01). The primary composite outcome was less common in those with LT incision than vertical incision (62% vs 94%, P=0.02). After adjusting for potential confounders, the odds of the primary outcome were the same (aOR 8.2, CI 0.8-89). However, vertical incision was more likely to have estimated blood loss $\geq$ 2500 cc (aOR 6.9, CI 1.2-38.5), operative time $\geq$ 120 minutes (aOR 8.9, CI 1.6-49.3) and discharge home with Foley catheter (aOR 13, CI 1.8-95.6), Table 1. There were no differences in wound complications, pain scores, opioid use or postpartum length of stay. There were also no differences in outcomes by skin incision when restricting the analysis to patients with percreta (8 LT incision; 4 vertical incision).

CONCLUSION: Vertical skin incision at time of planned C-Hyst for PAS is associated with higher blood loss, longer operative time and prolonged Foley catheter use as compared to LT incision, without a reduction in operative complications. For a surgeon skilled at either approach, LT skin incision should be considered a safe and effective option for treating PAS.

Table 1. Perioperative outcomes by skin incision for cesarean hysterectomy in patients with placenta accreta spectrum

Outcome	Low-Transverse Skin Incision N=37	Vertical Skin Incision N=16	P	Adjusted OR [a] (95% CI)	P
Composite primary outcome [b]	23 (62)	15 (94)	0.02	8.2 (0.8-89)	0.08
Transfusion ≥ 4 units	21 (57)	15 (94)	<0.01	10.5 (1-111.3)	0.05
Operative complications			0.22	3.2 (0.7-14.7)	0.14
Bladder	7 (18.9)	7 (43.8)			
Bowel	2 (5.4)	1 (6.3)			
Need for re-exploration	3 (8.1)	0 (0)			
ICU admission	12 (32.4)	10 (62.5)	0.04	5.7 (1-33.9)	0.06
Wound complication [c]	3 (8.1)	0 (0)	0.24	1	NA
EBL ≥ 2500 cc	17 (46)	13 (81.3)	0.02	6.9 (1.2-38.5)	0.03
Any transfusion	31 (83.8)	16 (100)	0.09	1	NA
Uterotonic use	11 (29.7)	5 (31.3)	0.91	0.6 (0.1-2.9)	0.49
Operative time ≥ 120 min	10 (27)	12 (75)	<0.01	8.9 (1.6-49.3)	0.01
Staple skin closure	4 (10.8)	8 (50)	<0.01	476 (8.6-26330)	<0.01
Foley catheter in situ on discharge	6 (16.2)	7 (43.8)	0.03	13 (1.8-95.6)	0.01
PP LOS (days)	4.6 ± 1.5	5.4 ± 2.1	0.17		
Total MME	176.4 ± 152.5	157 ± 102.2	0.64		
Neonatal outcomes					
NICU admission	32 (86.5)	15 (94)	0.44	1.3 (0.1-31.2)	0.86
5-minute APGAR < 7	10 (27)	10 (62.5)	0.01	2.6 (0.6-11)	0.19

Data are N (%) or mean ± SD unless noted otherwise
[a] Adjusted for age ≥ 35, gestational age, antenatal diagnosis of placenta accreta and hysterotomy type
[b] Composite primary outcome consists of transfusion ≥ 4 units, intraoperative bowel or bladder injury, intensive care unit admission or wound complication
[c] There were 2 patients with skin and soft tissue infection and 1 patient with wound separation in the low-transverse skin incision group
ICU, intensive care unit; *EBL*, estimated blood loss; *PP LOS*, postpartum length of stay; *MME*, morphine milligram equivalents; *NICU*, neonatal intensive care unit

689 Maternal morbidity in postpartum severe preeclampsia by obstetric hospital volume

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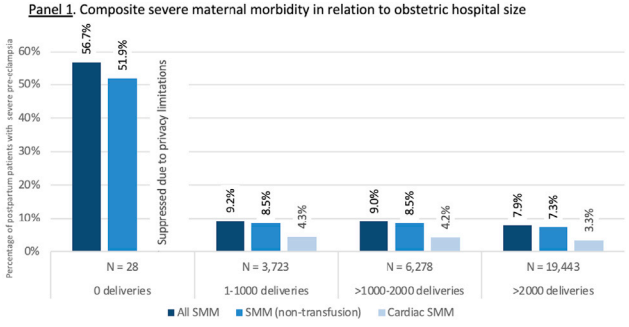
OBJECTIVE: Preeclampsia is a leading cause of maternal morbidity and mortality in the US. We investigated the relationship between facility delivery volume and rates of non-transfusion severe maternal morbidity (SMM) among patients readmitted postpartum for severe preeclampsia (SPREX).

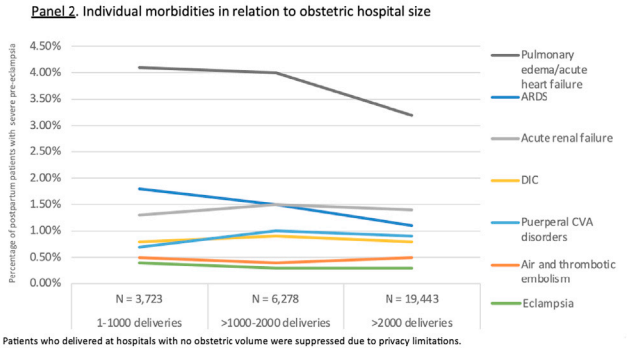
STUDY DESIGN: Retrospective cohort study using the Nationwide Readmissions Database (2015-2020), among patients readmitted for SPREX. Our primary outcome was non-transfusion SMM during readmission, defined per US Centers for Disease Control and Prevention criteria. We also evaluated SMM, cardiac SMM and individual morbidities. The exposure variable was the number of annual deliveries at the readmitting facility. Restricted cubic splines with 4 knots were used to assess the functional form of the relationship between obstetric volume and non-transfusion SMM; a linear relationship was identified as optimal. Logistic regression was used to generate adjusted odds ratios (aOR) which controlled for maternal age, non-transfusion SMM at delivery, expanded obstetric comorbidity index, and hypertensive disorder of pregnancy (HDP) during delivery.

RESULTS: The cohort included 29,472 patients readmitted postpartum with SPREX, of which the primary payer was 54.9% private and 41.7% governmental. Median age was 31.4 years. Most patients did not have prior HDP (64.7%) or chronic hypertension (85.6%). Non-transfusion SMM occurred in 7.3% readmitted to hospitals with >2,000 deliveries compared to 8.5% with 1-2,000 deliveries,

and 51.9% without any delivery hospitalizations (Panel 1). The most common SMM was pulmonary edema and heart failure (Panel 2). For every increase in 1,000 deliveries, the odds of a non-transfusion SMM at readmission decreased by 3.5% (aOR: 0.965; 95% confidence interval: 0.94, 0.99).

CONCLUSION: Non-transfusion SMM for postpartum readmissions with SPREX features were inversely associated with obstetric hospital volume. This information may guide risk-reducing initiatives for identifying strategies to optimize postpartum care at facilities with lower or no delivery volume.





690 Transport trends for early pregnancy evaluation before and after adoption of restrictive reproductive legislation

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OBJECTIVE: To evaluate the impact of the passage of restrictive abortion legislation in Texas and the federal Dobbs v Jackson Women's health decision on transports to our Level IV maternal center for early pregnancy evaluation.

STUDY DESIGN: We conducted a single-institution retrospective study on all transports to our center from 2/2021-2/2023, before and after the adoption of Texas restrictive abortion legislation (SB8—09/2021; SB4—12/2021) and the federal Dobbs decision (06/2022). Transports for early pregnancy evaluation including ectopic pregnancy, pregnancy of unknown location (PUL), miscarriage, and previable preterm prelabor rupture of membranes (PPROM). Demographics and transferring facility level of maternal care (LoMC) were compared between patients transported for early pregnancy evaluation versus transports for other indications. Severe morbidity and mortality (SMM; CDC definition) of transports were evaluated.

RESULTS: Of the 526 patients transferred, 63 (12%) were for early pregnancy evaluation. Of those, 21 (32%) were for ectopic pregnancy, 13 (20%) for PUL, 22 (33%) for miscarriage, and 9 (13%) for previable PPROM. Early pregnancy transports were significantly older, self-identify as Black, have lower body mass index, and be nulliparous when compared to other transports. Early pregnancy transports were also more likely to be via ground/ambulance (96 v 68%, $p< 0.0001$) and from a hospital/emergency room without a labor and delivery (59 v 24%, $p< 0.0001$). There were no differences in SMM rates ($p >0.05$). There was an increase in number of patients transferred from 2021-2022 (n=29) compared to 2022-2023 (n=36), though not significantly different (p=0.4). There were increases in transport rates after 09/21 and 06/22, particularly for miscarriage management (Figure).

CONCLUSION: Transports to a higher LoMC center for early pregnancy evaluation increased after passage of restrictive abortion legislation suggesting potentially unwarranted transports from centers with capability to manage early pregnancy evaluation.

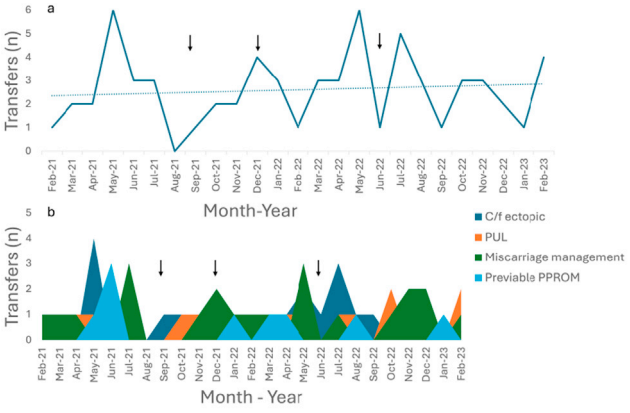

Figure. Transfers for a) early pregnancy evaluation from February 2021-February 2023 with trendline (dotted line) and b) by specific etiology – concern for (c/f) ectopic pregnancy, pregnancy of unknown location (PUL), miscarriage management (includes missed, incomplete, complete, septic abortion as well as retained products of conception) and previable preterm prelabor rupture of membranes (PPROM). Arrows indicate passage of SB8 (September 2021), SB4 (December 2021), and Dobbs (June 2022).

691 Neonatal outcomes in late preterm premature rupture of the membranes – subpopulation analysis

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OBJECTIVE: Following the PPROMT trial, our departmental protocol was revised in 2016, so that pregnant women with late preterm premature rupture of the membranes (PPROM), are managed conservatively up to 37 weeks. This study assessed neonatal outcomes according to clinical subpopulations, as various clinical scenarios in the face of late PPROM can affect outcomes and accordingly- clinical decisions.

STUDY DESIGN: The study included all women with late PPROM (defined as PPROM 34—37 weeks of gestation), during 2016-2022. The conservative management (CM) group (n=397) and the active management (AM) group (n=82) were compared according to neonatal outcomes (5-minute Apgar score ≤7, phototherapy, NICU

admission, neonatal respiratory support, and antibiotic treatment). Subpopulations were further analyzed: patients after cesarean delivery (CD) (n=66), twin pregnancy (n=24), diabetes mellitus (n=78), small for gestational age (SGA) (n=46), group B Strep carriers (n=15), and obesity (n=138).

RESULTS: When comparing active to conservative management, we found higher rates of CD (45.6% vs. 13.9%, p< 0.001), neonatal phototherapy (25.6% vs. 16.9%, p=0.05) and neonatal antibiotic treatment (6.6% vs. 1.4%, p=0.05), respectively.

Further analysis of patients after CD, twin pregnancy, diabetes or obesity, found vaginal delivery was more common in the CM compared to the AM group (P< 0.001). We also found higher rates of neonatal respiratory support in obese patients in the AM group (11.4% vs. 8.0%; P=0.002).

CONCLUSION: Patients with PPROM managed conservatively had a lower CD rate, which is particularly important when emphasizing the importance of preventing primary CD. Results were similar among the different subpopulations. Importantly, we found no differences in neonatal outcomes among diabetic patients and among twin pregnancies with late PPROM, where antenatal corticosteroid treatment was not used.

692 Genetic findings among neonates with perinatal hypoxic-ischemic encephalopathy

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OBJECTIVE: Neonatal encephalopathy (NE) occurs in 3 out of 1000 births, causing substantial morbidity and neurodevelopmental sequelae. Although more than 50% of NE cases are attributed to hypoxic-ischemic encephalopathy (HIE), most newborns with HIE have limited evidence of perinatal hypoxia. We hypothesized that some infants diagnosed with HIE have an identifiable genetic disorder with phenotypic features that resemble encephalopathy.

STUDY DESIGN: We reviewed HIE cases referred for genetic analysis in a clinical diagnostic laboratory between October 2014 - September 2022. Cases were included if they were given a diagnosis of HIE by the referring physician, were ≥35 wks at birth and < 1 yo at the time of genetic analysis, and if they underwent exome sequencing. Cases were excluded if there was significant cardiopulmonary pathology resulting in hypoxia or if clinical features or neuroimaging suggested a postnatal cause for hypoxic ischemic injury. This research was IRB approved (H-18414).

RESULTS: Twenty-three cases met inclusion criteria. A total of four (17.4%) had pathogenic or likely pathogenic variants linked to adverse neurologic outcomes with phenotypic features resembling encephalopathy (Table 1). Two additional neonates had pathogenic or likely pathogenic variants in genes associated with unrelated phenotypes, including congenital hypothyroidism and Noonan syndrome (Table 1). Two neonates had isolated HIE without significant comorbidities to suggest an underlying genetic disorder. There was no correlation between cord gas or Apgar values and genetic findings.

CONCLUSION: In this cohort, 17.4% of perinatal HIE cases had a genetic syndrome with a known neuromuscular or neurodevelopmental phenotype that overlaps with HIE. Notably, a subset of these neonates had isolated HIE without other clinical features to suggest that there may be an underlying genetic disorder. The variants identified in non-encephalopathy genes may be incidental or may represent a phenotypic expansion for these genes. These results, while limited by biases inherent in retrospective studies, call for prospective investigation.

Table 1. Pathogenic and likely pathogenic genetic findings in a cohort of neonates with hypoxic-ischemic encephalopathy.

ID	Phenotype	Cooling	Genetic variants having phenotypic overlap with encephalopathy:		Variant	Classification	Inheritance	OMIM Entry & Description
			Yes	No				
1	Static encephalopathy, GI dysmotility, hypertonia, motor delay, visual impairment, PFO, acute lactic acidemia, liver dysfunction.	NA	*KIF1A*		Heterozygous *de novo* c.757G>A (p.E253K)	Pathogenic	AD	Neurodegeneration and spasticity with or without cerebellar atrophy or cortical visual impairment [MIM:614255]
2	Hypotonia, seizures, decerebrate rigidity, respiratory failure, abnormal EEG, cerebral hemorrhage, macrocephaly, PDA, biventricular hypertrophy, arachnodactyly, long bone fractures, posteriorly rotated ears, frontal bossing.	No	*ATCA1*		Heterozygous *de novo* c.346G>A (p.A116T)	Likely Pathogenic	AD	Congenital myopathy 2A, typical [MIM:161800]
3	Flexion contractures, hypotonia, hyporeflexia, cephalohematoma, seizure, pulmonic stenosis, IUGR, polyhydramnios, single palmar crease. Parental consanguinity.	Yes	*GBE1*		Homozygous c.1693C>T (p.R565W)	Likely Pathogenic	AR	Glycogen storage disease IV [MIM:232500]
4	Emergency cesarean, placental abruption, therapeutic hypothermia, seizures, coarctation of the aorta.	Yes	15q13.3 deletion		Heterozygous 1.484 Mb LOSS	Pathogenic	AD	15q13.3 deletion syndrome [MIM:612001]
5	Decreased fetal movement, nephropathy, hypoglycemia, lactic acidosis, hepatomegaly and hepatic failure, hypothyroidism, anemia.	Yes		*DUOX2*	Compound heterozygous c.3616G>A, (p.A1206T) c.2654G>T, (p.R885L)	Pathogenic / Likely Pathogenic	AR	Thyroid dyshormonogenesis [MIM:607200]
6	Hypotonia, areflexia, abnormal EEG, respiratory distress, hydrops fetalis, pleural effusion, decreased fetal movement, PFO, PDA.	Yes		*PTPN11*	Heterozygous *de novo* c.1507G>A (p.G503R)	Pathogenic	AD	Noonan syndrome 1 [MIM:163950]

Abbreviations: GI, gastrointestinal. PFO, patent foramen, ovale. EEG, electroencephalogram. PDA, patent ductus arteriosus. IUGR, intrauterine growth restriction.

693 OBGYN shortage by Hospital Referral Region: Opportunities to reduce reproductive disparities

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OBJECTIVE: To examine pre-Dobbs decision hospital referral region (HRR) characteristics and their association with OBGYN physician density outliers.

STUDY DESIGN: Data on active non-subspecialist OBGYNs and total Graduate Medical Education full-time equivalents were obtained from Centers for Medicare and Medicaid Services. Census and socioeconomic data for each zip code were abstracted from the US Census Bureau, including total female population, population by race, and percentage (%) of females by marital status, education, household income, insurance status/source, and public assistance factors. These data were then aggregated by HRR per the Dartmouth Atlas. Linear regression was performed comparing each HRR's female population to number of active OBGYNs to identify regions with the highest and lowest deciles of variance in expected compared to actual number of OBGYNs. Logistic regression was used to determine variable significance of demographic factors in the highest and lowest physician density deciles.

RESULTS: Of the 306 HRRs, the highest OBGYN density decile comprised 31,463,100 females and 11,914 OBGYNs for a density of 2,641 females per OBGYN. In the lowest decile, there were 41,549,887 females and 7,980 OBGYNs for a density of 5,207 females per OBGYN. In univariate analysis, the % of Hispanic females, ≥bachelor's degree, fulltime employment, private insurance, poverty, households receiving SNAP assistance, mean household income, and overall population density were significantly associated with OBGYN density outliers (Table). In multivariate analysis, HRRs with a higher percentage of Hispanic females (p=0.013) and those with less than a bachelor's degree (p< 0.001) were associated with more pronounced physician shortfalls.

CONCLUSION: HRRs with a higher proportion of Hispanic patients and lower educational attainment were more likely to have an OBGYN shortage. Policy aimed at recruitment and retention of

OBGYNs in HRRs with an OBGYN shortfall as well as innovative healthcare delivery solutions should be a public health priority to reduce disparities.

Table: Hospital Referral Region Characteristics and OB/GYN Density

	OB/GYN Density		Univariate		Multivariate	
Characteristic	**Low[1]**	**High[1]**	**z-value**	**p-value**	**z-value**	**p-value**
Race						
Black (%)	11.9 (10.5)	13.0 (11.7)	0.37	0.713		
White (%)	72.5 (12.1)	70.7 (16.1)	-0.50	0.619		
Hispanic ethnicity (%)	21.4 (17.2)	12.0 (8.1)	-2.43	**0.015**	-2.47	**0.013**
Bachelor degree or above (%)	29.4 (5.9)	40.2 (8.1)	3.81	**<0.001**	3.74	**<0.001**
Employed full-time (%)	42.6 (3.6)	45.1 (2.8)	2.59	**0.010**		
Married (%)	49.3 (2.7)	48.8 (5.0)	-0.45	0.653		
Gave birth in the last 12 months (%)	5.4 (0.7)	5.0 (0.7)	-1.95	0.051		
Private insurance (%)	51.9 (5.6)	60.2 (5.6)	4.05	**<0.001**		
Below poverty line (%)	15.5 (3.3)	12.1 (3.8)	-3.10	**0.002**		
Households with government aassistance						
SNAP (%)	12.6 (3.0)	10.6 (3.9)	-2.11	0.035		
SSI (%)	5.5 (1.6)	4.8 (1.3)	-1.81	0.070		
Other (%)	2.3 (1.3)	2.3 (0.8)	-0.21	0.837		
Owner occupied housing (%)	63.5 (6.1)	64.7 (9.4)	0.59	0.555		
Mean household income ($)	65,259 (12,743)	87,823 (25,787)	3.30	**<0.001**		
Population per square mile	176 (213)	1,284 (3,126)	2.62	**0.009**		
Rural classification	29 (94%)	18 (60%)	-2.76	**0.006**		
GME FTEs per active OB/GYN	2.5 (1.4)	3.2 (2.4)	1.36	0.174		

[1] Mean (SD); n (%)

694 Pregnancy Dysglycemia and Predicted Risk of Fatty Liver Disease 10-14 Years after Delivery

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OBJECTIVE: To determine whether pregnancy dysglycemia is associated with higher 6-year predicted risk of non-alcoholic fatty liver disease (NAFLD), as quantified by the Framingham Risk Calculator, 10-14 years after delivery.

STUDY DESIGN: A secondary analysis from the prospective Hyperglycemia and Adverse Pregnancy Outcome (HAPO) Follow-up Study. The exposures examined were maternal dysglycemia defined by summary z-score using fasting, 1-, and 2-hour values of a 75-gram oral glucose tolerance test (OGTT) at 24-32 weeks' gestation, and secondarily by diagnosis of GDM per IADPSG criteria The primary outcome was the predicted 6-year NAFLD risk using the Framingham Risk Calculator modelled either as a continuous measure or in tertiles from lowest (tertile 1, [T1]) to highest predicted risk (T3). Linear and modified Poisson regression models adjusted for baseline covariates at the time of the OGTT, including study field center, age, parity, and gestational age at OGTT.

RESULTS: Of 4,697 individuals in the analytic sample, the median age was 30.5 (IQR: 26.0,34.1) and the median BMI was 26.6 (IQR: 24.1,29.9) at baseline. A total of 14.3% (n=672) developed GDM. At 10-14 years after delivery (median 11.6, IQR: 10.8, 12.4), the median predicted 6-year risk of NAFLD was 13% (IQR: 3, 13). Individuals with a higher OGTT summary z-score were at higher predicted risk of NAFLD (adj. beta coefficient: 3.1 per 1 SD; 95% CI: 2.7, 3.6), as were those who were diagnosed with GDM (adj. beta coefficient: 4.3; 95% CI: 3.1, 5.4). Individuals with higher OGTT summary z-scores were also more likely to be in the highest tertile of NAFLD predicted risk (adj. RR: 1.2 per 1 SD; 95% CI: 1.0, 1.3), but those who had GDM were not more likely to be in the highest tertile of predicted risk.

CONCLUSION: Increasing dysglycemia in pregnancy is associated with a higher predicted risk of NAFLD 10-14 years after delivery. Postpartum prevention of cardiometabolic risk factors for NAFLD among individuals with pregnancy dysglycemia requires further investigation.

TABLE. Association between pregnancy dysglycemia and 6-year predicted risk of Fatty Liver Disease (NAFLD) 10-14 Years after Delivery

	Unadjusted and adjusted analysis	
NAFLD predicted risk by 1% increase (continuous)		
	Unadjusted Percent Risk (95% CI)	Adjusted Percent Risk (95% CI)
OGTT summary z-score	**3.33 (2.86, 3.79)**	**3.14 (2.67, 3.61)**
GDM	**5.07 (4.02, 6.13)**	**4.25 (3.08, 5.42)**
NAFLD predicted risk by tertiles (categorical)		
	Unadjusted Risk Ratio (95% CI)	Adjusted Risk Ratio (95% CI)
OGTT summary z-score		
Tertile 1 (lowest NAFLD risk)	1.00	1.00
Tertile 2	**1.14 (1.05, 1.24)**	1.07 (0.98, 1.16)
Tertile 3 (highest NAFLD risk)	**1.24 (1.11, 1.38)**	**1.15 (1.03, 1.27)**
GDM		
Tertile 1 (lowest NAFLD risk)	1.00	1.00
Tertile 2	1.04 (0.86, 1.26)	0.97 (0.78, 1.16)
Tertile 3 (highest NAFLD risk)	1.18 (0.93, 1.51)	1.05 (0.80, 1.30)

Poisson and linear regression with robust error variance was used.
Model adjusted for baseline HAPO site, age, parity, gestational age at OGTT.
N=4,697.
Bold findings are statistically significant associations (p<0.05).
Abbreviations: Fatty Liver Disease (NAFLD), gestational diabetes (GDM), and oral glucose tolerance test (OGTT).

695 Maternal height and risk of neonatal morbidity in pregnancies complicated by fetal growth restriction

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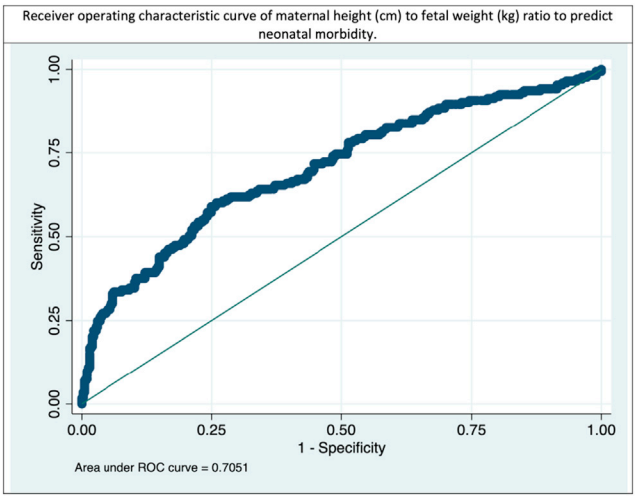
OBJECTIVE: To evaluate the role of maternal height in differentiating constitutionally small infants from pathologically growth-restricted infants who have not met their genetic growth potential by assessing risk of neonatal morbidity.

STUDY DESIGN: Pregnancies complicated by fetal growth restriction (FGR) were identified within a large, NIH-funded database of pregnancies resulting in delivery of live, singleton, non-anomalous infants at a single center 2002-2013. Neonatal morbidity was defined as one or more of the following: 5-minute Apgar < 7, arterial cord pH < 7.0, sepsis, neonatal death, or need for respiratory support, chest compressions, phototherapy, exchange transfusion, or hypoglycemia treatment. Maternal heights were compared between infants who experienced neonatal morbidity and those who did not, using raw height and the ratio of maternal height to infant birth weight.

RESULTS: Neonatal morbidity occurred in 174 of 575 eligible pregnancies (30%) and was associated with greater maternal height (160 vs 159cm, $p = 0.03$) and greater ratio of maternal height to infant birth weight (77 vs 66, $p < 0.01$) — an infant of a given birth weight was more likely to experience neonatal morbidity if delivered to a tall mother. Unadjusted odds ratio was 1.06 (95% confidence interval 1.04-1.08). Area under the received operating characteristic curve was 0.71 (Figure). This remained statistically significant after adjusting for umbilical artery Doppler findings, age, and insurance status (aOR 1.06, 95% CI 1.04-1.08, $p < 0.01$). There were no statistically significant differences in gestational age at delivery,

ultrasound estimated fetal weight centile, or rates of diabetes, hypertension, renal disease, cardiac disease, smoking, or illicit substance use.

CONCLUSION: Among pregnancies complicated by fetal growth restriction, neonatal morbidity occurred more frequently among infants delivered to taller mothers and in cases of a higher ratio of maternal height to infant birth weight. However, the effect size is modest and further study is needed.



696 Trends in Antepartum Pyelonephritis Hospitalizations and Risk for Associated Sepsis and Severe Maternal Morbidity

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OBJECTIVE: To characterize trends in antepartum pyelonephritis hospitalizations in the United States and related sepsis and non-transfusion severe maternal morbidity (ntSMM).

STUDY DESIGN: The 2010-2020 Nationwide Readmissions Database was used for this retrospective cohort study. Delivery hospitalizations in October and November of each study year of patients aged 15-44 were identified. Linked antepartum admissions with a pyelonephritis diagnosis in the 9 months preceding delivery hospitalization were identified. Temporal trends in antepartum pyelonephritis admissions were analyzed using joinpoint regression to estimate the average annual percent change (AAPC) with 95% CIs. Risk for sepsis and ntSMM (excluding sepsis) among antepartum hospitalizations based on CDC criteria was similarly trended.

RESULTS: Of 10,158,939 delivery hospitalizations, 49,147 (0.48%) had an antepartum admission with a pyelonephritis diagnosis in the 9 months preceding delivery. Of these antepartum admissions, 4470 (9.1%) had a sepsis diagnosis and 5093 (10.4%) had a severe morbidity diagnosis other than sepsis. The rate of antepartum pyelonephritis hospitalizations declined over the course of the study period from 56.4 per 10,000 in 2010 to 40.2 per 10,000 in 2020. This trend was significant (AAPC -2.9%, 95% CI -4.0%, -1.9%). However, the proportion of antepartum pyelonephritis hospitalizations with a sepsis diagnosis increased over the study period from 3.7% to 8.5% (AAPC 10.4%, 95% CI 8.3%, 13.4%). Risk for ntSMM also increased significantly over the study period from 5.0% to 20.0% (AAPC 13.8%, 95% CI 10.7, 17.9%).

CONCLUSION: Rate of antepartum pyelonephritis hospitalizations has declined over the decade, likely reflecting an increased adaptation of prenatal screening for urinary tract infections, treatment of asymptomatic bacteriuria, and use of antibacterial suppression. Although antepartum hospitalizations have declined, the proportions of hospitalizations for pyelonephritis with sepsis and severe morbidity have increased. Further investigation is indicated to reduce morbidity associated with antepartum pyelonephritis.

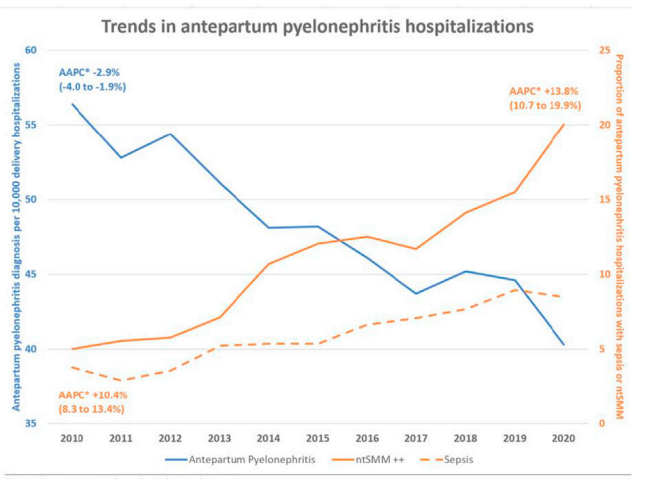

Figure: Antepartum pyelonephritis hospitalizations
* AAPC = average annual percent change
++ ntSMM = non-transfusion related severe maternal morbidity

697 Social determinants of health and hypertensive disorders of pregnancy in patients with heart disease

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OBJECTIVE: Hypertensive disorders of pregnancy (HDP) are a leading cause of maternal morbidity and mortality in the United States (US). We sought to examine the relationship between social determinants of health (SDOH) and HDP in patients with congenital or acquired maternal cardiac disease (MCD).

STUDY DESIGN: Retrospective cohort study of 156 MCD patients from 2015- 2019 at a single tertiary center. Patients with ≥1 visit in the cardio-obstetrics program and delivered at this center were included. The primary exposure was SDOH defined as a census tract level Area Deprivation Index (ADI) using a scale of 1 − 100 with social disadvantage worsening as numbers increase. ADI was divided into categories as follows: Low (0-33), Medium (34-66), High (67-100). The primary outcome was a composite of gestational hypertension, preeclampsia with and without severe features, HELLP syndrome, and eclampsia; secondarily, individual components of this composite were examined. Differences in outcomes were compared across ADI categories. A ROC curve and AUC examined the predictive ability of ADI.

RESULTS: On average, patients were obese (BMI 32.1±8.8), non-Hispanic White (55%), ≥ mWHO Class II (87%), publicly/self-

insured (61%), and 15% had chronic hypertension. Baseline characteristics across categories differed with respect to age, race, marital status, and payor. Delivery gestational age was no different (mean 37.0±3.3 weeks), and overall, 29.5% developed HDP. An increasing rate of HDP as ADI category increased was observed; however, the primary composite was not statistically significant between categories (Low: 18.8%, Medium: 22%, High: 34.3%; p= 0.21, Table 1). Additionally, no component of the HDP composite showed significance. ADI as a continuous variable was not predictive of HDP (AUC=0.5).

CONCLUSION: Nearly 1 in 3 patients in our cardio-obstetrics cohort developed HDP. HDP rates appeared to increase as SDOH worsened. While this was not significant, it should be further explored in a larger geographically and racially diverse sample.

Table. Baseline characteristics and incidence of hypertensive disorders of pregnancy in a cardio-obstetrics program by area deprivation index

Baseline Characteristics	Entire Cohort (n=156)	ADI 0 -- 33 (n=16)	ADI 34 – 66 (n=41)	ADI 67 – 100 (n=99)	p-value
Maternal age (years)	27.4 ± 6.4	31.8 ± 4.2	28.0 ± 6.6	26.4 ± 6.4	<0.01
Parity	1.0 ± 1.3	1.3 ± 2.1	0.9 ± 1.1	1.0 ± 1.2	0.58
BMI	32.1 ± 8.8	28.0 ± 6.3	31.9 ± 8.0	33.1 ± 9.3	0.10
Race					
Non-Hispanic Black	62 (39.7)	3 (18.8)	12 (29.3)	47 (47.5)	0.02
Non-Hispanic White	85 (54.5)	12 (75.0)	27 (65.9)	46 (46.5)	
Married / living with partner	65 (41.9)	12 (75.0)	23 (57.5)	30 (30.3)	<0.01
Insurance status					
Private	61 (39.1)	12 (75.0)	18 (43.9)	31 (31.3)	0.02
Public	88 (56.4)	4 (25.0)	22 (53.7)	62 (62.6)	
Self-pay	7 (4.5)	0 (0.0)	1 (2.4)	6 (6.1)	
NICU Admission	37 (23.9)	2 (12.5)	10 (25.0)	25 (25.3)	0.53
CHTN	23 (14.7)	3 (18.8)	3 (7.3)	17 (17.2)	0.29
mWHO Class					
I	12 (7.7)	1 (6.3)	1 (2.4)	10 (10.1)	0.29
II	36 (23.1)	4 (25.0)	13 (31.7)	19 (19.2)	0.27
II – III	35 (22.4)	3 (18.8)	7 (17.1)	25 (25.3)	0.53
III	37 (23.7)	3 (18.8)	13 (31.7)	21 (21.2)	0.37
IV	27 (17.3)	3 (18.8)	7 (17.1)	17 (17.2)	0.99
Outcomes: Incidence of HDP					
Any HDP*	46 (29.5)	3 (18.8)	9 (22.0)	34 (34.3)	0.21
GHTN	21 (13.5)	1 (6.3)	3 (7.3)	17 (17.2)	0.20
Preeclampsia w/o SF	6 (3.9)	1 (6.3)	0 (0.0)	5 (5.1)	0.33
Preeclampsia w/ SF	19 (12.2)	1 (6.3)	6 (14.6)	12 (12.1)	0.75
HDP antenatal diagnosis	42 (91.3)	2 (66.7)	9 (100.0)	31 (91.2)	0.26
HDP PP diagnosis	4 (8.7)	1 (33.3)	0 (0.0)	3 (8.8)	0.26

ADI = Area Deprivation Index, a measure of social determinants of health, whereby 1 indicates that an individual lives in a resource rich community and 100 indicates that an individual lives in a resource poor community; BMI = body mass index, CHTN = chronic hypertension, GA = gestational age, HDP = hypertensive disorders of pregnancy, NICU = neonatal intensive care unit, mWHO.= modified WHO score, PP = postpartum, SF = severe features. *There were no cases of HELLP syndrome or eclampsia

698 Maternal Epigenetic Variation among women Experiencing Preterm Birth in Hawai'i

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OBJECTIVE: Geographic level of deprivation may contribute to preterm birth risk. This study sought to identify epigenetic changes via methylation differences in women with high social vulnerability experiencing preterm birth vs. women who had term births.

STUDY DESIGN: Whole genomic DNA was isolated from peripheral blood from 160 participants of the Hawaii Reproductive Biorepository (biobanked from 2006-2013). Subjects who self-identified as Filipino and Native Hawaiian were selected due to overrepresentation of preterm birth in these ethnic subgroups. DNA was isolated and subjected to Illumina Epic Methylation Array. Data was processed according to EWAStools R package. Genome wide methylation differences (Limma) and regional differential methylation (DMRcate) were assessed among women who did and did not deliver preterm, and as well as according to level of high or low social vulnerability. EWAS model included Maternal Age, Ethnicity, Obesity, Cell Type Proportion and level of Social Vulnerability. DNA methylation age was calculated using the Horvath method, and compared to Age Acceleration among term vs. preterm births and those of high and low social vulnerability.

RESULTS: 149 samples (72 preterm, 71 term) passed quality control. There were no significant global methylation differences in the EWAS model between women who delivered term vs. preterm, nor those who lived in areas of high vs. low social vulnerability. Differentially methylation regional analysis demonstrated 512 areas of differential methylation among term vs. PTB participants; Overlapping genes in the top ten regions are listed in Table 1. Age acceleration residuals were greater among those who delivered preterm vs. term (p = 0.01762) but not among varying levels of social vulnerability (p = 0.081).

CONCLUSION: This pilot study identified areas of differential methylation in women who experienced PTB. A larger, validation cohort is needed to replicate the findings, as well as look for mechanistic causes for the interaction of these regions and PTB risk.

Chromosome Position	start	end	Smoothed FDR	HMFDR	Overlapping Genes
chr2	233765616	233766658	5.63E-31	7.60E-15	NGEF
chr14	65189412	65190321	1.93E-22	2.26E-14	PLEKHG3
chr9	139920520	139921971	2.12E-21	1.12E-14	C9orf139, ABCA2
chr1	121137854	121138479	5.39E-20	1.43E-13	RP11-343N15.1
chr11	2019624	2020496	5.97E-18	6.74E-14	H19
chr17	45266302	45266950	1.72E-17	8.42E-13	CDC27
chr7	73081712	73081977	7.01E-15	1.60E-10	NA
chr19	58986999	58987653	6.53E-14	1.84E-09	ZNF446, CTD-2619J13.23
chr4	39529294	39530224	3.24E-13	4.09E-10	UGDH-AS1, UGDH
chr1	155107648	155108759	3.40E-13	1.74E-08	SLC50A1

Table 1: Top 10 differentially methylated regions in women experiencing preterm birth vs. term births. FDR = false discovery rate, HMFDR = harmonic mean of false discovery rate.

699 Inpatient versus outpatient/home initiation of medications for opioid use disorder (MOUD) in pregnancy

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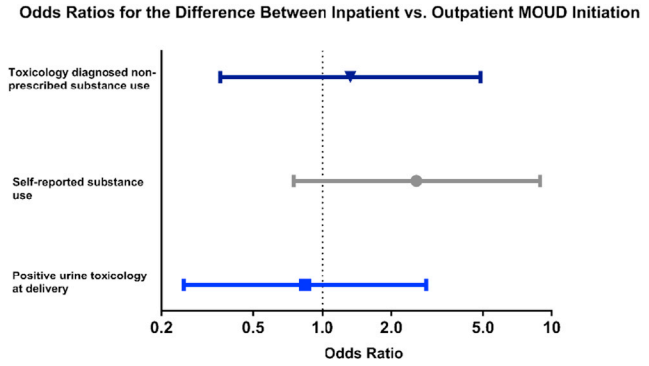
OBJECTIVE: To evaluate whether the location, inpatient versus outpatient/home, of MOUD initiation in pregnancy is associated with differences in non-prescribed substance use and neonatal outcomes.

STUDY DESIGN: This was an IRB-approved retrospective chart review conducted at a single academic center. We included patients with a diagnosis of opioid use disorder, who initiated MOUD in pregnancy, and received care in our comprehensive substance use in pregnancy clinic.

RESULTS: A total of 163 patients were identified as being treated with MOUD, 45 of whom initiated or re-initiated in pregnancy. Of the 45, 28 patients were initiated MOUD inpatient and 17 outpatient. There was no difference between groups for maternal age, self-reported race, ethnicity, parity and gestational age at delivery. Patients in the inpatient group were more likely to use methadone (inpatient 75%, outpatient 35%, p=0.008) and the average gestational age at initiation of MOUD between groups was different (inpatient 24.9, outpatient 18.5 weeks, p=0.023). There was no significant difference in the rate of self-reported substance use between group (inpatient 36%, outpatient 59%, p=0.216). The rate of urine toxicology diagnosed non-prescribed substance use was no different between groups (inpatient 64%, outpatient 71%, p=0.664), nor was there a difference in the number of weeks between MOUD initiation and

the first positive urine toxicology (inpatient 4.6 weeks, outpatient 4.3 weeks p=0.906). Finally, rates of positive urine toxicology at delivery were also similar (inpatient 57%, outpatient 53%, p=0.999). When examining neonatal outcomes there were no differences in birthweight percentiles or rates of diagnosis of neonatal abstinence syndrome.

CONCLUSION: Our data suggest that outpatient/home initiation of MOUD is not associated with significantly different rates non-prescribed substance or adverse neonatal outcomes. In an appropriately counseled patient with comprehensive substance use care in pregnancy outpatient/home MOUD initiation can be considered as an alternative to traditional inpatient initiation.



700 Timing of medication for opioid use disorder (MOUD) initiation in pregnancy and outcomes

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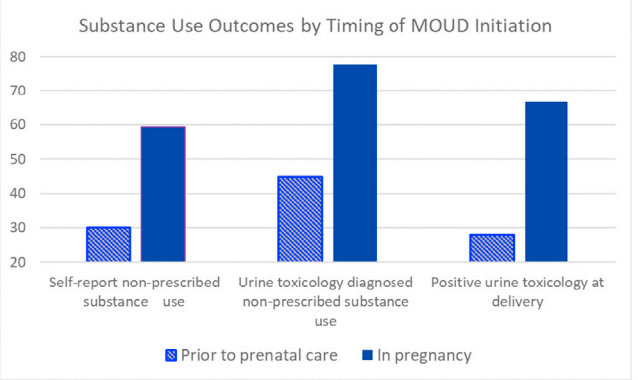
OBJECTIVE: Observe patterns of non-prescribed substance use in patients who start MOUD prior to prenatal care compared to those who begin treatment in pregnancy.

STUDY DESIGN: This is an IRB-approved retrospective cohort study conducted at a single academic center. We included patients taking MOUD in pregnancy and receiving care in our comprehensive substance-use in pregnancy clinic.

RESULTS: A total of 163 patients met inclusion criteria. Of these, 136 were identified as starting MOUD prior to their first prenatal visit in our clinic, and 27 as having started after initiating prenatal care. Patients starting MOUD prior to their first prenatal visit were older (31.6 vs 29.5 years) and had higher parity (81% vs 44% multiparous) than patients starting MOUD during pregnancy. There was no difference in the type of MOUD used. The rate of self-reported non-prescribed substance use was different between groups (prior 30.1%, during 59.3%, p=0.004). Rates of urine toxicology diagnosed non-prescribed substance use were also different between groups (prior 44.9%, during 77.8%, p=0.002). Average gestational ages at first and last non-prescribed substance use were similar (first: prior 26.4 weeks, during 26.5 weeks, p=0.976; last: 33.9 weeks, during 32.0 weeks, p=0.422). Finally, rates of positive urine toxicology at delivery were higher in the during pregnancy group (prior 27.9%, during 66.7%, p< 0.001). When examining neonatal outcomes there were no differences in birthweight percentiles or rates of diagnosis of neonatal abstinence syndrome.

CONCLUSION: Patients starting MOUD prior to their first prenatal visit had lower rates of non-prescribed substance use by self-report and urine toxicology antenatally, and by urine toxicology during their delivery admission. These findings highlight the importance of community MOUD resources for all females of childbearing age, especially for those considering pregnancy. The average gestational ages at first and last positive urine toxicology were similar between groups, suggesting times that patients may be at higher risk of use and benefit from additional support.



701 Hypertensive Disorders of Pregnancy and Childhood Growth

Cynthia Gyamfi-Bannerman

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OBJECTIVE: The fetal in utero environment is known to affect health outcomes in childhood and beyond. Hypertensive disorders of pregnancy (HDP) are associated with uteroplacental ischemia, small for gestational age (SGA) newborns, and accelerated childhood growth. We evaluated whether HDP, in women at risk for late preterm delivery, were associated with altered growth in childhood.

STUDY DESIGN: Secondary analysis of a prospective, follow-up study of children of mothers enrolled in a trial of late preterm steroids. To be eligible, children had to be $\geq$ 6 years old and have complete anthropometric measures. Participants with gestational hypertension, preeclampsia with or without severe features, HELLP or eclampsia at any time during pregnancy were considered to have a hypertensive disorder of pregnancy. Childhood height and weight were assessed at a study visit and BMI calculated. Z-scores were generated using the Centers for Disease Control and Prevention Growth Charts. Height, weight, and BMI z-score, along with measurements that were $< 5^{th}$ percentile or $\geq 95^{th}$ percentile, were compared in children of mothers with or without a hypertensive disorder of pregnancy. Univariable and multivariable analyses were performed, the latter adjusting for pre-specified characteristics (Table).

RESULTS: Of 2,422 eligible children, 1,026 were enrolled in the follow-up study and 1,020 were included in this analysis, of whom 353 (34.6%) had mothers with a HDP. Children in the hypertensive group were more likely to have been SGA at birth and their mothers were heavier and more likely to identify as White or Black race. There were no differences in the adjusted z-scores or the proportion $< 5^{th}$ percentile or $\geq 95^{th}$ percentile for height, weight or BMI at the time of follow-up for children from pregnancies affected by hypertensive disorders (Table).

CONCLUSION: Hypertensive disorders of pregnancy in women at risk for late preterm delivery were associated with small for gestational age infants, but not childhood growth at 6 years of age.

Table 1. Hypertensive Disorders of Pregnancy and Childhood Anthropometrics

Anthropometrics	Hypertensive Disorder of Pregnancy		Unadjusted	Adjusted*
	Yes (N=353)	No (N=667)		
Weight-for-age z-score	0.6 +/- 1.3	0.4 +/- 1.2	0.19 (0.03,0.34)	-0.07 (-0.22,0.09)
< 5th percentile	11 (3.1%)	18 (2.7%)	1.15 (0.55,2.42)	1.41 (0.65,3.02)
≥ 95th percentile	85 (24.1%)	113 (16.9%)	1.42 (1.11,1.83)	1.13 (0.87,1.46)
Height-for-age z-score	0.4 +/- 1.2	0.2 +/- 1.0	0.15 (0.01,0.29)	0.02 (-0.11,0.16)
< 5th percentile	10 (2.8%)	18 (2.7%)	1.05 (0.49,2.25)	0.97 (0.44,2.14)
≥ 95th percentile	46 (13.0%)	56 (8.4%)	1.55 (1.07,2.24)	1.25 (0.85,1.85)
BMI-for-age z-score	0.5 +/- 1.6	0.4 +/- 1.4	0.16 (-0.02,0.35)	-0.09 (-0.28,0.09)
< 5th percentile	17 (4.8%)	34 (5.1%)	0.94 (0.54,1.67)	1.15 (0.65,2.05)
≥ 95th percentile	85 (24.1%)	114 (17.1%)	1.41 (1.10,1.81)	1.11 (0.86,1.44)

Data are n (%), relative risk (95% CI), mean +/- standard deviation, or mean difference (95% CI).
*Adjusted by pre-specified characteristics including maternal weight, maternal height, maternal age, gestational age at delivery, child age, gender, private insurance, treatment assignment, and center.

702 Pain Management After Vaginal Birth: A Systematic Review To Support Clinical Practice Guideline Development

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OBJECTIVE: To assess the evidence for key aspects of pain management following vaginal birth, higher-order perineal trauma, and peripartum tubal ligation to inform new clinical practice guidelines.

STUDY DESIGN: We conducted a systematic review and narrative synthesis of studies addressing post-vaginal birth pain management (opioid medications, non-opioid medications, and non-pharmacologic methods). Studies assessed opioid use, analgesia effects, patient-centered outcomes, and disparities in the general population, patients with opioid use disorder (OUD), chronic pain, and psychiatric conditions. Ovid MEDLINE, Elsevier's Scopus, Elsevier's Embase, Google Scholar, PubMed, and Web of Science were searched to identify relevant articles. Articles were screened and abstracted by two researchers. Quality was assessed using the RAND/UCLA Appropriateness Methodology approach.

RESULTS: Of 2,255 studies screened, 21 were included: 1 high-quality (clinical practice guideline); 7 moderate-quality (RCTs); and 13 low-quality (non-RCTs, observational studies). Two reported that multimodal, non-opioid interventions (e.g. scheduled ibuprofen and acetaminophen) reduced opioid use without increasing pain after vaginal birth. Inpatient strategies and nonpharmacologic studies were limited with mixed results. Three discharge prescribing studies after vaginal birth showed variability and racial/ethnic disparities. Receiving discharge opioid prescriptions was linked to persistent use and opioid-related adverse events. Higher-order perineal trauma and tubal ligation were associated with increased opioid use after discharge. Patients with chronic pain and psychiatric conditions had increased opioid exposure and persistent use.

CONCLUSION: Multimodal oral opioid-sparing strategies provide adequate pain control while limiting opioid use after vaginal birth. Nonpharmacologic methods may provide low-risk enhancement in pain management. There are significant evidence gaps for postpartum pain management in patients with OUD, chronic pain, and psychiatric conditions.

703 UCSD Health CardioObstetrics Initiative: A Multidisciplinary Team to Improve Outcomes in the Pregnant Cardiac Patient

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OBJECTIVE: Cardiovascular disease is the leading cause of maternal death in the United States. Despite professional obstetric and cardiology societies advocating for multidisciplinary care of cardiac patients in pregnancy, this care is not often standardized even at large academic centers. In 2020, we established a monthly conference to review prenatal course and develop safe delivery plans for pregnant patients with cardiac disorders.

STUDY DESIGN: This is a description of our multidisciplinary program and summary of patients who have been enrolled in our CardioObstetrics Care Conference since 2020. Every patient discussed in our conference is assigned a class corresponding to the Modified World Health Organization (WHO) Classification of Maternal Cardiovascular Risk. These scores range from 1 to 5 with 1 denoting a low-risk lesion unlikely to cause problems in pregnancy (eg successfully repaired simple defect) and 5 corresponding to a high risk of mortality with termination recommended (eg pulmonary arterial hypertension). The data presented summarizes the demographics and birth outcomes of our cohort stratified by WHO Risk Class.

RESULTS: Since starting our program, we have enrolled 121 patients with the majority falling into WHO Risk Classes 1 to 3. Most of our patient cohort self-identified as White, around half as Hispanic, and roughly even numbers were covered by private and public insurance. While increasing BMI was statistically related with worsening pathology, other demographic characteristics and mode of delivery did not vary significantly by WHO Risk Class (Table 1).

CONCLUSION: In the 3 years since its inception, our CardioObstetrics Care Conference has facilitated care for a diverse group of 121 patients with cardiac disease in pregnancy. In our cohort, increasing BMI is statistically related to higher WHO Risk Class while mode of delivery appears unrelated.

	WHO Class 1 (n=47)	WHO Class 2 (n=34)	WHO Class 2-3 (n=15)	WHO Class 4 (n=1)	WHO Class 5 (n=5)	P Value*
Average Age, mean +/- SD	29.9 +/- 5.9	30.4 +/- 6.0	32.8 +/- 5.4	40 (NA)	31 +/- 3.7	0.351
Race n (%)						
White	38 (80.9)	32 (74.4)	9 (60.0)	1 (100.0)	3 (60.0)	0.339
Black/African American	1 (2.1)	2 (4.7)	3 (20.0)	0	0	
Asian	2 (4.3)	3 (7.0)	1 (6.7)	0	0	
Other Race or Mixed Race	6 (12.8)	4 (9.3)	1 (6.7)	0	2 (40.0)	
Unknown	0	2 (4.7)	1 (6.7)	0	0	
Ethnicity n (%)						
Hispanic	21 (44.7)	14 (32.6)	4 (26.7)	1 (100)	0	0.074
Non-Hispanic	26 (55.3)	29 (67.4)	11 (73.3)	0	1 (20.0)	
Insurance Payer n (%)						
Public/Medi-Cal	18 (38.3)	18 (41.9)	9 (60.0)	1 (100.0)	4 (80.0)	0.498
Private	27 (57.4)	25 (58.1)	6 (40.0)	0	1 (20.0)	
Unknown/Other	2 (4.3)	0	0	0	0	
Average BMI, mean +/- SD	25.2 +/- 5.6)	25.9 +/- 6.6	32.5 +/- 10.5	32.7 (NA)	30.2 +/- 11.7	0.021
Mode of Delivery n (%)						
Termination (<20 weeks)	0	0	1 (6.7)	0	1 (20.0)	0.098
Spontaneous abortion (<20 weeks)	0 1 (2.3)	1 (2.3)	1 (6.7)	0	0	
Spontaneous vaginal delivery	28 (59.6)	30 (69.8)	6 (40.0)	0	0	
Operative vaginal delivery	1 (2.1)	0	0	0	0	
Cesarean section	18 (38.3)	12 (27.9)	7 (46.7)	1 (100.0)	4 (80.0)	

Table 1: Demographic characteristics and mode of delivery for CardioObstetrics patients by WHO Risk Class (would put the title at the top of the table if possible).
*Categorical variables were analyzed using Chi-square testing and categorical variables with ANOVA.

704 Operative Vaginal Delivery Rates over two-decades: Instrument Choice and Neonatal Morbidity-Implications for Resident Training

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OBJECTIVE: Operative vaginal delivery (OVD) rates have shown a downward trend in contemporary obstetrics, paralleling the decline in the trainee experience of forceps in some hospitals. We conducted a 20-year single-center study to explore the trajectory of OVD rates as well as assessing the trend of instrument choice and associated neonatal morbidity and mortality rates.

STUDY DESIGN: This was a retrospective analysis of prospectively collected data at a single tertiary referral center from 2002-2021. All cases of OVD were included. The choice of instrument (forceps or vacuum), rate of hypoxic-ischemic-encephalopathy (HIE) and of neonatal death (NND) after OVD were also recorded. Linear regression analysis was used to determine trends.

RESULTS: During the study period, there was a total of 162,460 deliveries. The rate of OVD accounted for 17.4% (n=21,042) of all deliveries or 25.0% of all vaginal deliveries. The overall rate of OVD use showed a non-significant decrease (p=0.33, R^2=0.0528, slope=-0.2299) during the 20-year study period. Forceps were used in 4.4% of all deliveries (n=7,197), while vacuum was used in 13.0% (n=21,042). In contrast to other center's experience, the use of forceps significantly increased during the study period (p=0.006, R2=0.3491, slope=0.5908). There were no statistically significant difference in NND (p=0.067) or HIE (p=0.370) associated with OVD use.

CONCLUSION: Our analysis of OVD use at a single tertiary referral center revealed noteworthy trends. While the overall rate of OVD use showed a non-significant decline, the use of forceps increased significantly. The cause of this increase is likely to be multi-factorial and may reflect institutional commitment on the part of senior clinicians to optimizing forceps training for residents. Despite these shifts in delivery methods, there was no statistically significant difference in neonatal morbidity or mortality associated with OVD use. These findings should be useful for encouraging obstetric residency training programs to either commit to, or maintain, resident exposure to forceps as a useful obstetric skillset.

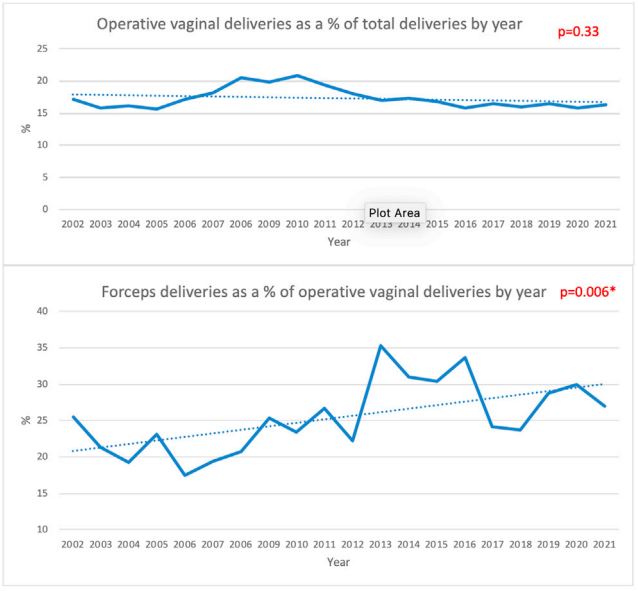

Fig1. % of forceps deliveries and % operative vaginal deliveries by year

705 Gestational diabetic CD4+ T-cells cause impaired glucose utilization, placental and pancreatic dysfunction, and hypertension

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OBJECTIVE: Gestational diabetes mellitus (GDM) refers to glucose intolerance, insulin sensitivity and beta islet cell dysfunction during pregnancy. GDM pathogenesis is associated with hypertension, impaired placental and renal function, oxidative stress and increased circulating CD4+ T cells. Importantly, there are limited animal models available to explore GDM pathology and treatment. This study sought to determine a role for GDM patient placental CD4+ T cells to parallel the manifestations of GDM phenotype in pregnant athymic nude recipient rats.

STUDY DESIGN: GDM placental CD4+ T cells (GDM-CD4+ T cells) were magnetically isolated upon delivery and injected into pregnant nude athymic rats on gestational day (GD) 12. Mean arterial pressure (MAP) and markers of renal injury, proteinuria, kidney injury molecule-1 (KIM-1), and neutrophil gelatinase-associated lipocalin (NGAL) and placental mtROS were assessed on GD19. Glucose and Glucose tolerance tests (GTT) were performed on GD 19. Renal and pancreatic tissues were stained for Periodic acid Schiff (PAS) and

hematoxylin and eosin (H&E). A student's t-test was used for statistical analysis.

RESULTS: On GD19, MAP was higher in GDM-CD4+ T cell rats (121±3, n=8, p< 0.05) compared to pregnant athymic nude control rats (105±3 mmHg, n=8). Blood glucose was 201±46 mg/dl, (p< 0.05) in GDM CD4+T cell rats compared pregnant controls (82±9 mg/dl). GTT was impaired in GDM CD4+ T rats. Proteinuria and markers of renal injury were elevated in GDM-CD4+ T cell rats (5±0.8 ml/day (p< 0.05); 47±10 pg/mg, (p< 0.05); 28±4 pg/mg, (p< 0.05)) compared to controls (2±0.3 ml/day; 22±3 pg/mg; 12±1 pg/mg). Histological analysis showed increased glomerular damage and decreased beta islet number in GDM-CD4+T cell rats compared to controls. Placental mt ROS increased in GDM CD4+ T cells rats (291±47 FLU, p< 0.05) compared to controls (100±18 FLU).

CONCLUSION: Our findings indicate that GDM CD4+ T cells cause a diabetic phenotype during pregnancy suggesting a new model to investigate mechanisms and therapies for diabetes during pregnancy.

706 Insomnia in pregnancy: are hospitalized inpatients sleeping less than outpatients?

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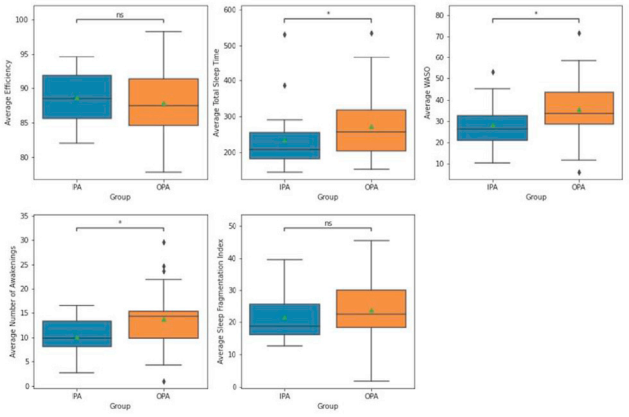
OBJECTIVE: Optimizing physical and mental health during antepartum hospitalization is critical, and understanding sleep quality is a key component of this. Since little is known about how antepartum hospitalization affects sleep, we compared sleep between pregnant inpatients and outpatients.

STUDY DESIGN: This was a prospective cohort between 2021-2022 including pregnant people aged 18-55 years with singleton gestations ≥16 weeks. Outpatients from obstetrics clinics were gestational age matched to antepartum inpatients. Participants responded to the Insomnia Severity Index (ISI) and wore Actigraph accelerometer watches up to 7 days to evaluate sleep. The primary outcome was mean total sleep duration per 24 hours. Secondary outcomes were sleep efficiency (time asleep/time in bed as a percentage), ISI score, clinical insomnia based on ISI score >15, short sleep duration (< 300 minutes per 24 hours), Wakefulness After Sleep Onset (WASO), number of awakenings, and sleep fragmentation index. Sleep parameters were compared using Wilcoxon rank sum tests and multivariable generalized estimating equations adjusting for body-mass index and use of sleep aid medication.

RESULTS: Data from 59 participants were analyzed. Inpatients were more likely to use sleep aids (39.9% versus 12.5%, p=0.03). Inpatients had significantly lower total sleep duration than outpatients (264.1 ± 97.5 minutes versus 309.4 ± 87.3 minutes, beta -62.8 [95% Confidence Interval -109.2 to -16.4], p=0.008). There were no differences in sleep efficiency, ISI score, clinical insomnia, or short sleep duration (Table 1). Number of awakenings and WASO were reduced among inpatients (p=0.01 and p=0.03, Figure 1).

CONCLUSION: Hospitalized pregnant inpatients slept 1 hour less than outpatients per day despite increased use of sleep aids, which is enough to have a clinically significant effect on health. Notably, average sleep time for inpatients was < 5 hours per day - well below the recommended 7 hours in pregnancy. Initiatives to improve sleep during pregnancy are warranted, particularly for antepartum inpatients.

Figure 1. Summary of sleep parameters compared between inpatients (IPA) and outpatients (OPA), N=59.



707 Patient factors associated with severe maternal morbidity by urban-rural designation in Georgia, United States

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OBJECTIVE: Georgia has among the highest rates of severe maternal morbidity (SMM) in the nation. Location of residence has been identified as a contributing factor for SMM, with those in metropolitan and rural Georgia at highest risk. To determine whether SMM risk factors differed by location of residence, we evaluated the association of maternal and pregnancy characteristics with SMM stratified by categories of urban-rural designation.

STUDY DESIGN: This population cohort study included all delivery hospitalizations in Georgia during 2016-2020 with birth record linked to hospital discharge data (n = 529,357). Multivariable robust Poisson regression analysis was used to estimate adjusted risk ratios (aRR) and 95% confidence intervals (CI) for the association of maternal and pregnancy characteristics with SMM at delivery admission or through 42 days postpartum, stratified by location of residence (categorized using the National Center for Health Statistics Urban-Rural Classification Scheme for Counties). SMM was identified using the 21 indicators defined by the Centers for Disease Control.

RESULTS: Across all residency categories, cesarean delivery was the factor most strongly associated with SMM (aRR 3.52, 95% CI 3.04-4.06 in small metro). Association of comorbidities varied by residency location. In metropolitan Georgia, severe mental illness (aRR 1.56, 95% CI 1.43-1.70), hypertension (aRR 1.40, 95% CI 1.28-1.53), and substance use (aRR 1.26, 95% CI 1.09-1.46) were the comorbidities most strongly associated. In rural Georgia, severe mental illness (aRR 1.40; 95% CI 1.05-1.86) and hypertension (aRR 1.39, 95% CI 1.08-1.80) were most strongly associated. The strength of association between hypertensive disorders of pregnancy and SMM increased as rurality increased (aRR 1.08, 95% CI 1.96-2.21 in metropolitan vs. aRR 2.53, 95% CI 2.01-2.13 in rural).

CONCLUSION: These findings demonstrate variation in factors associated with SMM by location of residence in Georgia and underscore the need for tailored prevention efforts within each location of residence.

Table 1. Multivariable robust Poisson analysis of SMM at delivery admission or through 42 days postpartum for maternal and pregnancy characteristics by location of residence.

Characteristic	Adjusted Relative Risk of Severe Maternal Morbidity				
	Large Metro	Medium Metro	Small Metro	Micropolitan	Rural
Mode of Delivery					
Cesarean	2.78 (2.62-2.95)	3.21 (2.63-3.93)	3.52 (3.05-4.06)	3.03 (2.58-3.56)	2.92 (2.43-3.51)
Comorbidities					
Diabetes Mellitus	1.11 (0.96-1.29)	1.40 (0.93-2.11)	1.53 (1.19-1.98)	0.85 (0.59-1.24)	1.42 (0.97-2.06)
Hypertension	1.40 (1.28-1.53)	1.12 (0.86-1.48)	1.54 (1.30-1.83)	1.29 (1.04-1.61)	1.39 (1.08-1.80)
Substance Use	1.26 (1.09-1.46)	1.32 (0.88-1.98)	1.41 (1.12-1.78)	1.14 (0.86-1.50)	1.19 (0.83-1.69)
Severe Mental Illness	1.56 (1.43-1.70)	1.65 (1.27-2.16)	1.27 (1.02-1.58)	1.05 (0.81-1.37)	1.40 (1.05-1.86)
Pregnancy Complications					
Hypertensive Disorder of Pregnancy	1.08 (1.96-2.21)	1.88 (1.54-2.30)	2.36 (2.07-2.69)	2.37 (2.05-2.75)	2.53 (2.13-3.01)
Preterm Delivery	1.84 (1.73-1.97)	3.01 (2.45-3.69)	1.92 (1.67-2.21)	2.32 (1.99-2.70)	1.77 (1.46-2.15)

Data are adjusted relative risk (95% confidence interval).
Adjusted models included age, race/ethnicity, level of education, marital status, insurance status, prenatal care utilization, parity, plurality, mode of delivery, comorbidities, and pregnancy complications.

708 Trends in placenta previa by age, race/ethnicity, and pre-pregnancy body mass index

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OBJECTIVE: To characterize recent trends in placenta previa (PP) by maternal age, race/ethnicity, and pre-pregnancy body mass index (BMI).

STUDY DESIGN: Using Kaiser Permanente Southern California's electronic health records, we examined temporal trends in PP from 2009-10 through 2021-22 among singleton births at ≥20 weeks of gestation (N=507,494). Diagnosis of PP was based on the International Classification of Diseases Ninth/Tenth codes from routine clinical records of the electronic health records. We calculated the proportion of PP in the earliest (2009) versus most recent (2022) periods stratified by maternal age, race/ethnicity, and pre-pregnancy BMI. Poisson regression analysis was used to evaluate the adjusted p-values for temporal changes. Adjustments were made for maternal characteristics and behavioral factors.

RESULTS: The prevalence of PP was 10 per 1000 singleton pregnancies. Prevalence decreased from 11/1000 in 2009-10 to 8/1000 in 2021-22 (a relative decrease of 27.3%, $p < 0.001$). From 2009-10 to 2021-22, the PP rate decreased among women aged 30-34 years from 13/1000 to 8/1000, a relative decrease of 38.5% (adjusted p-value < 0.0001), and among women aged ≥35 years from 19/1000 to 14/1000, 26.3% decrease (adjusted p-value < 0.0001). Women aged < 30 years had the largest relative decrease (from 6/1000 to 3/1000; 50.0% [adjusted p-value < 0.0001]). Decreased rates of PP were observed for all race/ethnicity and BMI categories, but was largest for morbidly obese patients (41.7% relative reduction, adjusted p-value < 0.0001).

CONCLUSION: The prevalence of PP has decreased over the past decade. PP prevalence is disproportionately higher among racial/ethnic minorities and obese women. The drivers of these disparities are unclear and need to be investigated further. Although racial/ethnic disparities in rates of PP are persistent, they could be narrowing.

709 Impact of abortion bans on pregnancies with severe life-limiting fetal anomalies: a cost-effective analysis

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OBJECTIVE: Since the US Supreme Court decision in *Dobbs v. Jackson Women's Health* to overturn a constitutional right to abortion in June 2022, 24 states have enacted laws prohibiting termination of pregnancy before most fetal anomalies are diagnosed. No exceptions are made for trisomy 13, trisomy 18, or anencephaly, which are severe life-limiting conditions with significant morbidity for survivors and their mothers. In this cost-effectiveness model, we estimated the difference in cost and maternal health outcomes associated with a termination ban for severe life-limiting fetal anomalies.

STUDY DESIGN: A decision-analytic model was built using TreeAge software to compare a total ban on termination in a theoretical cohort of 1038 women constructed from the annual incidence of trisomy 13, trisomy 18, or anencephaly (5.76/10000) and birth data from the 24 states with bans. All of these women were assumed to desire termination. Probabilities, utilities and costs were derived from the literature. National data was used to estimate the number of women who would travel out of state to obtain an abortion (27.2%). The threshold for cost-effectiveness was set at $100,000 per quality adjusted life year (QALY). Clinical outcomes included maternal death, stillbirth, birth of neonates with severe disease, severe preeclampsia, blood transfusion for hemorrhage, and infections.

RESULTS: Among the cohort, there would be 734 more live births affected by a severe life-limiting anomaly with an abortion ban in place. A policy restricting termination is associated with higher costs ($76,257,272) and decreased quality of life (4065 QALYs) annually. Two hundred and eighty-two women would travel out of state to obtain abortions.

CONCLUSION: Termination bans without exceptions for severe life-limiting fetal anomalies significantly restrict access to care for affected women and are associated with increased costs and worse health outcomes. Policies addressing abortion access should consider these health and cost impacts for both individuals and society.

Table 1.
Additional cases of each outcome in a theoretical cohort of 1038 women with trisomy 13, trisomy 18, or anencephalic pregnancies in states with abortion bans.

n=1038	Abortion Ban	No Abortion Ban	Difference
Maternal Mortality	0	0	0
Stillbirth	20	0	20
Birth of Neonate with Severe Disorder	734	0	734
Severe Preeclampsia	3	0	3
Hemorrhage Requiring Transfusion	5	3	2
Postpartum/Postoperative Infections	14	11	3
Abortions	282	1038	756
Cost	$84,431,573	$8,174,301	$76,257,272
Effectiveness (QALY)	22,608	26,673	4065

710 Variability in Epithelial DNA Yield Isolated from Cervical Mucosa During Pregnancy

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OBJECTIVE: There are ongoing challenges to studying pathophysiology of perinatal outcomes proximal to cervical architecture. However, epithelial DNA obtained from pregnant cervical mucosa offers a potentially noninvasive way of assessing gestational cervical changes at a genomic level. This study aims to evaluate the feasibility of isolating adequate cervical DNA during pregnancy and characterize the variability of DNA yields during routine clinical speculum exams at various gestational ages.

STUDY DESIGN: This is a prospective observational study, with patients recruited from an urban, safety-net hospital. During the prenatal visit, an additional cervical sample was obtained from routine speculum exams with a cytobrush; collected swabs were stored in a DNA transport medium. DNA was isolated using the DNeasy Blood & Tissue Kit (Qiagen) and banked in a -80 degree Celsius freezer. Demographics of participating subjects were collected. Descriptive statistics and multiple regression were utilized for data analyses.

RESULTS: Forty-three subjects were enrolled in the study, of which 40 had a cervical sample collected at the time of their initial obstetric visit. Gestational age ranged from 7 to 35 weeks with a median of 11.7 (IQR 9.8-16.3). Cervical epithelial DNA was successfully isolated in all viable samples, though the total yield varied widely across all gestational ages (Figure 1), with a median of 11ug (IQR 2,850-23,150). Gestational age, body mass index, and maternal age did not significantly predict the quantity of cervical DNA isolated (R^2=0.070, p=0.46).

CONCLUSION: Given that there was no correlation between multiple population characteristics and amount of DNA obtained, provider technique likely plays a role. However, this study did demonstrate that adequate cervical DNA can be easily obtained across a range of gestational ages and as part of a routine screening procedure in pregnancy (Pap smear) for downstream genomic analysis requiring typically only 100ng of DNA. Therefore, there could be utility in using this approach for future screening tools when identifying markers for adverse pregnancy outcomes.

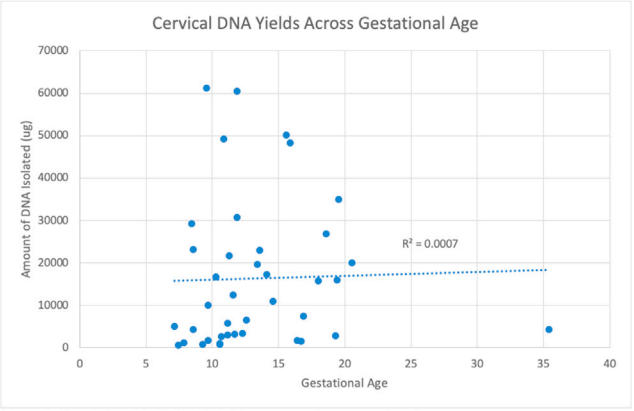

Figure 1. Cervical epithelial DNA yield across various gestational ages

711 Maternal endometriosis: an independent risk factor for long-term infectious morbidity of the offspring

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OBJECTIVE: Endometriosis, a debilitating disease characterized by chronic inflammation, is associated with adverse pregnancy outcomes. However, the long-term health implications for offspring born to mothers with endometriosis remain inadequately explored. The maternal immune response in pregnancy is crucial for fetal development and growth, and the pro-inflammatory state of endometriosis may alter fetal immunologic programming. In this study, we aimed to assess an association between fetal exposure to maternal endometriosis and long-term risk of infectious morbidity for the offspring.

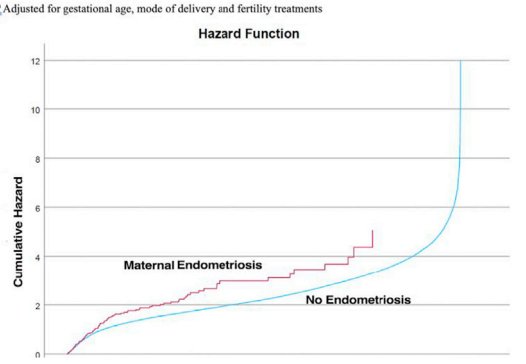
STUDY DESIGN: We conducted a retrospective population-based cohort study, comparing offspring of mothers diagnosed with endometriosis with those of mothers without the diagnosis. We followed the offspring longitudinally, tracking the time to their first diagnosis with an infectious disease made in a community-based clinics or hospitalization. A Kaplan-Meier survival curve was used to compare the cumulative incidence of offspring infectious morbidity between the study groups. A Cox regression model was constructed to evaluate an association between maternal endometriosis and offspring infectious morbidity, adjusting for possible confounders.

RESULTS: A total of 232,476 singleton deliveries were included. 224 deliveries of mothers diagnosed with endometriosis were compared to those without endometriosis. The total infectious morbidity rate was comparable between groups (70.5% vs. 68.0%, p=0.41). However, the Kaplan-Meier survival curve illustrated an elevated cumulative incidence of infectious morbidity in offspring born to mothers with endometriosis (Log-rank< 0.01, **Figure**). A Cox regression model, adjusted for gestational age, fertility treatments and mode of delivery, found that fetal exposure to maternal endometriosis was an independent risk factor for long-term infectious morbidity of the offspring (adjusted HR=1.17, 95%CI 1.00-1.36, p=0.05, **Figure**).

CONCLUSION: Fetal exposure to maternal endometriosis is an independent risk factor for long-term infectious morbidity of the offspring.

	Maternal endometriosis (N =224)	No maternal endometriosis (N = 232,252)	OR (95% CI)	Adjusted* HR (95% CI)
Infectious morbidity	158 (70.5%)	157,931 (68%)	1.12 (0.84-1.50)	1.17 (1.00 - 1.36)

*Adjusted for gestational age, mode of delivery and fertility treatments



712 Mode of delivery in preterm twin pregnancy and long-term cardiovascular morbidity of the offspring

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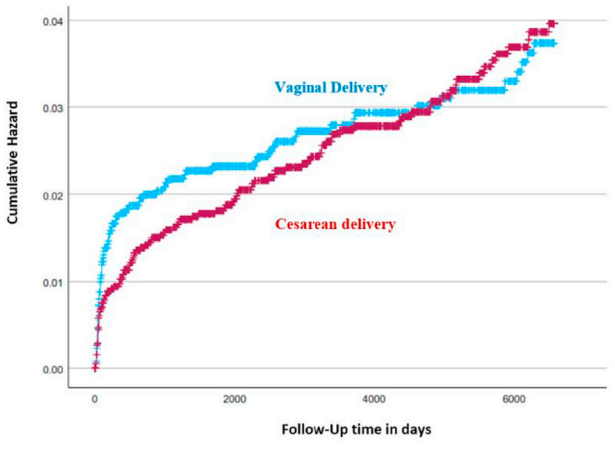
OBJECTIVE: Twin pregnancies are associated with higher rates of prematurity. The recommended mode of delivery in premature twin pregnancies is still under debate. Considering the known association between prematurity and long-term cardiovascular morbidity of the offspring, we opted to assess the association between mode of delivery of premature twins and long-term cardiovascular morbidity of the offspring.

STUDY DESIGN: A population-based retrospective cohort study, assessing the association between mode of delivery in preterm twin pregnancy and long-term cardiovascular morbidity of the offspring was conducted. Twins were born between the years 1991-2021 in a single tertiary medical center. The study groups were followed until 18 years of age for cardiovascular-related morbidity. A Kaplan-Meier survival curve was used to compare cumulative cardiovascular morbidity between the groups, and a multivariable Cox proportional hazard analysis was used to adjust for confounders.

RESULTS: During the study period 6,504 premature twins, born before 37 weeks gestation, were included, of which 3,868 (59.5%) were born through cesarean delivery (CD). Premature twins born through vaginal delivery did not demonstrate a significantly higher rate of long-term cardiovascular morbidity when compared with premature twins born through CD (2.9% vs. 2.8%, OR=0.96, 95% CI 0.71-1.30, p=0.82). Likewise, the cumulative incidence of long-term cardiovascular morbidity did not differ according to mode of delivery (Kaplan-Meier Log rank p=0.804, Figure). In a Cox proportional hazard model, the mode of delivery in premature twins was not associated with long-term cardiovascular morbidity of the offspring (adjusted HR=0.83, 95% CI 0.60-1.15, p=0.264).

CONCLUSION: In our population, no association was documented between mode of delivery in preterm twin pregnancies and long-term cardiovascular morbidity of the offspring. In the perspective of childhood cardiovascular morbidity, vaginal delivery in preterm twin pregnancies seems to be as safe as CD.

Figure: The cumulative incidence of long-term cardiovascular morbidity of premature twins according to mode of delivery (Log Rank p value= 0.804)



713 What blood bank preparation is appropriate for women giving birth?

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OBJECTIVE: Maximum surgical blood order schedules (MSBO) recommend T&S if the need for transfusion during an operative procedure is predicted to be > 5%. The type of blood bank preparation ordered for women giving birth (hold clot, type and screen, or crossmatch) is often determined according to the presence of hemorrhage risk factors. This approach does not quantify the chance for transfusion. The purpose of this study was to quantify the relative importance of risk factors for needing a blood transfusion and to develop a formula to define each individual's risk. This could then be used to decide an appropriate level of blood preparation for patients at different risk levels.

STUDY DESIGN: Risk factors for hemorrhage and the level of blood bank preparation were extracted from the medical records of a cohort of 89,239 women delivering in an 18-hospital health care system over 40 months. We tabulated the number who required at least one RBC transfusion or an urgent transfusion- defined as receiving blood during labor or within 4 hours after delivery. Odds ratios for requiring a transfusion were calculated for each risk factor. We then calculated the probability of a transfusion in deciles according to predicted risk of transfusion.

RESULTS: On admission, 66.3% of patients had a hold clot, 33.0% had a type and screen, and 0.7% had a crossmatch. 648 patients had any transfusion during their hospitalization (0.73% of deliveries), and 313 had an urgent transfusion (0.35% of deliveries). Odds ratios and frequency of risk factors are shown in the table. The mean probability of patients in the highest risk decile of having any transfusion was 3.4% (95% CI 3.0-3.8%).

CONCLUSION: In our cohort, the lowest 9 deciles risk of transfusion was < 1%, and even the highest risk decile had a predicted transfusion risk well below 5%. Based on the low chance of needing a transfusion for almost all obstetric patients, we suggest that a hold clot be used except for the highest risk patients- i.e. those with PAS, Hgb < 8, or placenta previa.

	Presence of Risk Factor		Tranfusion*		Urgent Transfusion*		Odds of transfusion
	n	%	*n*	%	*n*	%	*OR (95% CI)*
Planned cesarean	11,377	12.7%	186	1.6%	86	0.8%	1.76 (1.42, 2.20)
Preeclampsia	4,143	4.6%	101	2.4%	53	1.3%	3.01 (2.27, 3.85)
TOLAC	3,574	4.0%	35	1.0%	18	0.5%	1.52 (1.02, 2.12)
Hx PPH	3,535	4.0%	63	1.8%	34	1.0%	2.17 (1.60, 2.84)
Admit Hgb<10	3,205	3.6%	167	5.2%	75	2.3%	6.20 (4.97, 7.60)
Parity>= 5	3,202	3.6%	37	1.2%	22	0.7%	1.00 (0.67, 1.28)
Multifetal	1,549	1.7%	58	3.7%	25	1.6%	3.37 (2.36, 4.62)
Abruption	1,083	1.2%	50	4.6%	30	2.8%	4.76 (3.24, 6.53)
Polyhydramnios	854	1.0%	11	1.3%	6	0.7%	1.37 (0.73, 2.44)
Large fibroids	489	0.5%	11	2.2%	4	0.8%	2.82 (1.13, 4.75)
Uterine Bleeding (no Dx)	425	0.5%	23	5.4%	14	3.3%	2.30 (1.23, 3.77)
Placenta previa	279	0.3%	34	12.2%	26	9.3%	7.29 (3.98, 11.65)
Admit Hgb<8	193	0.2%	46	23.8%	31	16.1%	7.45 (4.83, 11.57)
Suspected PAS	35	<0.1%	15	42.9%	11	31.4%	21.46 (9.18, 49.19)

*Denominator is per risk factor, not entire population

714 Neonatal Outcomes After Maternal versus Neonatal Transfers to a Level IV Perinatal Care Center

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OBJECTIVE: To access the highest levels of maternal and neonatal care, inpatient transfer to Level IV Perinatal Care Centers (PCC) is sometimes needed. We sought to compare neonatal outcomes between maternal and neonatal transfers to a Level IV PCC.

STUDY DESIGN: We performed a retrospective cohort study of all maternal and neonatal transfers to our Level IV PCC from January – December 2021. Maternal transfers who delivered during the transfer admission, and neonatal transfers within 24 hours of birth were included. Neonates were excluded if neonatal resuscitation was declined. The primary outcome was composite neonatal morbidity which included: respiratory distress syndrome (RDS), mechanical ventilation, sepsis, grade 3-4 intraventricular hemorrhage (IVH), chronic lung disease, necrotizing enterocolitis, patent ductus arteriosus, and stage 3-4 retinopathy of prematurity. Secondary outcomes included mode of delivery, APGAR < 7 at 5 minutes, length of neonatal stay, and each composite morbidity component. Chi-square, fisher exact, Mann-Whitney U, and multivariate logistic regression were used as appropriate.

RESULTS: 217 neonatal and 200 maternal transfers were included. Maternal transfers delivered at earlier gestational ages. Additionally, maternal transfers were less likely to have congenital anomalies, and more likely to receive antenatal steroids, be diagnosed with hypertensive disorders of pregnancy, and include racial minorities. For our primary outcomes, maternal transfers had significantly less odds of composite neonatal morbidity (aOR 0.79 [0.72-0.88]), specifically RDS (aOR 0.78 [0.70-0.86]), mechanical ventilation (aOR 0.84 [0.76-0.93]), and IVH (aOR 0.96 [00.92-0.99]), but their neonates had longer lengths of stay.

CONCLUSION: Maternal transfer to a Level IV PCC, compared to neonatal transfers, are associated with significantly lower odds of neonatal morbidity. These results underscore the importance of sustaining and expanding robust maternal transport programs to best access both maternal and neonatal expertise at Level IV PCCs.

	Neonatal transfer, n=217	Maternal Transfer, n=200	OR	aOR*
Neonatal Composite**	**129 (59.4)**	**126 (63.0)**	**1.16 (0.77-1.76)**	**0.79 (0.72-0.88)**
Respiratory distress syndrome	**109 (50.2)**	**120 (60.0)**	**1.48 (0.99-2.23)**	**0.78 (0.70-0.86)**
Mechanical Ventilation	**75 (34.6)**	**62 (31.0)**	**0.85 (0.55-1.31)**	**0.84 (0.76-0.93)**
Sepsis	5 (2.3)	10 (5.0)	2.23 (0.68-8.46)	1.00 (0.96-1.05)
Neonatal death	7 (3.2)	14 (7.0)	2.24 (0.83-6.74)	1.02 (0.97-1.07)
Grade 3 or more IVH	**7 (3.2)**	**4 (2.0)**	**0.61 (0.13-2.45)**	**0.96 (00.92-0.99)**
Chronic lung disease	3 (1.4)	5 (2.5)	1.83 (0.35-11.92)	1.00 (0.97-1.03)
Necrotizing enterocolitis	6 (2.8)	8 (4.0)	1.46 (0.44-5.21)	0.97 (0.93-1.02)
Patent ductus arteriosus	10 (4.6)	20 (10.0)	2.30 (0.99-5.64)	1.02 (0.96-1.08)
>Stage 3 retinopathy of prematurity	1 (0.5)	9 (4.0)	8.96 (1.18-400.42)	1.01 (0.97-1.04)
Cesarean Delivery	111 (51.2)	110 (55.0)	1.17 (0.78-1.75)	0.90 (0.80-1.02)
APGARs <7 at 5 minutes	30 (13.8)	14 (0.7)	0.47 (0.22-0.95)	0.94 (0.88-1.01)
Length of neonatal stay, median days (IQR)	**15 (23.0)**	**25 (48.5)**	**p<0.001**	

*Adjusted for transferring facility, gestational age at delivery, race, fetal anomalies, antenatal steroids, and hypertensive disorders of pregnancy
**Composite of respiratory distress, mechanical ventilation, sepsis, death, Grade 3 or worse IVH, chronic lung disease, NEC, PDA, or stage 3-4 of retinopathy of prematurity

715 Trends in Tdap and Flu Vaccination in Pregnant People in Relation to the COVID-19 Pandemic

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OBJECTIVE: We aimed to understand how the COVID-19 pandemic impacted routine Tetanus, Diphtheria, and Pertussis (Tdap) and Influenza (Flu) vaccine administration in pregnancy.

STUDY DESIGN: This was a retrospective review of electronic medical records for Tdap and Flu vaccine administration for pregnant patients at a single institution from Mar 2018 to Dec 2022. Patients were assigned to the acute COVID epoch if their gestational age was < 20 weeks by 3/10/2020 and their estimated due date was before 1/1/2021. Pre-COVID and chronic COVID epochs comprised matched months for the two years before and after acute COVID. Bivariate associations between patient characteristics by COVID epoch (Table) and Tdap vaccination (data not shown) were assessed using X^2 and ANOVA. Associations between COVID epoch and Tdap vaccination, and COVID epoch and Flu vaccination, were evaluated using multivariable logistic regression.

RESULTS: Tdap vaccination rates varied across COVID epoch with a > 10% increase from pre-COVID (75.5%) to acute COVID (85.8%). The Tdap vaccine rate attenuated in the chronic COVID epoch (81.2%). A similar pattern was observed for Flu vaccination with an increasing rate from pre-COVID (48.1%) to acute COVID (53.3%). Flu vaccination rates fell dramatically in the chronic COVID epoch (38.5%) to below pre-COVID levels. Seven covariates were included in regression modeling. Compared to pre-COVID, the likelihood of Tdap vaccination was increased in both the acute COVID epoch [aOR= 2.01; CI 1.74-2.34] and the chronic COVID epoch [aOR = 1.38; CI 1.24-1.54]. The likelihood of Flu vaccination also significantly increased from pre-COVID to acute COVID [aOR=1.25; CI 1.2-1.39]. Notably, Flu vaccination uptake was dramatically reduced from pre-COVID to chronic COVID [aOR=0.67; CI 0.61-0.73].

CONCLUSION: Tdap and Flu vaccination rates peaked during acute COVID, likely correlating with amplified health concerns during the pandemic. After acute COVID, vaccination rates were sustained for Tdap, but decreased for Flu. Future studies are needed to elucidate health factors influencing rates of vaccination uptake.

Table 1: Tdap and flu vaccine administration rates and demographics by COVID-19 epoch

	COVID Epochs			
	Pre-Covid[1]	Acute[2]	Chronic[3]	p-value
Patient characteristics - n (%)	4007 (40.2)	1948 (19.6)	4008 (40.2)	
Maternal age ≥35	1055 (26.3)	487 (25.0)	1167 (29.1)	0.001
Non-commercial insurance*	1646 (41.1)	776 (39.8)	1613 (40.2)	0.60
Non-partnered	1428 (35.6)	687 (35.3)	1453 (36.3)	0.73
Nulliparous*	1692 (42.5)	817 (42.5)	1647 (41.4)	0.55
Smoking	306 (7.6)	138 (7.1)	190 (4.7)	<0.0001
Race-ethnicity				
Hispanic	848 (21.2)	444 (22.8)	996 (24.9)	
Black, non-Hispanic	714 (17.8)	343 (17.6)	719 (17.9)	
White, non-Hispanic	2069 (51.6)	1013 (52.0)	1971 (49.2)	<0.001
Asian, non-Hispanic	224 (5.6)	87 (4.5)	221 (5.5)	
Other, non-Hispanic	152 (3.8)	61 (3.1)	101 (2.5)	
Chronic hypertension	388 (9.7)	219 (11.2)	556 (13.9)	<0.0001
Hypertensive disorders of pregnancy	827 (20.6)	425 (21.8)	910 (22.7)	0.08
GA (days) at 1st in person prenatal visit - mean (SD)*	89.1 (51.0)	88.3 (49.6)	87.2 (48.4)	0.24
Outcomes - n (%)				
Tdap vaccination	3026 (75.5)	1672 (85.8)	3254 (81.2)	<0.0001
Influenza vaccination	1927 (48.1)	1039 (53.3)	1543 (38.5)	<0.0001

*P-value for test of significance for association with Tdap vaccination <0.05, therefore, included in regression model
[1] Pre-COVID date range for deliveries: 3/28/2018-12/25/2018 and 4/4/2019-12/25/2019
[2] Acute COVID date range for deliveries: 4/23/2020-12/27/2020
[3] Chronic COVID date range for deliveries: 4/13/2021-12/25/2021 and 3/31/2022-12/28/2022

716 Outcomes from a 15 Year Review of Cystic Hygroma

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OBJECTIVE: Invasive genetic testing is routinely recommended to investigate aneuploidy as a cause of cystic hygroma in the first trimester. In the context of normal genetic testing, the predicted outcome is impacted by the presence of co-existing structural anomalies, particularly cardiac anomalies. We reviewed the diagnosis and outcome of these patients to establish contemporary outcome data to aid appropriate counseling.

STUDY DESIGN: This is a retrospective cohort study in a single large maternity hospital. Cases were identified using a fetal anomaly database and an electronic health record system. Data were collected on all patients with a fetal diagnosis of a nuchal translucency > 3mm with septations from 2007 to 2022. Results of chromosomal analysis, pregnancy outcomes and fetal outcomes were collated and described using summary statistics.

RESULTS: During the 15-year period, there were over 135,000 deliveries at our center. 677 cases of septated cystic hygroma were diagnosed. Pregnancy outcome was obtained in 97.5% (n=660) of cases, with 92% (621/677) undergoing invasive prenatal or postnatal testing. 39% (247/621) had a normal karyotype. 38% (249/660) of women underwent termination of pregnancy. In-utero demise occurred in 24% (159/660). Structural anomalies were found in 16% (39/247) of those with normal karyotype. In cases of cystic hygroma, normal invasive testing in the absence of structural anomalies carried a livebirth rate of 86% (164/191), in contrast to an overall livebirth rate of 38% (252/660) in all pregnancies affected by cystic hygroma.

CONCLUSION: Cystic hygroma is a significant finding in early pregnancy which confers a risk of aneuploidy of approximately 60% and is associated with adverse pregnancy outcomes. Outcomes of the study demonstrate a high livebirth rate in those with normal invasive testing and fetal echocardiography. This confirms the significance of appropriate counseling regarding confirmatory invasive testing, and highlights the value of follow-up with detailed anatomy ultrasound.

Table 1: First Trimester Septated Cystic Hygroma - Pregnancy Outcome

	n	%
Total Cystic Hygroma diagnosed	677	
Pregnancy Outcome known	**660**	98%
Outcome		
Livebirth:	252	38%
Neonatal death	*16*	*2%*
Overall survival	*236*	*36%*
1st trimester miscarriage	33	5%
2nd and 3rd trimester in-utero demise	126	19%
Termination of Pregnancy	249	38%

Table 2: First Trimester Septated Cystic Hygroma - Genetic Testing

	n	%
Total Cystic Hygroma diagnosed	677	
Karyotype known	**621**	92%
Karyotype		
Normal karyotype (46XX/XY)	247	40%
Trisomy 21	169	27%
Trisomy 18	94	15%
Trisomy 13	18	3%
Monosomy X (Turner Syndrome)	65	11%
Triploidy	7	1%
Other	21	3%

717 Is expectant management of late PPROM an option in patients with GBS colonization?

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OBJECTIVE: To determine if carriers of group B streptococcus (GBS) have adverse obstetric and neonatal outcomes when preterm premature rupture of membranes (PPROM) occurs between 34 to 37 weeks of pregnancy.

STUDY DESIGN: A retrospective cohort study was conducted at a single university-affiliated medical center between 2012 and 2022. Patients who had preterm premature rupture of membranes (PPROM) between 34 to 37 weeks of pregnancy carrying a singleton gestation, with no contraindications to expectant management were included in the study group. According to the department protocol, all patients with PPROM receive 1G of IV Azithromycin once and 4g of IV penicillin every 4 hours. Antibiotics are discontinued in patients negative for GBS and continued for one week in GBS positive patients. Outcomes were compared to those with a negative GBS culture. Baseline demographic characteristics were compared between the groups. The primary outcome was latency from PPROM till delivery. Secondary outcomes included cesarean delivery, composite adverse maternal outcome (PPH, chorioamnionitis, abruption of placenta) and composite neonatal outcome (NICU admission, respiratory distress syndrome, early onset GBS disease).

RESULTS: Two hundred and seventeen patients were included in the study. 98(45.2%) were GBS carriers and 119 (54.8%) were non-carriers. There were no significant between group differences in mean maternal age (GBS carriers: 27.3±6, noncarriers: 29.7±6.1; p=0.37) or gestational age at delivery (252 days±5 Vs 252

days±6;p=0.4),rate of diabetes (10.1% Vs 10.2%;p=0.97) neonatal mean birthweight (2602g ±36 Vs 2698g±56;p=0.32). There were no significant differences between the groups for the primary outcome of duration from membrane rupture until delivery (2.83 ± 2.9 days Vs 3.03 ± 2.9 days ;$P = 0.98$) nor the rate of cesarean delivery (9.8% Vs 10.9% ;p=0.45) or in composite maternal (2.7% Vs 1.9%;p=0.26) or neonatal outcomes(23% Vs 22%;p=0.34).

CONCLUSION: Expectant management of late PPROM in GBS carriers is not associated with an increased risk of adverse maternal or neonatal outcomes.

baseline demographic characteristics			
	GBS carriers	noncarriers	P value
Mean maternal age	27.3±6	29.7±6.1	0.37
Gestational age at delivery	252 days±5	252 days±6	0.4
Rate of diabetes	10.1%	10.2%	0.97
Hypertension disease	2%	1.7%	0.84
Neonatal mean birthweight	2602g±36	2698g±55	0.32
Maternal and neonatal outcomes			
Rate of cesarean delivery	9.8%	10.9%	0.45
PPH	4.2%	1.7%	0.27
Chorioamnionitis	2.1%	0.8%	0.45
Abruption of placenta	4.1%	3.4%	0.79
Composite maternal outcomes	2.7%	1.9%	0.26
NICU admission	30.6%	30.3%	0.95
Respiratory distress syndrome	17.3%	14.3%	0.53
Phototherapy	23.5%	22.7%	0.89
Early onset GBS disease	0	0	
Composite neonatal outcomes	23%	22%	0.34
Duration from membrane rupture until delivery	2.83 ± 2.9 days	3.03 ± 2.9 days	0.98

Table 1- baseline demographic characteristics and Maternal and neonatal outcomes.

718 Identification of Black Birthing People at Highest Risk for Suicide

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OBJECTIVE: Suicide is one of the leading contributors to maternal mortality, however prediction of perinatal suicide remains poor. A history of prior suicide attempt is considered one of the most robust predictors of eventually completed suicide. We aimed to evaluate whether social determinants of mental health (SDoMH) can correctly classify birthing people at the highest risk of perinatal suicide.

STUDY DESIGN: This secondary analysis of a prospective cohort of Black birthing people. Individuals in the primary study were included in this analysis if they completed the Philadelphia ACE screen, which queried any prior history of attempted suicide. SDoMH, including age at pregnancy, parity, body mass index, ethnicity, insurance, marital status, and educational attainment, was obtained through self-report. Bivariable and multivariable models were used to identify SDoMH associated with a prior suicide attempt. A receiver operating characteristic curve for the outcome of prior suicide attempt was generated and the area under the curve (AUC) calculated.

RESULTS: Of the 592 Black birthing people included in the parent cohort, 487 (82%) met eligibility criteria. Forty-six people (9.5%) reported a history of a prior attempted suicide. In bivariable and multivariable analyses, none of the evaluated SDoMH were significantly associated with a history of attempted suicide (Table). SDoMH were unable to accurately classify which individuals had a prior history of suicide attempt (AUC 0.62, 95% CI 0.52-0.72).

CONCLUSION: Nearly one in ten Black birthing people in this cohort previously attempted suicide. While SDoMH have been implicated as risk factors for suicide in the general population, these determinants were not associated with a history of a suicide attempt in this perinatal cohort. These data demonstrate persistent gaps in our capacity to correctly identify birthing people at highest risk of suicide.

Table: Associations between social determinants of mental health and prior suicide attempt

Social Determinants of Mental Health	OR	95% CI	aOR	95% CI
Age at pregnancy (years)	0.97	0.92-1.03	0.99	0.92-1.07
Nulliparous	1.59	0.86-2.96	1.88	0.82-4.32
Body mass index ≥ 30 kg/m^2	0.80	0.43-1.48	0.89	0.44-1.81
Hispanic ethnicity	1.87	0.68-5.11	2.14	0.58-7.94
Public insurance	1.35	0.63-2.89	1.56	0.61-4.04
Married	0.77	0.31-1.89	0.69	0.21-2.23
Educational attainment				
High school or less	ref	ref	ref	ref
Some college	1.29	0.67-2.47	1.39	0.62-3.10
Completed college	2.76	0.85-8.94	7.55	1.43-39.63

719 Optimal Mode of Delivery for Term Breech Presentations: Emulating a Target Trial

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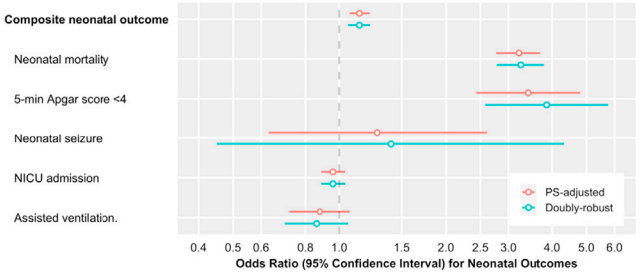
OBJECTIVE: Since the pivotal Term Breech Trial, global studies have demonstrated favorable neonatal outcomes for singleton vaginal breech deliveries. Despite changes in guidance from ACOG, current neonatal and maternal outcomes of those undergoing singleton breech deliveries at term in the US remain unknown. Since a randomized controlled trial (RCT) is ethically infeasible, we emulated a target trial to estimate the causal effect of vaginal versus cesarean delivery of term breech presentations in contemporary deliveries in the US.

STUDY DESIGN: We utilized the US vital records data of non-anomalous, singleton, term breech live births (2015 to 2020). We emulated a target RCT to contrast neonatal and maternal outcomes in vaginal versus cesarean delivery. To address confounding of the mode of delivery, we performed a propensity score (PS) analysis in a 1:5 match of vaginal to cesarean deliveries, and a doubly-robust estimation to account for confounding of the outcomes. Rates of neonatal and maternal complications were compared between the two groups.

RESULTS: Of 434,952 breech births, 4.4% (n = 19,256) were delivered vaginally. Composite adverse neonatal outcomes occurred in 7.6% of vaginal breech and 5.6% of cesarean breech deliveries (PS-matched, doubly robust odds ratio [OR] 1.14; 95% confidence interval [CI] 1.06, 1.22). Neonatal mortality occurred in 0.5% (n = 90) of vaginal and 0.1% (n = 373) of cesarean breech deliveries (OR 3.25; 95% CI 2.78, 3.79). Composite adverse maternal outcomes occurred in 0.3% of the vaginal breech and 0.5% of the cesarean (OR 0.43; 95% CI 0.31, 0.58) deliveries.

CONCLUSION: In a contemporary cohort of breech births in the US, vaginal delivery of breech presentations is associated with increased risks of composite neonatal adverse outcomes. This risk is over 3-fold higher for neonatal mortality. Although the findings are broadly similar to the landmark Term Breech Trial, the risks of both neonatal and maternal adverse outcomes are lower in this contemporary cohort. This present-day data should be considered when counseling patients who desire term vaginal breech births.



720 Perinatal suicidality among high-risk individuals: evaluating trends to inform policy

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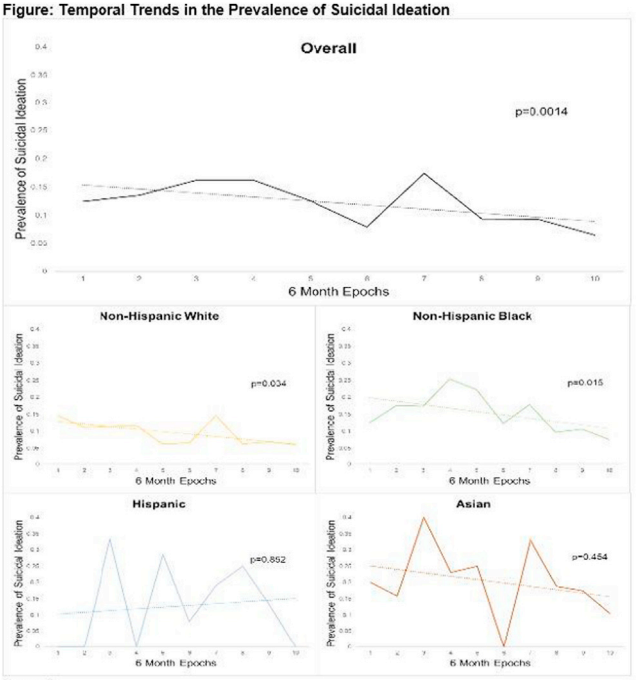
OBJECTIVE: The CDC recently reported that mental health conditions, inclusive of suicide, were the leading contributor to maternal mortality from 2017-2019. Suicidal ideation (SI) is an antecedent to suicide and can serve as a proximate indicator of population-level trends to inform public health responses. We aimed to evaluate trends in SI among individuals enrolled in a collaborative care model (CCM) for mental health care.

STUDY DESIGN: This retrospective cohort study included all birthing people referred to a CCM for mental health care between 2017-2022. In the CCM, participants are asked to complete a PHQ-9 at least every 4 weeks, wherein SI is assessed. Any affirmative response, irrespective of frequency, was considered SI. Individuals enrolled in the CCM were divided into 6-month epochs based on their EDD, reflecting their general temporal engagement with the CCM. Tests of linear trend in SI over time were performed in both bivariate and multivariate modes. Linear trend curves of SI prevalence were created. Analyses were performed both for the overall sample and stratified by race/ethnicity.

RESULTS: Of the 2031 individuals enrolled in the CCM, 318 (11.7%) reported SI. The overall prevalence of SI decreased across each epoch (epochs 1 vs 10 = 12.8% vs 6.4%, respectively; aOR of SI by epoch = 0.92, 95% CI 0.88-0.97). Similar trends reflecting a steady linear decrease in SI were observed in the subset of individuals who identify as non-Hispanic Black (aOR = 0.90, 95% CI 0.83-0.98) and non-Hispanic White (aOR = 0.92, 95% CI 0.85 - 0.99). However, the prevalence of SI did not change over time among birthing people who identified as Hispanic (aOR = 1.01, 95% CI 0.84 − 1.22) or Asian (aOR = 0.97, 95% CI 0.84-1.11). Point estimates with overlayed linear trend curves are shown in the Figure.

CONCLUSION: SI is decreasing over time among high-risk perinatal individuals, mirroring recent population-level improvements in suicide rates across the United States. However, Latinx and Asian subgroups did not experience these same trends. These data can be used to inform targeted perinatal suicide prevention efforts.

Figure: Temporal Trends in the Prevalence of Suicidal Ideation



Legend:
Solid lines represent point estimates at each epoch; dotted lines represent linear trend curves
P-values represent tests of linear trend

721 Umbilical artery endocan level increases with maternal BMI

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OBJECTIVE: Maternal obesity is strongly associated with offspring obesity and is potentially inherited through fetal programming, for which inflammation and endothelial dysfunction may play a mediating role. Endocan is a soluble biomarker linked to endothelial dysfunction and inflammation. We sought to determine whether umbilical artery endocan levels at birth differed between newborns born to mothers with and without obesity.

STUDY DESIGN: We conducted a prospective cohort study of term mother/fetus dyads who presented for delivery. We collected umbilical artery cord blood at delivery, and measured fetal/cord endocan levels by ELISA. We assessed differences using statistical regression modeling. A sample size of 168 was planned to detect a difference of 35% between infants born to obese and non-obese mothers.

RESULTS: We recruited 233 patients; following exclusion criteria and dropout, 148 remained. BMI of the included mothers ranged from 21 to 97 kg/m^2 (median 34, IQR 8). There were 36 patients with BMI $<$ 30 and 112 patients with BMI $\geqq$ 30. Bivariate analysis using obesity as a dichotomous variable showed no difference in cord endocan level between patients with BMI $<$ 30 and those with BMI $\geqq$ 30 (medians 272 pg/ml [IQR 113] vs. 299 [153], p=0.476). A

backward stepwise linear regression included the following candidate variables which were selected a priori: BMI at delivery, age, diabetes, hypertension, delivery mode, birthweight, sex. The final model reduced to BMI at delivery and maternal age. The overall regression was statistically significant (R^2=0.12, F(2,142)=9.22, p< 0.001). Endocan levels in newborn cord blood were positively and significantly associated with maternal BMI at delivery (p = 0.022), when controlling for maternal age.

CONCLUSION: Our results suggest that infants born to mothers with obesity may have higher levels of endothelial dysfunction and inflammation at birth, and may be affected in a dose-dependent manner with increasing BMI. These findings emphasize the importance of fetal programming in utero, prior to postnatal factors that contribute to downstream effects of maternal obesity.

Table 1. Backward stepwise linear regression modeled on umbilical artery endocan level

	Coefficient	Standard error	p
Maternal BMI at delivery	2.29	0.99	**0.022**
Maternal age	5.57	1.67	**0.001**
Constant	50.95	58.75	

Final model: F(2,142) = 9.22, R^2 = 0.12, **p < 0.001**

Candidate variables: Maternal BMI at delivery, maternal age, insulin controlled diabetes, hypertensive disorder of pregnancy, mode of delivery, birthweight, neonatal sex
Final variables: Maternal BMI at delivery, maternal age

723 Intrauterine vacuum-induced tamponade versus intrauterine balloon-tamponade for postpartum hemorrhage management

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OBJECTIVE: To compare the effectiveness of intrauterine vacuum-induced tamponade device (IUVT) versus intrauterine balloon-tamponade device (IUBT) for postpartum hemorrhage (PPH) management.

STUDY DESIGN: This is a retrospective cohort study of patients who had an intrauterine tamponade device placed for management of PPH secondary to uterine atony from 4/2020-7/2023 at an academic medical center. Patients who underwent IUVT (Jada®) placement (n=152) were compared 1:1 to those who underwent IUBT (Bakri®) placement (n=152) prior to adoption of the Jada® device at the study institution. Primary outcomes were estimated blood loss (EBL), red blood cell (pRBC) transfusion, and failure of the device to control PPH. Secondary outcomes included time from hemorrhage identification to device placement, time spent in 1:1 nursing care, and length of stay. Cohorts were compared using bivariable and multivariable analyses.

RESULTS: Patients in both cohorts were similar in age, race, ethnicity, body mass index (BMI) and route of delivery (p >0.05). Patients who underwent IUVT placement had a significantly lower EBL and fewer units transfused that those who underwent IUBT placement (p< 0.01) (Table). Difference in EBL persisted in multivariable regression analysis (p< 0.01). There was no difference in failure between devices in controlling PPH (p >0.05). Of the IUVT that failed, 8 (53.3%) patients were subsequently managed with IUBT, and 6 (75%) of those then required further interventions. Patients underwent IUVT placement earlier, and IUVT remained in place for less time (p< 0.01). Patients who underwent IUVT placement spent less time in 1:1 nursing care and had shorter lengths of stay overall (p< 0.01). There was no difference between cohorts in admission to ICU, postpartum infection, or rates of readmission (p >0.05).

CONCLUSION: IUVT is similarly effective to IUBT in managing postpartum hemorrhage due to atony. IUVT is associated with less blood loss, fewer transfusions, lower nursing utilization, and shorter lengths of stay, which has significant implications for patient safety and costs of care.

Table. IUVT vs IUBT for PPH management.

Primary outcomes	IUVT (n=152)	IUBT (n=152)	OR (95%CI)	P value
EBL, median (IQR), mL	1583 (1200, 2099)	2090 (1599, 2657)	-	<0.01 *<0.01
pRBCs transfused, median (IQR), units	0 (0, 1)	1 (0, 2)	-	0.01 *0.05
Device failure in management of PPH	15 (9.9)	18 (11.8)	0.81 (0.39-1.62)	0.71
Hysterectomy	7 (4.6)	8 (5.3)	-	>0.99
UAE	4 (2.6)	10 (6.6)	-	0.17
IUBT	8 (5.3)	-	-	-
Secondary outcomes			**P value**	
Time of first uterotonic to device placement, median (IQR), minutes	19 (10, 37)	32 (19, 63)	<0.01	
Time device in place, median (IQR), minutes	180 (132, 248)	844.5 (717, 1178)	<0.01	
Time in 1:1 nursing, median (IQR), minutes	393 (314.8, 567.5)	1239 (973.3, 1548)	<0.01	
Length of stay, median (IQR), days	3 (2, 4)	3 (3, 5)	<0.01	

Results are shown as no. (%) unless otherwise indicated.
*adjusted for age, race, ethnicity, parity, cesarean, history of PPH, preeclampsia, multiples, macrosomia, neuraxial anesthesia
pRBC: pack red blood cells, Hgb: hemoglobin, BMI: body mass index, ICU: intensive care unit, UAE: uterine artery embolization
Patients who had an IUBT placed after Jada® adoption were excluded to minimize impact of provider preference.

724 Optimizing YouTube OB/GYN Video Search: The Impact of Adding Boolean Operators

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OBJECTIVE: YouTube is an accessible online resource for educational related information. A Boolean search uses specific search words and symbols known as Boolean operators (BO) to aid in limiting or expanding results. There is limited knowledge on the impact of boolean search terms on quality and accuracy of OB/GYN educational instructional video. Our objective is to examine the effect of Boolean searching on the quality and accuracy of YouTube OB/GYN video.

STUDY DESIGN: Surgical Curriculum of Obstetrics and Gynecology (SCOG) procedures in combination with BO were used in YouTube search queries. Results were screened with strict exclusion criteria and video characteristics were obtained. Videos were graded on accuracy and quality using the SCOG accuracy checklist and the validated Laparoscopic Surgery Video Educational Guidelines (LAP-VEGaS) video assessment tool. Results were analyzed using ANOVA statistical testing.

RESULTS: A total of 353 videos were screened, 89 were excluded and 264 were analyzed. For videos without BO, international organizations had highest % accuracy and only international healthcare organization videos met a quality score of 11.2. After using BO, average accuracy and quality scores increased by 54.6% and 37.7%, respectively. Videos with quality scores > 11 included multiple types of organizations (Table 1). BO videos had statistically significant

improvement in quality and accuracy separated by likes, views and affiliated organizations (p-value < 0.01). There was no statistically significant difference in accuracy and quality for BO videos based on number of subscribers and geographic location.

CONCLUSION: The user-friendly nature of YouTube allows OB/GYN providers the ability to access and learn from educational videos. Understanding characteristics associated with accurate and quality information ensures proper selection to precise and current educational resources. It is imperative that providers are aware of the importance and enhancement of BO when searching for OB/GYN educational content.

Table 1: Average Scores with and without Boolean Operators

SCOG Accuracy Score	Videos without Boolean Search	Videos with Boolean Search
average	35.00%	54.11%
LAP-VEGaS Quality Score (educational quality signified by score ≥ 11)		
average	7.809	10.75
Average by Affiliated Organizations:		
Academic Organizations	9.8	10.9
Non-Academic Organizations	6.9	11.69
Private Practices	7.3	11.31
International Healthcare Organizations	11.2	14.75
Commercial Organizations	7.3	10.87

725 Impact of maternal age on the risk for perineal injury and OASI in nulliparous women

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OBJECTIVE: We aimed to evaluate the association between maternal age and the incidence of perineal injury and obstetric anal sphincter injuries (OASI) in nulliparous women.

STUDY DESIGN: A retrospective, cohort population-based study was conducted in a tertiary, university-affiliated medical center from (January 2011- December 2020). The study included all nulliparous women with singleton pregnancies at term (37-41 weeks of gestation) in vertex and only with occiput anterior presentation who received epidural analgesia during labor. Exclusion criteria included stillbirth, and chronic and obstetric maternal conditions (hypertension, diabetes mellitus, etc.). Instrumental vaginal deliveries or deliveries in which episiotomy was performed were also excluded. The population was divided into two groups by age (20-25 vs 30-35 years old) and their characteristics were compared. The primary outcome was the incidence of perineal injury, defined as any spontaneous perineal tear, and/or OASI.

RESULTS: (1) Overall during the study period 39,596 nulliparas women delivered vaginally in our center. Of them 3,410 (8.61%) women met the study criteria, with 843 (24.72%) in the 20-25 age group and 2,567 (75.23%) in the 30-35 age group.

(2) Significant differences were observed between the two age groups in terms of ethnicity, maternal weight prior to pregnancy and at delivery, gestational glucose challenge test results, gestational age at delivery, duration of the second stage of labor, and birthweight (Table). (3) The incidence of perineal injury and OASI were significantly higher in the younger group (perineal injuries: 58% vs. 53.2%; p-value= 0.015) OASI (0.9% vs 0.4%, p-value: 0.04). (4) In multivariable logistic regression analysis for maternal age and perineal injury, the overall odds ratio for perineal injury in relation to age category was calculated as 1.22 (CI: 1.03-1.44; p-value: 0.023), indicating a higher risk of perineal injury in the 20-25 age group compared to the 30-35 age group.

CONCLUSION: This study suggests that young maternal age may be associated with an increased risk of perineal injury in nulliparous women.

Table 1: Demographics characteristics and pregnancy outcomes

	Age 20-25 N= 843	Age 30-35 N = 2567	P Value
Age, years, SD	22.86 (±1.66)	31.7 (±1.57)	0.001
Local Caucasian ethnicity	594 (70.5)	1970(76.7)	<0.001
Weight_Before_Pregnancy, kg, IQR	57 (51-63)	57 (53-63)	0.106
Weight at Delivery, kg, IQR	70(64-77)	61 (65-78)	0.069
BMI, IQR	26.17(24.12-28.68)	25.97 (24.09-28.28)	0.494
GCT, IQR	97(84-112)	102(87-117)	<0.001
Gestational Age, week, SD	39.4(±1)	39.3(±1)	0.001
Second stage, min, IQR	73(35.5-120.5)	89(44-139)	<0.001
Prolonged Second Stage,n, (%)	51(6.05)	229(8.92)	0.008
Third Stage, min, IQR	12(10-16)	13(10-18)	0.001
Neonatal Weight, grams, (SD)	3228(±358)	3185(±348)	0.002
Male Gender, n (%)	402(47.7)	1265(49.3)	0.422
Perineal Injuries, n. (%)	489 (58)	1365 (53.2)	0.015
OASI, n, (%)	8(0.9)	9(0.4)	0.04
Packed cells Transfusion, n, (%)	8(0.95)	17(0.66)	0.397
Uterine Revision, n(%)	11(1.3)	63(2.45)	0.002
Manual Lysis, n(%)	4(0.47)	47(1.83)	0.002

726 Outcomes of fetoscopic laser surgery for twin-twin transfusion syndrome according to the presenting twin

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OBJECTIVE: The major complications of fetoscopic laser surgery (FLS) for advanced twin-twin transfusion syndrome (TTTS) are prelabor premature rupture of membranes (PPROM) and preterm birth. We hypothesize that rupture of the amniotic sac of the recipient twin may present differently when a donor twin amniotic sac covers the cervical canal. We examined the incidence and complications of PPROM in patients who underwent FLS for TTTS according to the presenting twin.

STUDY DESIGN: This is a prospective observational cohort study of 660 monochorionic-diamniotic pregnancies with TTTS who

underwent FLS, performed at a single institution during 2011-2022. PPROM was defined as leakage of amniotic fluid documented prior to 34 weeks gestation. Study groups were assigned according to the presenting twin, either donor (D) or recipient (R). Baseline characteristics, gestational age (GA) at delivery and neonatal outcomes were compared between the two groups.

RESULTS: There were 204 cases with a D-presenting twin and 456 cases with a R-presenting twin. Baseline characteristics were similar between groups. The GA at FLS, incidence of PPROM, and GA at delivery were similar between the groups. The gestational age at PPROM was significantly later when the donor was presenting (median GA 28.6 weeks versus 27.0 weeks, p = 0.028). Among patients managed expectantly, there was no difference in GA at delivery nor was there any difference in twin survival or short-term neonatal outcomes between the groups.

CONCLUSION: FLS is associated with similar incidence of PPROM although PPROM occurs at a later GA when the donor twin is presenting, with similar GA at delivery than cases where recipient twin in presenting. This finding may represent a 'plugging' effect of the donor amniotic sac and should be considered when counseling patients undergoing FLS.

Figure 1: Baseline characteristics and outcomes based on presenting twin who underwent FLS for TTTS

	Presenting twin		
	Donor presenting N = 204	Recipient presenting N = 456	P-value
Cervical length (mm)	38 (30, 44)	38 (30, 45)	0.7
TTTS stage			0.7
I	28 (14%)	58 (13%)	
II	58 (28%)	125 (27%)	
III	107 (52%)	256 (56%)	
IV	11 (5.4%)	17 (3.7%)	
G.A. at FI (wks)	20.57 (18.29, 22.82)	20.00 (18.43, 21.96)	0.2
PPROM	72 (35%)	183 (40%)	0.2
G.A. at PPROM (wks)	28.6 (24.3, 32.0)	27.0 (22.1, 30.0)	**0.028**
G.A. at delivery (wks)*	31.6 (27.6, 33.5)	31.1 (27.6, 33.7)	0.9
Survivors*			0.6
Dual survivors	93 (69%)	230 (72%)	
Dual loss	16 (12%)	38 (12%)	
Donor loss	20 (15%)	33 (10%)	
Recipient loss	3 (2.2%)	6 (1.9%)	
Unknown	2 (1.5%)	11 (3.5%)	

N (%), median (IRQ)
**Excludes patients who underwent pregnancy termination (1 donor presenting twin and 9 recipient presenting twin): TTTS, twin twin transfusion syndrome; G.A., gestational age*

727 One laboratory's experience with prenatal cfDNA screening and incidental findings concerning for maternal neoplasia

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OBJECTIVE: Cell-free DNA (cfDNA) prenatal screening has been increasingly utilized in pregnancies, and aims to provide fetal genetic information. However, incidental detection of maternal neoplasia has been reported by some cfDNA methodologies; particularly massively parallel sequencing (MPS). This cohort reviews cases submitted for cfDNA screening with nonreportable results by MPS due to multiple chromosome abnormalities, increasing concern for possible underlying maternal neoplasia.

STUDY DESIGN: Maternal blood samples submitted for cfDNA screening were subjected to DNA extraction, library preparation, and genome-wide MPS. Nonreportable cases with concerning sequencing profiles were identified by lab directors for discussion with the ordering provider. These cases were retrospectively analyzed. Outcome information for maternal and fetal health was collected from ordering providers.

RESULTS: From 2012 to 2019, 108 cases were nonreportable due to globally aberrant or chaotic genome-wide sequencing data in multiple chromosomes. This chaotic pattern of data was detected in ~1:10,000 samples. Maternal outcome was obtained in 92 cases (85%); all cases reported maternal neoplasia, many of which were malignant (n = 77/92; 84%). Of the maternal malignancies, breast cancer (n=20), lymphoma (n=28), and colorectal cancer (n=5) were most frequently reported. Other neoplasia cases (n=15) were thought to be benign, predominantly uterine fibroids (n = 12/15; 80%), but also included vestibular schwannoma, fibroadenoma, and ovarian teratoma. Of malignant cases, 54 (70%) had no clinical indication of malignancy and were diagnosed after cfDNA screening.

CONCLUSION: As part of evolving procedures, laboratories may contact the referring physician to discuss concerns and inquire about patient health history based on globally aberrant cfDNA sequencing profiles. As recommended by ACOG/ SMFM, pretest counseling should include the possibility of discovering a maternal incidental finding. Based on this cohort, when globally aberrant cfDNA sequencing data is observed on an MPS assay, the chance of a maternal neoplasia is significant.

728 Water birth youtube videos: understanding its accuracy in accordance to evidence-based guidelines

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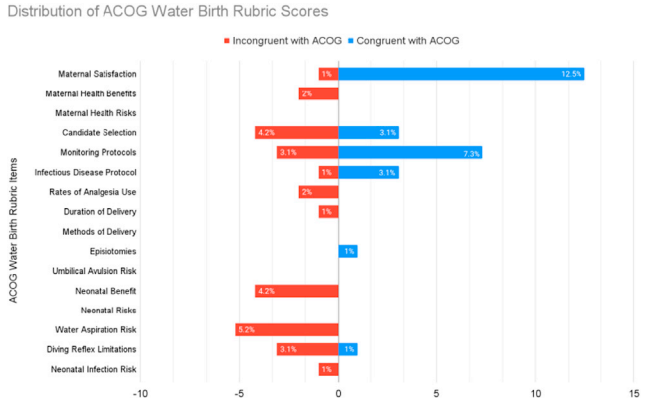
OBJECTIVE: YouTube is a frequently visited video platform for seeking and sharing advice during pregnancy, specifically around natural delivery methods such as water births. We aim to assess the most popular water birth videos on YouTube to determine how accurately these videos reflect published recommendations put forth by the American College of Obstetricians and Gynecologists (ACOG).

STUDY DESIGN: A YouTube "water birth" search was conducted on 3/9/2023 with a new profile and private browser using the filter "most viewed". The first 100 videos were selected and a strict inclusion criteria was followed. Video views ranged from 457,296 to 78,035,874. Reviewers scored videos in accordance with published guidelines using the "ACOG Water Birth Rubric".

RESULTS: 96 videos met criteria. 77.1% (n=74) scored neutral, 13.5% (n=13) accurate, and 9.4% (n=9) inaccurate. Accurately addressed guidelines include increased maternal satisfaction (12.5%), need for monitoring protocols (7.3%), and candidate selection and infectious disease protocols, (each 3.1%), limitations of the diving reflex and rates of episiotomies (each 1%). Inaccurate information included denying neonatal aspiration risk (5.2%), and need for candidate selection, neonatal benefit of water birth, (each 4.2%), denying the limitations of the diving reflex and the need for a monitoring protocol, (each 3.1%), false report of maternal health benefits and false information on rates of analgesia, (each 2%), neonatal infection risk, duration of delivery, and maternal satisfaction, (each 1%). No videos addressed alternative methods of delivery, avulsion, maternal health, or neonatal infection risk.

CONCLUSION: Caution is warranted viewing YouTube water birth videos as the most popular vastly overlooked ACOG recommendations. Some accurately emphasized increased maternal satisfaction, but inaccurately addressed neonatal aspiration risk, candidate selection, and neonatal benefits of water births. Future research should

assess the impact that such videos have on patients' perceptions of labor and delivery options compared to healthcare provided information.



gene functions may promote the increased anxiety observed in these offspring via altered microbe-to-host signaling in the gut.

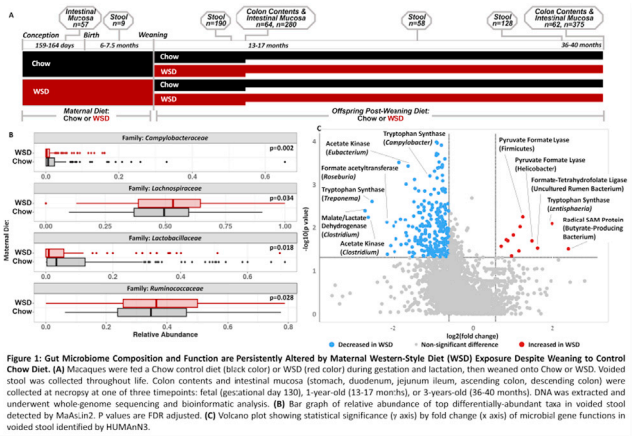


Figure 1: Gut Microbiome Composition and Function are Persistently Altered by Maternal Western-Style Diet (WSD) Exposure Despite Weaning to Control Chow Diet. (A) Macaques were fed a Chow control diet (black color) or WSD (red color) during gestation and lactation, then weaned onto Chow or WSD. Voided stool was collected throughout life. Colon contents and intestinal mucosa (stomach, duodenum, jejunum ileum, ascending colon, descending colon) were collected at necropsy at one of three timepoints: fetal (gestational day 130), 1-year-old (13-17 months), or 3-years-old (36-40 months). DNA was extracted and underwent whole-genome sequencing and bioinformatic analysis. **(B)** Bar graph of relative abundance of top differentially-abundant taxa in voided stool detected by MaAsLin2. P values are FDR adjusted. **(C)** Volcano plot showing statistical significance (y axis) by fold change (x axis) of microbial gene functions in voided stool identified by HUMAnN3.

729 Gut Microbiome is Persistently Altered by Maternal Western-Style Diet Exposure Despite Weaning Diet

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OBJECTIVE: Gut microbes moderate and/or produce metabolites like serotonin and short-chain fatty acids (SCFAs) that are crucial for normal behavior. In a Japanese macaque model, offspring exposed to maternal Western-Style diet (mWSD) display anxiety, despite being weaned onto a control diet. We hypothesized that maternal mWSD alters the gut microbiome's ability to moderate the production of serotonin and SCFA pathway metabolites, contributing to the anxiety phenotype.

STUDY DESIGN: Dams were fed a Chow control diet or mWSD during pregnancy and lactation, then offspring were weaned onto Chow or Western-Style diet. Voided stool, colon contents, and intestinal mucosa were sampled throughout development ranging from fetal (gestational day 130) to pre-puberty (36-40 months) (Fig. 1A). DNA from these tissues (total n=1223 + n=27 kit negative controls) underwent whole-genome sequencing, taxonomic classification with MetaPhlAn4, functional classification with HUMAnN3, and differential abundance determination by MaAsLin2.

RESULTS: mWSD drove differential abundance of n=37 taxa in voided stool, independent of offspring sex, offspring diet, or repeat sampling. Presented at the family level, mWSD was associated with depleted *Campylobacteraceae* (p=0.002) and *Lactobacillaceae* (p=0.018), and enriched *Lachnospiraceae* (p=0.034) and *Ruminococcaceae* (p=0.028) (FDR adjusted p values) (Fig. 1B). At the functional level, mWSD was associated with suppression of gene expression, with n=395 genes down-regulated vs n=122 up-regulated (2-fold change threshold). Genes responsible for tryptophan (serotonin's precursor) availability and SCFA phosphorylation were persistently downregulated at all time points in stool from offspring of dams fed a mWSD (Fig. 1C).

CONCLUSION: Gut microbiome composition and bacterial gene function were found to be significantly altered by mWSD exposure, even when offspring were weaned onto and fed a control diet for 2.5 years. Downregulation of serotonin's precursor and SCFA-related

730 Vaginal progesterone treatment failure in otherwise low-risk patients with short cervix

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OBJECTIVE: Although vaginal progesterone is recommended for treatment in otherwise low-risk patients with cervical length (CL) ≤25mm, the data are limited on failed treatment, defined as the need for cerclage placement, cervical dilation, or spontaneous delivery prior to 24 weeks, particularly for the highest risk subgroup with CL ≤10mm.

STUDY DESIGN: This is a retrospective cohort study (2016-2022) at a single institution of individuals with singleton pregnancies, no history of spontaneous preterm birth, and started on vaginal progesterone for CL of ≤25mm between 16-24 weeks. The primary outcome was cerclage placement, cervical dilation, or spontaneous delivery prior to 24 weeks. Planned subgroup analysis was performed for those with CL ≤10mm. Baseline and sonographic characteristics were compared using chi-square, Fisher's exact, t-test, or Wilcoxon rank sum test as appropriate. Kaplan Meier survival curves were used to depict time to treatment failure stratified by CL ≤10mm.

RESULTS: Of 162 patients who met inclusion criteria, 41 (25.3%) failed treatment defined as cerclage placement (N=39), cervical dilation (N=16), or spontaneous delivery prior to 24 weeks (N=5). Baseline demographic characteristics were similar between groups. The relative risk of treatment failure for those with CL ≤10mm was 4.07 [2.61, 6.35] compared to those with CL >10mm. Individuals who experienced treatment failure were more likely to have initial sonographic findings of cervical funneling (81.6% vs 30.6%, p< 0.001), changes with Valsalva (46.7% vs 10.6%, p< 0.001), and dynamic changes (43.8% vs 18.8%, p=0.009) at their initial ultrasound diagnosing short cervix. Gestational age at diagnosis of short cervix did not differ between groups. Approximately 75% of patients with cervical lengths ≤10mm experienced treatment failure within 3 weeks of their initial short cervix ultrasound.

CONCLUSION: In otherwise low-risk patients with a short cervix on vaginal progesterone, the risk of cerclage placement, cervical dilation, or pregnancy loss prior to 24 weeks is significant (25%) and

approaches 75% in patients with cervical length ≤10mm.

Table: Sociodemographic characteristics and ultrasound findings of low-risk patients with short cervix on vaginal progesterone by treatment outcomes

	No dilation or cerclage placement prior to 24 weeks (N=121)	Cerclage placement, dilation, or pregnancy loss prior to 24 weeks (N=41)	p-Value
Sociodemographic characteristics			
Age	31.8 ± 5.9	32.3 ± 5.2	0.65
Race			0.10
White	30 (24.8)	16 (39.0)	
Black	42 (34.7)	11 (26.8)	
Asian	2 (1.7)	3 (7.3)	
Other	4 (3.3)	0 (0.0)	
Unknown	43 (35.5)	11 (26.8)	
Ethnicity			0.23
Latinx	41 (33.9)	20 (48.8)	
Non-Latinx	52 (43.0)	14 (34.1)	
Unknown	28 (23.1)	7 (17.1)	
Insurance Type			0.48
Private	63 (61.8)	23 (63.9)	
Medicaid	38 (37.3)	12 (33.3)	
Medicare	1 (1.0)	0 (0.0)	
Self-pay	0 (0.0)	1 (2.8)	
Smoking Status			0.08
Current smoker	0 (0.0)	2 (5.1)	
Former smoker	12 (10.0)	4 (10.3)	
Never smoker	108 (90.0)	33 (84.6)	
Pre-gravid BMI	26.4 (24.0 to 30.9)	27.9 (25.4 to 30.4)	0.42
Uterine anomaly	2 (1.7)	0 (0.0)	>0.99
Cervical dysplasia	30 (24.8)	7 (17.1)	0.31
Prior LEEP	12 (9.9)	2 (4.9)	0.57
Prior cold-knife cone	4 (3.3)	0 (0.0)	0.52
Prior term deliveries	0.0 (0.0 to 1.0)	0.0 (0.0 to 1.0)	0.68
Prior cesarean deliveries	1.0 (1.0 to 1.0)	1.0 (1.0 to 1.0)	>0.99
IVF pregnancy	9 (8.0)	3 (7.9)	>0.99
Gestational age at initial short cervix			0.32
16 to <20 weeks	66 (54.5)	26 (63.4)	
20 to <24 weeks	55 (45.5)	15 (36.6)	
Ultrasound findings at initial short cervix			
Funneling	30 (30.6)	31 (81.6)	<0.001
Changes with Valsalva	10 (10.6)	14 (46.7)	<0.001
Dynamic changes	16 (18.8)	14 (43.8)	0.009

Data presented as mean ± standard deviation, N (%), or median (interquartile range).

731 Nationwide Trends in Periviable Preterm Birth Interventions

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OBJECTIVE: To examine differences in periviable preterm birth interventions in neonates born in 2021 compared to 2016 in the United States after implementation of the Obstetrics Care Consensus guidelines (introduced in 2015 with most recent revisions made in 2017).

STUDY DESIGN: This study is a retrospective analysis of the National Vitals Statistics Database, comparing obstetric (corticosteroids and cesarean delivery) and neonatal interventions (ventilation, surfactant use, NICU admission) for periviable preterm births (22 to 25 weeks' gestation) in the years 2016 and 2021. Adjusted odds ratios and 95% confidence intervals were calculated for the outcomes of interest, using the year 2016 as the reference group.

RESULTS: Table 1 presents a comparison of birth characteristics for the years 2016 and 2021. In 2016, preterm births accounted for 11.4% (450,225 cases). Among the preterm births, 15,668 (447/1000 births) were categorized as periviable births (between 22 to 25 weeks gestation). In 2021, preterm births slightly increased to 12.3% (450,318). Periviable births numbered 13,689 (425/1000 births), showing a small decrease compared to 2016. Table 2 provides the adjusted odds ratios for various outcomes in the year 2021 when compared to 2016 (reference group). Use of Corticosteroids for Fetal Lung Maturity showed an odds ratio of 1.51 (CI: 1.42-1.60) in 2021 and the odds of Cesarean Section rose to 1.20 (CI: 1.13-1.27) in 2021 compared to the reference year 2016. Additionally, the odds of Immediate-Assisted Ventilation were 1.35 times higher in 2021 compared to 2016, with a 95% CI of (1.27-1.43). Furthermore, the odds of Assisted ventilation exceeding 6 hours increased to 1.30 (CI: 1.22-1.38), NICU Admission to 1.31 (CI: 1.23-1.40), and Surfactant Use to 1.18 (CI: 1.10-1.27) in 2021.

CONCLUSION: These findings suggest that neonatal care interventions and medical practices for periviable preterm births have undergone substantial changes between 2016 and 2021. Further study is warranted to understand how current management of periviable preterm births impacts long term maternal and neonatal health outcomes.

Table 1. Comparison of neonatal preterm birth characteristics in year 2016 to 2021

Characteristic	Year 2016	Year 2021
Term Births	3,502,371 (88.5%)	3,216,483 (87.6%)
Preterm Births	450,225 (11.4%)	450,318 (12.3%)
Periviable Births (22-25 weeks)	15,668 (0.4%)	13,689 (0.4%)

Table 2. Adjusted odds ratios (OR) for year 2021 compared to year 2016 (reference group)

Outcomes	Year 2016	Year 2021	95% CI
Immediate-Assisted Ventilation	1.0	1.35	(1.27-1.43)
Assisted ventilation > 6 hours	1.0	1.30	(1.22-1.38)
NICU Admission	1.0	1.31	(1.23-1.40)
Surfactant Use	1.0	1.18	(1.10-1.27)
Corticosteroids for Fetal Lung Maturity	1.0	1.51	(1.42-1.60)
Cesarean Section	1.0	1.20	(1.13-1.27)

1. Each multivariate logistic model used stepwise model selection. First, characteristics including maternal age, nativity, race, marital status, education, paternal age, paternal race, paternal education, payment type, nulliparous status, participant in WIC, smoking, BMI, Pre-diabetes, gestational diabetes, chronic hypertension, gestational hypertension, eclampsia, prior preterm birth and prior cesarean section were included in the full model. Then, stepwise model selection used a significance level of entry=0.15 and significance level of stay =0.15 to select final model. Adjusted odds ratios listed here are from the final model.

732 Multi-disciplinary Review of International Guidelines on Iron Deficiency Anemia in Pregnancy

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OBJECTIVE: Iron deficiency anemia (IDA) in pregnancy is a common diagnosis that is associated with adverse obstetric and neonatal outcomes. There is limited high-quality evidence to guide screening, prevention, and treatment of IDA in pregnancy. There is no consensus on benefits of routine iron supplementation, with concerns regarding potential harmful effects in women who are iron replete. The purpose of this review was to compare the content and appraise the quality of international guidelines on the screening and treatment of IDA in pregnancy.

STUDY DESIGN: Fourteen international guidelines were selected and appraised by a multidisciplinary team of 2 obstetricians, a hematologist and clinical dietician. International guidelines from the U.S., Europe, the U.K., Australia, New Zealand and Canada were reviewed. The AGREE II GRS tool was employed. Independent reviewer assessment collated scores from 1-7 for an overall score incorporating seven domains: process of development, clarity of presentation, completeness of reporting, clinical validity, and overall quality. The reviewers' mean scores were also individually compared according to discipline.

RESULTS: The mean score across all the guidelines was 4.4 (range 3.5-6.5). The median score was 4 (3.6-5.2 IQR). There was noted variation in overall scores among the different disciplines of the reviewers. Half of the guidelines recommended routine iron in pregnancy. Four guidelines recommended routine screening with ferritin in pregnancy, two recommended selective screening with ferritin for at risk groups only and one guideline suggested using ferritin where feasible. One guideline specifically advises against routine use of ferritin in pregnancy. While most of the guidelines recommended similar doses of oral elemental iron of 100-200mg daily, 2 guidelines recommend twice daily or three times daily dosing.

CONCLUSION: IDA in pregnancy is a common obstetric problem encountered in all populations. Despite this, there clearly remains a need to clarify the optimal screening method, dosing regimen, and timing of iron supplementation in pregnancy.

733 Perinatal outcomes in pregnancies complicated by a prenatal diagnosis of critical congenital heart disease (CCHD)

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OBJECTIVE: Prenatal diagnosis of CCHD allows for optimal perinatal decision-making. We sought to examine care pathways and perinatal outcomes on prenatally and postnatally diagnosed cases over a four-year period.

STUDY DESIGN: This retrospective cohort study sought to determine the perinatal outcome of pregnancies complicated by CCHD detected prenatally and postnatally from 01/2019 to 12/2022. Patients attending a tertiary perinatology center in Ireland and its affiliated secondary centers underwent mid-trimester fetal cardiac ultrasound examination. All pregnancies diagnosed with CCHD were referred prenatally to the Fetal-medicine/cardiology service, offered genetic testing and counselling. Data sources included retrospective electronic chart and ultrasound report review and neonatology/pediatric records. All cases were treated in a single national pediatric cardiac center. CCHD was defined as duct-dependency or structural abnormality requiring urgent intervention in the 1st month of life.

RESULTS: Among 49,950 screened pregnancies, the incidence of CCHD was 0.21% (104/49,950) with a prenatal detection rate of 91% (95/104). In the prenatally diagnosed group, 41% of cases were complicated by extracardiac structural abnormalities, a genetic diagnosis or both. 10% chose pregnancy termination, 29% opted for perinatal palliation and 7% died in utero. Among 67 cases evaluated for neonatal cardiac intervention, 17 (25%) were deemed not surgical candidates. All remaining neonates 52/67 (78%) had surgery or catheterization or both in the first month of life. Survival to Day 30 of life was 88% (46/52) and 85% (44/52) at 1 year in the prenatally diagnosed cohort. All 9 cases of CCHD first diagnosed in the postnatal period (all of whom had aortic coarctation or critical pulmonary stenosis) were alive at 1 year.

CONCLUSION: 40% of all pregnancies complicated by CCHD will not undergo neonatal cardiac intervention, by virtue of parental choice determined either prenatally or after birth. Survival at one year for infants deemed suitable for CCHD surgery is in excess of 85%.

Table 1: Pregnancy Outcomes in prenatally diagnosed CCHD:

Outcome		All (N=95)	Left duct-dependant heart disease (N =39)	Right Duct - dependant heart disease (N=38)	Transposition of the great arteries (N=15)	Congenital heart block (N=3)
Extracardiac structural anomaly		30 (31%)	16 (41%)	14 (38%)	0	0
Genetic abnormality	T21	2 (2%)	0	2 (5%)	0	0
	T18	3 (3%)	3 (8%)	0	0	0
	T13	1 (1%)	1 (3%)	0	0	0
	Triploidy	0	0	0	0	0
	Di George	4 (4%)	1 (3%)	3 (8%)	0	0
	Other	10 (10%)	6 (15%)	4 (11%)	0	0
Isolated CCHD		59 (62%)	21 (54%)	20 (53%)	15 (100%)	3 (100%)
Pregnancy termination		10 (10%)	8 (21%)	1 (3%)	1 (7%)	0
In-utero fetal death		7 (7%)	2 (5%)	4 (11%)	0	1 (25%)
Liveborn		78/95 (82%)	29 (74%)	33 (87%)	14 (93%)	2 (75%)
Palliative care plan prenatally		11/78 (14%)	6 (21%)	5 (15%)	0	0
Babies considered for surgery		67/78 (86%)	23/29(79%)	28/33(85%)	14 (100%)	2/2 (100%)
Prostin given		48/67 (72%)	16 (69%)	18 (64%)	14 (100%)	0
Palliative care plan postnatally		17/67 (25%)	9/23 (39%)	8/28(28%)	1/14 (7%)	0
Urgent cardiac catheterization		35/67 (52%)	9/23 (39%)	17/28 (60%)	7/14 (50%)	0
Surgery performed		49/67 (73%)	15/23 (65%)	19/28 (67%)	13/14 (93%)	2 (100%)
Survival at 28 days post procedure #		46/52 (88%)	14/16 (87%)	18/21 (86%)	12/13 (92%)	2/2 (100%)
Survival at 1 year post-procedure#		44/52 (85%)	13/16(81%)	17/21 (81%)	12/13 (92%)	2/2(100%)

Denominator of those with catheterization/surgery or both (N=52)
Note: n (%) is presented for categorical data and mean (SD) for numeric data.

734 Uterine artery doppler, placental volume, and the risk for hypertensive disorders of pregnancy

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OBJECTIVE: Hypertensive disorders of pregnancy (HDP) constitute a leading cause of maternal and perinatal morbidity and mortality worldwide. Early identification of pregnancies at risk for HDP could lead to improved risk stratification and surveillance to reduce morbidity and mortality. Our objective was to evaluate the risk for developing HDP by evaluating first trimester placental volume and uterine artery (UtA) Doppler velocimetry.

STUDY DESIGN: Retrospective case-control study of 664 patients with singleton gestations who presented for aneuploidy screening between 10 3/7 and 13 6/7 weeks' gestation. Each patient had three-dimensional placental volumes and bilateral UtA Doppler studies performed transabdominally with a Voluson E8 (GE Healthcare, Milwaukee, WI). UtA resistance index (RI) and notching were assessed. A placental quotient (PQ) was calculated by dividing the placental volume by the crown rump length. A UtA score was calculated by assigning one point for an RI >0.70 (>75th percentile) and one point for reproducible diastolic notching. The UtA score was calculated for each artery with points combined for a total score between 0-4. Next, UtA scores were grouped into three groups: score of 0, score of 1-2, and score of 3-4. Logistic regression was used to investigate the associations of PQ and UtA score groups with HDP.

RESULTS: PQ was not significantly associated with HDP ($p = 0.12$). The largest difference between UtA score groups occurred between groups 1-2 and 3-4 in predicting the development of preeclampsia (with and without severe features) (OR: 0.28, 95% CI: 0.12-0.66,$p = 0.003$). This relationship remained significant after adjusting for parity, body mass index, and chronic hypertension.

CONCLUSION: In this low-risk population, placental volume does not appear to be associated with HDP in the first trimester. A combination of increased RI and notching is associated with an increased risk of developing preeclampsia. Additional larger studies are warranted to confirm this finding in a low-risk patient population.

Table 1: Demographic Differences between Patients with no Preeclampsia and Patients with Preeclampsia (with and without Severe Features)

Variable		No Preeclampsia (n = 629)	Preeclampsia (n = 35)	Total	P-value
Maternal Age	Younger than 35	286 (94.7%)	16 (5.3%)	302 (46.0%)	0.969
	35 and above	335 (94.6%)	19 (5.4%)	354 (54.0%)	
Race	White	582 (94.5%)	34 (5.5%)	616 (92.8%)	0.305
	Black/Other	47 (97.9%)	1 (2.1%)	48 (7.2%)	
BMI	30kg/m^2 and below	554 (95.5%)	26 (4.5%)	580 (89.0%)	0.004
	Greater than 30kg/m^2	63 (87.5%)	9 (12.5%)	72 (11.0%)	
Parity	Multiparous	365 (97.1%)	11 (2.9%)	376 (57.3%)	0.001
	Nulliparous	256 (91.4%)	24 (8.6%)	280 (42.7%)	
Chronic Hypertension	No	623 (95.1%)	32 (4.9%)	655 (98.6%)	0.000
	Yes	6 (66.7%)	3 (33.3%)	9 (1.4%)	
Aspirin Use	No	577 (94.7%)	31 (5.1%)	608 (91.6%)	0.512
	Yes	52 (92.9%)	4 (7.1%)	56 (8.4%)	
Placental Quotient	Mean (SD)	1.4 (0.46)	1.3 (0.40)	1.4 (0.46)	0.146
Placental Quotient Percentile	Less than 10th percentile	53 (94.6%)	3 (5.4%)	56 (8.4%)	0.689
	10th-90th percentile	511 (94.5%)	30 (5.5%)	541 (81.6%)	
	Greater than 90th percentile	64 (97.0%)	2 (3.0%)	66 (10.0%)	
PAPP-A	Less than the 10th percentile	67 (95.7%)	3 (4.3%)	70 (10.6%)	0.686
Uterine Artery Score	Zero	173 (95.1%)	9 (4.9%)	182 (27.4%)	0.007
	One-Two	296 (97.0%)	9 (3.0%)	305 (45.9%)	
	Three-Four	160 (90.4%)	17 (9.6%)	177 (26.7%)	

735 Mode of delivery does not impact cardiovascular morbidity in patients with prior cardiovascular disease

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OBJECTIVE: Cardiovascular disease (CVD) affects up to 44% of women aged 20 years or older, making it an increasingly prevalent problem in persons of reproductive age. Patients with pre-existing CVD who become pregnant face an increased risk of adverse maternal and fetal outcomes. There is limited evidence available to guide the mode of delivery in persons with a history of CVD. The objective of this study is to determine if the mode of delivery affects CVD-related morbidity in a person with prior CVD. We hypothesize that patients with pre-existing CVD who undergo a cesarean delivery will be at increased risk of CVD morbidity in the first year after delivery.

STUDY DESIGN: We designed a retrospective cohort study utilizing the Nationwide Readmissions Database (2010-2018) to identify singleton births. ICD-9 and ICD-10 codes were used to identify patients with pre-existing CVD and who experience CVD morbidity within the calendar year of index delivery. Associations between mode of delivery and CVD morbidity were determined from Cox proportional hazards regression models before and after adjusting for potential confounders including hospital bed size, teaching status, patient insurance, and income.

RESULTS: Of the 19,217 patients with prior CVD who underwent delivery, 46% (n = 8,914) underwent a cesarean. Rates of CVD hospitalizations per 100,000 delivery discharges were 9,748 and 9,607 for cesarean and vaginal delivery (adjusted hazard ratio [HR] 0.98, 95% confidence interval [CI] 0.77, 1.11) (Table). The risk for stroke was highest in the first 30 days after the index delivery (adjusted HR 1.81, 95% CI 0.87-3.74) and diminished with increasing latency.

CONCLUSION: In patients with pre-existing CVD, the mode of delivery was not associated with the risk of CVD-related morbidity in the year following delivery. These findings support the recommendations that the usual obstetrical indications should be used to guide the mode of delivery in persons with pre-existing CVD.

Table 1

	Hazard ratio (95% confidence interval)	
	Unadjusted	Adjusted
Non-fatal complications		
Any cardiovascular disease	1.02 (0.84-1.23)	0.92 (0.77-1.11)
Any coronary heart disease	0.99 (0.81-1.21)	0.90 (0.74-1.09)
Ischemic heart disease	1.16 (0.77-1.76)	0.97 (0.64-1.47)
Atherosclerotic heart disease	0.83 (0.44-1.57)	0.90 (0.48-1.67)
Acute myocardial infarction	2.56 (0.83-7.88)	1.82 (0.56-5.90)
Hypertensive heart disease	1.57 (0.89-2.79)	1.20 (0.65-2.21)
Heart failure	0.99 (0.72-1.35)	0.88 (0.65-1.18)
Cardiomyopathy	1.27 (0.84-1.91)	1.16 (0.76-1.76)
Cardiac arrythmias	1.24 (0.95-1.62)	1.16 (0.88-1.54)
Any stroke	1.24 (0.79-1.95)	1.00 (0.70-1.71)
Ischemic stroke	1.25 (0.70-2.24)	1.10 (0.63-1.91)
Hemorrhagic stroke	1.21 (0.54-2.72)	1.10 (0.51-2.35)

Table 1: Risk of cardiovascular disease readmission by type in persons with pre-existing cardiovascular disease

736 Identifying women at high risk for preterm birth based on clinical data using machine learning

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OBJECTIVE: Existing models for predicting spontaneous preterm birth (delivery< 37 weeks, sPTB) are limited, relying mostly on a history of sPTB and multiple gestations, leaving the question of whether to screen the low-risk population for cervical dynamics during the 2nd trimester a matter of debate. Another challenge arises upon admission of patients presenting with suspected sPTB, regarding the need for corticosteroids or magnesium treatment for reducing prematurity complications. We aimed to develop a bedside tool using machine learning, to assist clinicians identify patients who justify cervical length screening, as well as identify those in need of corticosteroids or magnesium upon admission for suspected sPTB.

STUDY DESIGN: A data-based study of all live deliveries in a tertiary hospital between 2013-2023, of which 20% were used as a holdout test set, and 80% to train and validate a prediction model for sPTB using Xgboost. 1st trimester parameters were used to predict sPTB at 12 weeks. Within the population admitted with suspected sPTB (presenting with PMC, pPROM or cervical length< 20 mm), data available upon admission were used to predict sPTB within 2 or 7 days.

RESULTS: Included 63,937 deliveries, of whom 3,772 (5.9%) had a sPTB. Using 1st trimester parameters, 2% of the population were identified with a probability of 50% for having a sPTB that represent 25% of the sPTB cases. Excluding multiple gestations allowed to recognize 20% of the population having a 10% risk for sPTB representing over 40% of the sPTB cases. Including only singleton nulliparas, still allowed for some stratification; women with the highest 20% scores had a 1.5 risk factor for sPTB.

Within 3,718 patients who were admitted with suspected sPTB, 17% were recognized as high-risk patients, having a probability of practically 100% to deliver within 7 days (recall 0.5) and 10% were recognized as having a probability of 100% to deliver within 2 days (recall 0.3).

CONCLUSION: Implementation of machine learning can assist clinicians identify patients who are at higher risk for sPTB and justify cervical screening or medical interventions.

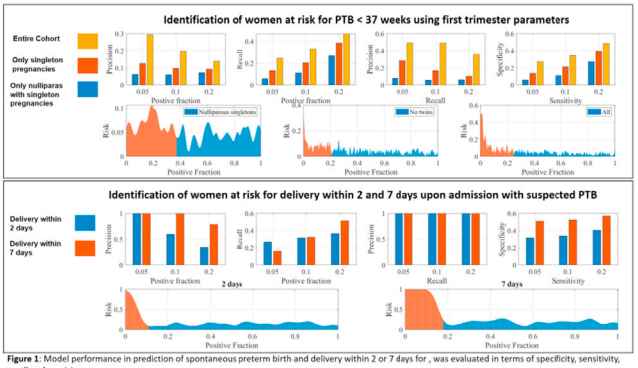

Figure 1: Model performance in prediction of spontaneous preterm birth and delivery within 2 or 7 days for , was evaluated in terms of specificity, sensitivity, recall and precision.

737 Trends and outcomes among pregnancy and non- pregnancy related hospitalizations with diabetic ketoacidosis

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OBJECTIVE: To evaluate temporal trends and outcomes related to diabetic ketoacidosis (DKA) in pregnancy and ascertain if it is associated with a higher rate of adverse outcomes than in non-pregnant reproductive age persons with DKA.

STUDY DESIGN: We conducted a retrospective cross-sectional study using the National Inpatient Sample to identify hospitalizations with DKA among reproductive age women (15-49 years) in the U.S. (2016-2020). DKA in pregnancy hospitalizations was compared to DKA in non- pregnant hospitalizations. Adverse outcomes evaluated included mechanical ventilation, coma, seizures, renal failure, prolonged hospital stay and death. Multivariable Poisson regression models with robust error variance were used to estimate adjusted relative risk (aRR) and 95% confidence interval (CI). Annual percent change (APC) was used to calculate change in DKA over time.

RESULTS: Among 35, 210,711 hospitalizations in reproductive age women, 447,600 (0.3%) were hospitalized with DKA. Of these, 13,390 (3%) hospitalizations occurred during pregnancy. Baseline characteristics differed in age, race and ethnicity, primary payer, household income, smoking status, location and teaching status of hospital, region of hospital bed size of hospital, heart disease, and baseline complications of diabetes. After adjustment, except for prolonged hospital stay, all adverse outcomes were more likely in non-pregnant DKA hospitalizations than in pregnant DKA hospitalizations (Table). Pregnancy related DKA hospitalizations were associated with a high rate of adverse outcomes including 12.5% renal failure, 2.1% seizures, 0.9% coma, and 0.2% mortality (Table). The rate of DKA increased over time (APC 3.8%, 95% CI 1.5 − 6.1), due to an increase in non-pregnancy related DKA (APC 4.7%, 95% CI 1.8 − 7.7).

CONCLUSION: A nationally representative sample of hospitalizations indicates higher risk of adverse outcomes in non-pregnancy related DKA hospitalizations as compared to pregnancy related DKA hospitalizations. DKA in pregnancy occurs at a rate of 68 per 100,000 hospitalizations with substantial adverse outcomes, including 0.2% mortality.

Table. Adverse outcomes associated with non- pregnancy hospitalizations with diabetic ketoacidosis and pregnancy hospitalizations with diabetic ketoacidosis

Outcomes	All	N	%	Crude RR (95% CI)	Adjusted RR* (95% CI)
Mechanical ventilation					
Not pregnancy related	434, 210	16,105	3.7	**1.91 (1.45-2.51)**	**1.56 (1.18-2.06)**
Pregnancy related	13,390	260	1.9	1.00	1.00
Seizures					
Not pregnancy related	434, 210	21,615	5.0	**2.34 (1.79-3.06)**	**2.26 (1.72-2.97)**
Pregnancy related	13,390	285	2.1	1.00	1.00
Renal Failure					
Not pregnancy related	434, 210	145,745	33.6	**2.68 (2.41-2.97)**	**2.26 (2.05-2.50)**
Pregnancy related	13,390	1,680	12.5	1.00	1.00
Prolonged hospitalization (>7 days)					
Not pregnancy related	434, 210	36,780	8.5	**0.71 (0.64-0.79)**	**0.64 (0.57-0.71)**
Pregnancy related	13,390	1,590	11.9	1.00	1.00
Coma					
Not pregnancy related	434, 210	10,130	2.3	**2.72 (1.81-4.08)**	**2.53 (1.68-3.83)**
Pregnancy related	13,390	115	0.9	1.00	1.00
Death					
Not pregnancy related	434, 010	3,250	0.7	**3.34 (1.50-7.43)**	**2.38 (1.06-5.36)**
Pregnancy related	13,385	30	0.2	1.00	1.00

RR: relative risk; CI: confidence interval
Data are n (%) unless otherwise specified; Bolded if statistically significant.
*Adjusted for: age, race and ethnicity, tobacco use, primary payor, median household income quartile, location/teaching status of hospital, bed status of hospital, hospital region, heart disease, systemic lupus erythematous, diabetic neuropathy, diabetic nephropathy, diabetic chronic kidney disease, and hypertensive disorders

738 Trends and outcomes among racial and ethnic groups in pregnancy associated stroke

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OBJECTIVE: To compare trends of pregnancy associated stroke (PAS), risk factors, and adverse maternal outcomes among racial and ethnic groups.

STUDY DESIGN: This was a retrospective cross-sectional study of the National Inpatient Sample to identify hospitalizations with PAS in the U.S. (2016-2020). The inclusion criteria was PAS at any time. Race and ethnicity were categorized as non-Hispanic White, non-Hispanic Black, Hispanic, and non-Hispanic Other. We excluded those with unknown race/ethnicity. Demographics, clinical characteristics and adverse maternal outcomes (mechanical ventilation, seizure, pneumonia, prolonged hospital stay [> 7 days] and in hospital mortality) were compared among racial and ethnic groups. Multivariable Poisson regression models with robust error variance were used to estimate adjusted relative risk (aRR) and 95% confidence interval (CI). Annual percent change (APC) was calculated to assess changes in rates of PAS over time.

RESULTS: Among 19,717,450 pregnancy hospitalizations, 7,815 hospitalizations (0.04%) had pregnancy associated stroke. Of these, 3,390 (45.4%) identified as Non-Hispanic White, 1,865 (25%) as Non-Hispanic Black, 1,400 (18.8%) as Hispanic, 810 (10.9%) as

Non-Hispanic Other race and 350 (0.4%) were excluded given unknown race/ethnicity. The groups differed in age, primary payer, smoking status, location and teaching status of hospital, and region of hospital. Non-Hispanic Black PAS were more likely to have body mass index ≥ 30, diabetes, sickle cell disease, hypertensive disorder of pregnancy, and have postpartum stroke. After adjustment, there was no significant difference in the risk of in-hospital mortality, prolonged hospital stay, or mechanical ventilation. However, there was a higher risk in seizure in non−Hispanic Other group and pneumonia in non-Hispanic Black (Table). The rate of PAS remained stable over the 5-year analysis period in all racial and ethnic groups.

CONCLUSION: A nationally representative sample of hospitalizations in the U.S. indicates racial and ethnic differences in the risk of some adverse outcomes related to pregnancy associated stroke.

Table. Adverse outcomes in pregnancy associated stroke by race and ethnic group

Outcomes	All	N	%	Crude RR (95% CI)	Adjusted RR* (95% CI)
Mechanical ventilation					
Non-Hispanic White	3390	475	14.0	1.00	1.00
Non-Hispanic Black	1865	360	19.3	**1.38 (1.04 - 1.84)**	1.09 (0.81 – 1.48)
Hispanic	1400	260	18.6	1.33 (0.98 - 1.80)	1.10 (0.80 – 1.52)
Non-Hispanic Other	810	145	17.9	1.28 (0.88 – 1.85)	1.11 (0.76 – 1.61)
Seizure					
Non-Hispanic White	3390	435	12.8	1.00	1.00
Non-Hispanic Black	1865	335	18.0	**1.40 (1.04 – 1.88)**	1.28 (0.93 – 1.75)
Hispanic	1400	250	17.9	1.39 (1.01 – 1.92)	1.30 (0.93 – 1.81)
Non-Hispanic Other	810	170	21.0	**1.64 (1.13 – 2.36)**	**1.64 (1.14 – 2.35)**
Pneumonia					
Non-Hispanic White	3390	100	2.9	1.00	1.00
Non-Hispanic Black	1865	160	8.6	**2.91 (1.68 – 5.03)**	**2.14 (1.15 – 3.98)**
Hispanic	1400	70	5.0	1.69 (0.88 – 3.28)	1.21 (0.59 – 2.48)
Non-Hispanic Other	810	30	3.7	1.26 (0.51 – 3.07)	1.03 (0.42 – 2.51)
Prolonged hospital stay >7 days					
Non-Hispanic White	3390	870	25.7	1.00	1.00
Non-Hispanic Black	1865	575	30.8	1.20 (0.98 – 1.47)	1.03 (0.83 – 1.28)
Hispanic	1400	415	29.6	1.16 (0.92 – 1.45)	1.04 (0.82 – 1.31)
Non-Hispanic Other	810	275	34.0	**1.32 (1.02 – 1.71)**	1.18 (0.91 – 1.54)
In hospital mortality					
Non-Hispanic White	3390	135	4.0	1.00	1.00
Non-Hispanic Black	1865	80	4.3	1.08 (0.59 – 1.97)	1.16 (0.59 – 2.29)
Hispanic	1400	55	3.9	0.99 (0.50 – 1.93)	0.82 (0.40 – 1.66)
Non-Hispanic Other	810	55	6.8	1.71 (0.89 – 3.28)	1.53 (0.79 – 2.96)

All analyses were reported with weighted estimation, unless otherwise specified; Bolded if statistically significant
*Adjusted for age, primary payer, smoking, location and teaching status of hospital, region of hospital, diabetes, body mass index ≥30 (kg/m^2), sickle cell disease, thrombophilia, migraines, hypertensive disorders, postpartum

739 Maternal fertility treatments and the risk for celiac disease of the offspring

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OBJECTIVE: Fertility treatments affect the female hormonal and immunological milieu, which also support the growing fetus. As celiac disease is known to be an immune-mediated disorder, we opted to investigate whether offspring of women conceived using fertility treatments are at higher risk to develop celiac disease.

STUDY DESIGN: A large population-based cohort study including all singleton deliveries in a tertiary medical center between the years 1991 and 2021 was conducted. The risk for celiac disease was compared between children (up to the age of 18 years) of women who conceived using fertility treatments (including ovulation induction with or without intrauterine insemination and in-vitro fertilization) and children born after spontaneously conceived pregnancies. Data for celiac disease diagnosis were extracted from community-based clinics and hospitalization records. Kaplan-Meier survival curve was used to compare the incidence of celiac disease between the study groups. A Cox proportional hazards model was used to control for possible confounders.

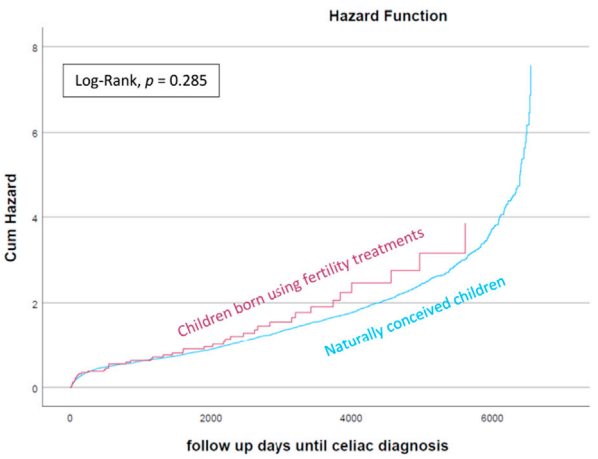
RESULTS: A total of 356,356 singleton deliveries were included in the study, of which 7,711 (2.2%) deliveries were pregnancies conceived using fertility treatments. Children born following fertility treatments had comparable rate of celiac disease as children who were born following spontaneously conceived pregnancies (0.6% vs. 0.5%, p=0.477, **Figure**). The Kaplan-Meier survival curve illustrated comparable cumulative incidence of celiac disease in both groups (Log Rank, p=0.285, **Figure**). Using a Cox proportional hazards model, controlling for maternal age and gestational age, fertility treatments were not associated with celiac disease of the offspring (adjusted hazard ratio (HR)=1.13, 95%CI 0.84-1.52, p=0.392, **Figure**).

CONCLUSION: Fertility treatments do not increase the risk for celiac disease of the offspring.

Figure. The association between being born using fertility treatments and celiac disease: Univariate analysis, Kaplan Meier survival curve and results from a Cox proportional hazards model

	Fertility treatments (n=7,711)	Spontaneously conceived pregnancy (n=348,645)	Odds Ratio (95% CI)	Adjusted* HR (95% CI)
Celiac disease	47 (0.6%)	1,914 (0.5%)	1.11 (0.83 – 1.48)	1.13 (0.84 – 1.52)

* Adjusted for maternal age and gestational age



740 Maternal history of recurrent pregnancy loss and placental related complications

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OBJECTIVE: Recurrent pregnancy loss (RPL) is a complex condition in which hematologic, endocrine and immunologic disorders have been identified as contributing factors. These disorders are also associated with suboptimal implantation and placentation. Hence, we sought to investigate whether maternal history of RPL is associated with placental-related complications in pregnancy.

STUDY DESIGN: A retrospective population-based cohort study of singleton deliveries was conducted to evaluate placental-related complications, including hypertensive disorders of pregnancy (gestational hypertension and preeclampsia), intra-uterine growth restriction (IUGR), placental abruption, placenta previa and preterm delivery, in mothers with and without a history of RPL. Generalized

estimating equation (GEE) models were used to control for potential confounders.

RESULTS: During the 30 years (1991-2021) study period, 356,356 singleton deliveries occurred; 14,235 deliveries (4.0%) occurred in women with a history of RPL. Placental complications were significantly more prevalent following RPL, including placental abruption, placenta previa and preterm delivery (**Table**). Using GEE models, controlling for siblings, maternal age, hypertensive disorders of pregnancy, pre-gestational and gestational diabetes mellitus, smoking and fertility treatments, maternal history of RPL was independently associated with IUGR, placental abruption, placenta previa and preterm delivery (**Table**).

CONCLUSION: Maternal history of RPL is an independent risk factor for placental-related complications in pregnancy, unrelated to maternal hypertensive disorders. Thus, emphasizing the need for specialized care and monitoring of these women.

Table. Placental-related complications in women with and without a history of RPL: Univariate analysis and results from a GEE model

	History of RPL (n=14,235)	No RPL (n=342,121)	Odds ratio (95%CI)	p value	Adjusted* OR (95%CI)	p value
Hypertensive disorders of pregnancy (%)	585 (4.1)	13,136 (3.8)	1.07 (0.98 – 1.16)	0.101	0.93** (0.85 – 1.03)	0.189
Intra-uterine growth restriction (%)	274 (1.9)	5,951 (1.7)	1.10 (0.98 – 1.25)	0.098	1.21 (1.06 – 1.37)	0.004
Placental abruption (%)	120 (0.8)	1,736 (0.5)	1.66 (1.38 – 2.00)	<0.001	1.47 (1.21 – 1.79)	<0.001
Placenta previa (%)	118 (0.8)	1,338 (0.4)	2.13 (1.76 – 2.57)	<0.001	1.54 (1.27 – 1.86)	<0.001
Preterm delivery (<37 weeks) (%)	1,417 (10.0)	23,094 (6.8)	1.52 (1.44 – 1.61)	<0.001	1.50 (1.40 – 1.61)	<0.001

* adjusted for siblings, maternal age, hypertensive disorders of pregnancy, pre-gestational and gestational diabetes mellitus, smoking and fertility treatments.

** adjusted for siblings, maternal age, pre-gestational and gestational diabetes mellitus, smoking and fertility treatments.

741 The association between hysterotomy extension and subsequent preterm birth

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OBJECTIVE: We aimed to quantify the association between uterine incision extensions and preterm birth (PTB) in a subsequent delivery.

STUDY DESIGN: We performed a retrospective cohort study using electronic perinatal data collected in 4 university-affiliated obstetrical centers, representing approximately 25% of all deliveries in the state of Israel. The study included patients with a primary cesarean delivery (CD) of a term, singleton live birth and a subsequent singleton birth in the same catchment (2006-2021). The primary outcome was subsequent PTB < 37 weeks; secondary outcomes included subsequent PTB < 34, < 32 and < 28 weeks. We assessed crude and adjusted associations between uterine incision extensions and subsequent PTB in multivariable regression models using odds ratios (ORs) and 95% confidence intervals (CIs). Adjusted models included several factors such as length of labour, indication for CD, chorioamnionitis, and smoking during pregnancy.

RESULTS: A total 4,827 patients met the study inclusion criteria. The overall rate of uterine incision extension was 6.0% and the total rate of PTB in the subsequent pregnancy was 4.9%. Patients with a uterine extension were more likely to have a longer duration of active labour, chorioamnionitis, failed vacuum delivery attempt, second stage CD, and persistent occiput posterior position of the fetal head in the primary CD and higher rates of smoking in the subsequent pregnancy. We found a higher, but statistically insignificant rate of subsequent PTB < 37 weeks among patients with vs without uterine incision extensions (adjusted OR 1.49, 95% CI 0.89-2.50; Table 1). However, a significantly higher rate of PTB < 34 weeks was found among patients with vs without extensions (adjusted OR 2.49, 95% CI 1.04-5.96; Table 1).

CONCLUSION: Patients with a hysterotomy extension have a 2.5-fold higher rate of PTB < 34 weeks compared with patients who do not sustain this injury. This association was not observed for PTB < 37 weeks.

Table 1. Crude and adjusted associations between hysterotomy extensions and preterm birth (PTB) in a subsequent pregnancy

	Rate (%)			
	With extension	Without extension	OR* (95% CI)	AOR† (95% CI)
PTB <37 weeks	6.6	4.8	1.40 (0.86-2.27)	1.49 (0.89-2.50)
PTB <34 weeks	2.4	1.1	**2.29 (1.03-5.11)**	**2.49 (1.04-5.96)**
PTB <32 weeks	1.4	0.6	2.36 (0.82-6.80)	2.53 (0.79-8.11)
PTB <28 weeks	0.7	0.3	2.44 (0.55-10.88)	3.05 (0.59-15.84)

*Deliveries without hysterotomy extension served as the referent group.
†Adjusted for the following characteristics of the primary CD: length of labour (no latent phase), CD type, CD indication, chorioamnionitis, failed vacuum attempt, persistent OP position and the following characteristics in the subsequent delivery: smoking during pregnancy.

742 Microwave ablation for selective fetal reduction in complicated monochorionic gestations

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OBJECTIVE: Second trimester selective fetal reduction (SFR) in monochorionic (MC) gestations has a cotwin loss rate of 18-40%. Microwave ablation (MA) is a newer technique for SFR with minimal thermal spread and a precise area of coagulation along the end of the needle and may result in lower preterm birth rates. We aimed to evaluate MA for SFR in MC gestations.

STUDY DESIGN: The surgical technique for MA is similar radiofrequency ablation. A 16-gauge microwave antennae is utilized under ultrasound guidance. Coagulation, tissue contact, and temperature are monitored. Demographics, procedure details and outcomes were evaluated for patients who underwent MA for SFR from 11/2017 to 4/2023 with available delivery outcomes. Our primary outcome was co-twin survival. Secondary outcomes included gestational age (GA)

at delivery and procedure to delivery interval. Continuous data were analyzed using Student's t-tests or Wilcoxon Rank Sum test. Categorical data were analyzed using Chi-square tests or Fisher's Exact.
RESULTS: Of 27 patients, 25 were MC twins, 1 was MC triplets and 1 was dichorionic triplets. MA was performed for twin reversed arterial perfusion in 14 (52%), discordant anomalies in 9 (33%), and twin to twin transfusion or selective fetal growth restriction in 6 (22%). Co-twin survival was 85%. Cotwin losses were due to previable birth (n=1), post operative intraventricular hemorrhage (n=1), septostomy with t cord entanglement (n=1), and post op day 1 demise (n=1). GA at delivery for 23 ongoing and delivered pregnancies was 37.7 [34-.1 - 38.9] weeks and interval to delivery was 17.2 [13.8 − 19.7] weeks. Between surviving and demised co-twins there was no difference in BMI, race, cervical length, gestational age, twin weight ratio, procedure time, or procedure energy. Transplacental entry was more frequent in co-twin demise (3/4 vs 5/23, p=0.03).
CONCLUSION: MA is a newer technique for SFR in MC twins thus far demonstrating favorable outcomes. Transplacental entry may be a risk factor for cotwin demise. Further studies are needed to evaluate outcomes and refine the technique.

743 Utility of genetic testing in fetuses with suspected lethal skeletal dysplasia on sonography

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OBJECTIVE: Determining lethality in prenatally diagnosed skeletal dysplasia can be suspected using sonographic parameters with confirmation via molecular diagnosis. The challenge in the prenatal setting is that established ultrasound parameters are imperfect, while molecular diagnosis is not always achievable. We examined the added benefit of definitive genetic etiology in fetuses with suspected skeletal dysplasia when ultrasound was indicative of lethality.
STUDY DESIGN: A single-center retrospective chart review was conducted from 2013-2023 for pregnancies suspected to have a skeletal dysplasia. Fetuses were evaluated by ultrasound with attention to measurements predictive of lethality, including thoracic circumference/abdominal circumference < 0.6, femur length/abdominal circumference < 0.16, and thoracic circumference < 2.5%ile. Record review included demographics, imaging, genetic testing, and fetal/neonatal outcome.
RESULTS: Of 122 pregnancies that met inclusion criteria, 88 had at least 1 ultrasound criteria suggestive of lethality. Among suspected lethal cases, 79 underwent genetic screening/testing prenatally (64.6%), postnatally (20.3%), postmortem (10.1%), or at multiple points (5.1%). Genetic testing revealed non-lethal molecular diagnoses in 16 (20.3%) pregnancies thought to be lethal by ultrasound. In 39 cases with only 1 measurement in the lethal range, genetic testing identified lethal, non-lethal, and indeterminate results in 15 (38.5%), 14 (35.9%) and 10 (25.6%) patients, respectively. When presenting in the 3rd trimester, a higher portion of fetuses harbored non-lethal versus lethal genetic diagnoses, although this was not statistically significant (6/10 vs 4/10; p=0.25).
CONCLUSION: A discordant outcome from suspected lethal was revealed via non-lethal genetic diagnoses in 20.3% of cases. This data emphasizes the value of genetic testing in corroborating or refuting ultrasound prediction of lethality. A combination of ultrasound findings and molecular diagnosis can paint the clearest picture of prognosis, ultimately aiding in counseling, familial decision-making, and delivery planning.

Fetuses with suspected lethal skeletal dysplasias who underwent genetic testing (n=79)

	Cases with a Lethal Genetic Dx n (%)	Cases with a Non-Lethal Genetic Dx n (%)
Total	33 (41.8)	16 (20.3)
# of US Measurements Consistent w/ Lethality*		
1/3 Measurements	15 (19.0)	14 (17.7)
2/3 Measurements	14 (17.7)	2 (2.5)
3/3 Measurements	4 (5.1)	0 (0.0)
Thoracic Circumference Percentile		
≤2.5th %ile	18 (22.8)	3 (3.8)
>2.5th-5th %ile	8 (10.1)	2 (2.5)
>5th %ile	7 (8.9)	11 (13.9)
GA at Initial Evaluation		
16w-21w6d	13 (16.5)	9 (11.4)
22w-27w6d	16 (20.3)	1 (1.3)
≥28w	4 (5.1)	6 (7.6)

*Including TC/AC, FL/AC, and TC %ile

744 Visual aids for induction of labor education: A randomized controlled trial

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OBJECTIVE: There are racial disparities in birth satisfaction among those undergoing induction of labor (IOL). Our objective was to develop a visual aid informed by the experience of historically marginalized pregnant people and test its ability to meet their IOL education needs.
STUDY DESIGN: This was a randomized trial of patients admitted for IOL. Those with prior cesareans, fetal anomalies, fetal growth restriction, and non-English speakers were excluded. Using data from an initial qualitative phase of semi-structured interviews and surveys of patients from marginalized backgrounds, we developed a visual aid handout on induction methods. On admission for IOL and prior to counseling on type of initial IOL method, patients were randomized to routine counseling or counseling with the visual aid. The primary outcome was patient knowledge, using a published IOL knowledge assessment tool. Secondary outcomes were Trust in Physician Scale scores and satisfaction with IOL counseling via Likert scale. A stratified analysis was performed by self-reported race (Black/Latinx/mixed race vs white). Eighty-four patients were required to detect a 25% difference in knowledge scores with 90% power. Analysis was performed using intention to treat approach.
RESULTS: Eighty-four patients were randomized: 42 to routine counseling, 42 to visual aid. 31% of patients self-identified as Black, Latinx, or mixed race. There was no significant difference in

knowledge score between routine counseling and visual aid groups (74.8% vs 68.3%, p=0.17). Trust in physician scores and satisfaction scores were also similar between groups. Although the visual aid increased knowledge scores in Black/Latinx/mixed race patients by 16%, there was no significant difference between routine counseling and visual aid groups.

CONCLUSION: The addition of a patient-informed visual aid to routine counseling at time of IOL did not significantly increase patient knowledge, trust in physician, or satisfaction scores. This calls for a broader investigation into contributors of birth dissatisfaction and consideration of earlier interventions prior to start of IOL.

Table: Impact of routine counseling vs counseling with patient-informed visual aid on knowledge scores, satisfaction, and trust in providers at time of induction of labor (IOL)

Outcomes	Routine counseling (n=21)	Visual Aid (n=21)	p-value
Satisfaction with quality of IOL counseling (0 to 10) Median (IQR)	9 (8, 10)	10 (9, 10)	0.08
Mean trust in physician scale (0-10) Mean (SD)	9.8 ± 0.4	10.0 ± 0.2	0.05
Average induction of labor knowledge score Mean % correct (SD)	68.3 ± 23.2	74.8 ± 19.4	0.17

745 Mode of delivery in FGR by EFW<10% vs. EFW≥10%ile and AC<10%ile undergoing trial of labor

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OBJECTIVE: Per 2020 SMFM guidelines, fetal growth restriction (FGR) is diagnosed by estimated fetal weight (EFW) < 10%ile or abdominal circumference (AC) < 10%ile despite EFW. The objective was to investigate the difference in mode of delivery in patients undergoing a trial of labor between EFW < 10%ile versus AC< 10% ile but EFW ≥10%ile.

STUDY DESIGN: Retrospective cohort study including singleton, non-anomalous gestation, diagnosed with FGR prior to delivery undergoing trial of labor at Mount Sinai Hospital from 2021-2023. Patient characteristics were compared between groups using T-tests or Wilcoxon-Rank Sum tests for continuous measures and Chi-square or Fisher's exact tests for categorical measures. Primary outcome was mode of delivery. Primary and secondary outcomes were assessed using univariable and multivariable logistic regression, controlling for gestational age at delivery.

RESULTS: 141 patients (65%) were diagnosed with FGR based on EFW < 10%ile and 77 (35%) were diagnosed with FGR based on EFW ≥10%ile and AC < 10%ile. Those with EFW < 10%ile were more likely to have hypertensive disorders of pregnancy (p=0.03) and early onset FGR (p=0.003). The mean gestational age at delivery was 37 weeks versus 39 weeks for those with EFW < 10%ile compared to EFW ≥10%ile (p< 0.0001). There were no differences in the remaining maternal characteristics, including nulliparity and induction of labor. Overall cesarean delivery (CD) rate was 17.4%. There was no significant difference in CD rate in fetuses with EFW < 10%ile vs. EFW ≥10%ile and AC < 10%ile (aOR 0.90, 0.7-1.1). Those with EFW < 10%ile were at increased odds of CD for non-reassuring fetal status compared to those with EFW ≥10%ile and AC < 10%ile (OR 6.8, 1.6-29.8) and increased odds of NICU admission (OR 3.1, 1.2-7.7, Table 1).

CONCLUSION: There does not appear to be increased odds of CD in pregnancies complicated by FGR based on diagnostic parameters. However, future studies with larger sample sizes are warranted.

Table 1: Univariate analysis of mode of delivery and maternal/fetal secondary outcomes

	All (n=218)	EFW <10%ile (n=141)	EFW ≥10%ile, AC <10%ile (n=77)	Unadjusted EFW <10%ile vs. EFW ≥10%ile, AC <10 %ile	
				OR (95% CI)	p-value
Primary Outcome					
C-Section	38 (17.4)	24 (17.0)	14 (18.2)	0.9 (0.4-1.9)	0.83
Vaginal Delivery	180 (82.6)	117 (83.0)	63 (81.8)	Ref.	Ref.
Secondary Fetal Outcome					
pH <7.1 *	2 (0.9)	2 (1.4)	0 (0)	-	-
Base >12.0 *	3 (1.4)	3 (2.1)	0 (0)	-	-
NICU admit	35 (16.1)	29 (20.6)	6 (7.8)	3.1 (1.2-7.7)	0.02
5-min APGAR <7	1 (0.5)	1 (0.7)	0 (0)	-	-
RDS/TTN	16 (7.3)	14 (9.9)	2 (2.6)	4.1 (0.9-18.7)	0.07
Neonatal Hypoglycemia	58 (26.6)	42 (29.8)	16 (20.8)	1.6 (0.8-3.1)	0.15
IVH	2 (0.9)	2 (1.4)	0 (0)	-	-
Weight at Birth (g) – mean (SD)	2450.4 (375.9)	2341.4 (372.7)	2650.0 (291.5)	-308.7 (-405.4 - -212.0) †	<0.0001
Secondary Maternal Outcome					
Intraamniotic Infection	10 (4.6)	7 (5.0)	3 (3.9)	1.3 (0.3-5.1)	0.72
Suspected Placental Abruption	10 (4.6)	9 (6.4)	1 (1.3)	5.2 (0.6-41.7)	0.12
PPH	4 (1.8)	3 (2.1)	1 (1.3)	1.7 (0.2-16.2)	0.67
Indication for C-Section**					
Other - Suspected Abruption	1/38 (2.6)	1/24 (4.2)	0/14 (0)	-	-
Labor abnormalities	14/38 (36.8)	6/24 (25.0)	8/14 (57.1)	0.3 (0.06-1.0)	0.05
Arrest of Dilation	3/38 (7.9)	0/24 (0)	3/14 (21.4)	-	-
Arrest of Descent	1/38 (2.6)	0/24 (0)	1/14 (7.1)	-	-
Failed IOL	10/38 (26.3)	6/24 (25.0)	4/14 (28.6)	0.8 (0.2-3.7)	0.81
NRFHT remote from delivery	24/38 (63.2)	19/24 (79.2)	5/14 (35.7)	6.8 (1.6-29.8)	0.01
Latent Stage	18/38 (47.4)	13/24 (54.2)	5/14 (35.7)	2.1 (0.5-8.3)	0.28
Active Stage	5/38 (13.2)	5/24 (20.8)	0/14 (0)	-	-
Stage 2	1/38 (2.6)	1/24 (4.2)	0/14 (0)	-	-

Unadjusted odds ratio estimated with the use of a simple logistic regression model.
EFW = estimated fetal weight, AC = abdominal circumference, pH = acidity, NICU = neonatal intensive care unit, RDS/TTN = respiratory distress syndrome/transient tachypnea of the newborn, HIE = hypoxic ischemic encephalopathy, IVH = intraventricular hemorrhage, NEC = necrotizing enterocolitis, PPH = postpartum hemorrhage, ICU = intensive care unit, IOL = Induction of labor, NRFHT = non-reassuring fetal heart tracing
* N=1 patient is missing pH < 7.1 and base > 12.0 data
** Categories are not mutually exclusive, values are only among patients who delivered by C-Section.
† Value reflects parameter estimate and 95% confidence intervals of dependent variable using simple linear regression.

746 Peripartum cardiomyopathy delivery hospitalization and postpartum readmission trends, risk factors, and outcomes

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OBJECTIVE: To evaluate prevalence of peripartum cardiomyopathy (PPCM) during birth and postpartum hospitalizations, and to analyze associated trends, risk factors, and clinical outcomes.

STUDY DESIGN: Birth hospitalizations and postpartum readmissions within 5 months of delivery were analyzed from the 2010-2020 Nationwide Readmissions Database. Temporal trends in PPCM diagnoses were analyzed with joinpoint regression to estimate the average annual percent change (AAPC) with 95% confidence intervals (CI). Clinical, demographic, and hospital factors associated with PPCM, and odds for severe adverse outcomes including mortality were assessed using adjusted logistic regression models with odds ratios (OR) as measures of effect.

RESULTS: Of 39.8 million birth hospitalizations, 9,210 were complicated by PPCM (2.3 per 10,000 birth hospitalizations). Prevalence of PPCM among 5-month readmissions was 4.8 per 10,000. PPCM prevalence during birth hospitalization increased

from 2010 to 2020 (AAPC 2.2%, 95% CI 1.0%, 3.4%); prevalence of new PPCM diagnoses during readmissions did not (AAPC 0.0%, 95% CI -1.6%, 1.6%). Factors associated with peripartum cardiomyopathy (Table) include preeclampsia with severe features (aOR 13.9, 95% CI 12.5, 15.3), preeclampsia without severe features (aOR 6.0, 95% CI 5.3, 6.8), superimposed preeclampsia without severe features (aOR 10.2, 95% CI 8.5, 12.3), multiple gestation (aOR 2.7, 95% CI 2.3, 3.0), pre-gestational diabetes (aOR 1.8, 95% CI 1.6, 2.1), chronic hypertension (aOR 6.3, 95% CI 5.5, 7.2), and maternal age 40-54 years (aOR 1.9, 95% CI 1.7, 2.2, ref age 25-29). PPCM readmissions were associated with 10% of overall postpartum deaths, 21% of cardiac arrest/ventricular fibrillation diagnoses, 18% of extracorporeal membrane oxygenation cases, and 40% of cardiogenic shock cases.

CONCLUSION: PPCM prevalence during birth hospitalizations has increased over time. Preeclampsia and maternal chronic conditions were associated with the highest odds of PPCM. PPCM accounts for a significant proportion of severe postpartum adverse cardiopulmonary outcomes and death.

Table. Adjusted model for peripartum cardiomyopathy

	Delivery Hospitalizations		Postpartum Readmissions	
	aOR	95% CI	aOR	95% CI
Maternal age				
15-19 years old	0.77	0.65, 0.91	0.63	0.53, 0.75
20-24 years old	0.86	0.77, 0.96	0.75	0.67, 0.83
25-29 years old	Reference		Reference	
30-34 years old	1.21	1.10, 1.33	1.36	1.25, 1.48
35-39 years old	1.50	1.35, 1.66	1.80	1.64, 1.98
40-54 years old	1.94	1.68, 2.24	2.66	2.32, 3.06
Payer status				
Medicare	3.53	2.88, 4.32	2.58	2.07, 3.21
Medicaid	1.68	1.54, 1.82	1.74	1.62, 1.88
Private Insurance	Reference		Reference	
Self-pay	1.90	1.48, 2.43	1.02	0.77, 1.35
Other	1.31	1.06, 1.62	1.36	1.12, 1.64
Clinical factors				
Multiple gestation	2.65	2.33, 3.02	2.71	2.39, 3.08
Grand multiparity	1.29	0.94, 1.78	1.10	0.77, 1.55
Pre-gestational diabetes	1.84	1.59, 2.14	1.55	1.32, 1.82
Asthma	1.72	1.55, 1.90	1.12	0.98, 1.29
Obese	1.68	1.52, 1.85	1.71	1.57, 1.86
Preeclampsia with severe features (including superimposed)	13.85	12.52, 15.32	5.11	4.52, 5.77
Superimposed preeclampsia without severe features	10.20	8.47, 12.27	5.17	4.45, 6.00
Preeclampsia without severe features	6.01	5.32, 6.80	4.92	4.41, 5.49
Chronic hypertension	6.28	5.50, 7.17	3.90	3.47, 4.37
Gestational hypertension	2.08	1.73, 2.51	3.17	2.86, 3.51

aOR, adjusted cdds ratio. *CI*, confidence interval. Adjusted models included all the demographic, hospital, and clinical factors in the table, along with median income quartile, hospital teaching status, and hospital bed size (not pictured).

747 "Low-risk" and "High-risk" Nulliparous Term Singleton Vertex (NTSV) Cesarean Birth Rates Following the ARRIVE Trial

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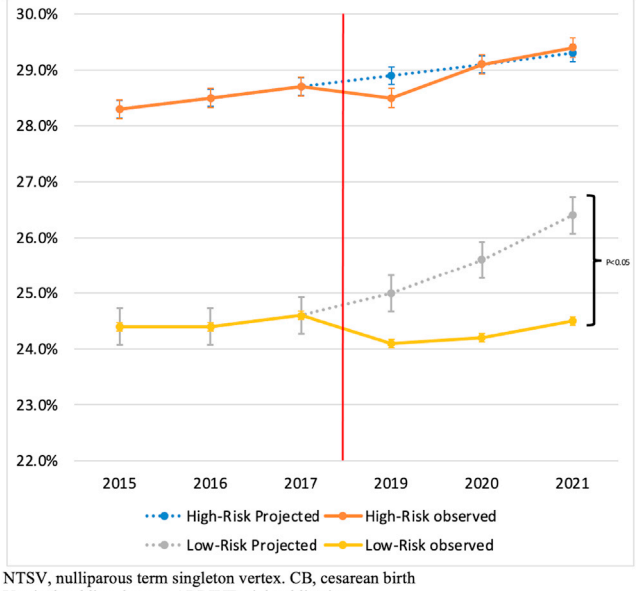
OBJECTIVE: The benefits of the ARRIVE trial for low-risk nulliparas, at ≥39 weeks, have been demonstrated. Given growing evidence that ARRIVE lowered the threshold for labor induction for all pregnant people, we sought to determine if the cesarean birth (CB) rate among "low-risk" and "high-risk" nulliparous term (≥37 weeks) singleton vertex (NTSV) pregnancies has changed since ARRIVE.

STUDY DESIGN: A population-based cohort study of all NTSV, non-anomalous live births using data from the US Natality database. Pre-ARRIVE included births between Jan-2015 and Dec-2017 and post-ARRIVE included births between Jan-2019 and Dec-2021. Low-risk births were without diabetes, hypertensive disorders of pregnancy, and prenatal care established < 12 weeks. Multivariable regression was performed to compare the mean NTSV CB rate between pre- and post-ARRIVE among births ≥37 weeks, adjusting for clinical differences. A logistic regression model was used to project the NTSV CB rate over time based on pre-ARRIVE rate and compare the rates, per year, using Wald confidence intervals.

RESULTS: There were 1,198,107 births pre-ARRIVE and 1,221,454 post-ARRIVE in the high-risk group and 2,413,279 births pre-ARRIVE and 2,226,433 post-ARRIVE in the low-risk group. After adjusting for clinical differences, the NTSV CB rate was lower post-ARRIVE compared to pre-ARRIVE in both the low-risk group (24.5% vs 24.3%, adjusted odds ratio (aOR) 0.92, 95% confidence interval (CI) 0.91-0.92) and the high-risk group (28.5% vs 29.0%, aOR 0.92, 95% CI 0.91-0.92). Low-risk pregnancies maintained a lower than projected NTSV CB rate based on pre-ARRIVE trends ($p < .05$), while there was no difference between projected and observed rates in the high-risk group (Figure 1).

CONCLUSION: There was a decrease in NTSV CB rate in the years following ARRIVE among both low-risk and high-risk pregnancies. However, among high-risk births, NTSV CB rates did not differ post-ARRIVE from what was projected based on pre-ARRIVE trends. These findings suggest that the ARRIVE protocol may not have the same benefits for high-risk pregnancies as it does for low-risk ones.

Figure 1: Rates of observed and projected NTSV CB rates pre-and post-ARRIVE among high-risk and low-risk groups:



NTSV, nulliparous term singleton vertex. CB, cesarean birth
Vertical red line denotes ARRIVE trial publication

748 Can Failed Vacuum Extraction Be Predicted?

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OBJECTIVE: We aimed to determine risk factors for failed vacuum delivery among singleton pregnancies and to develop a prediction model.

STUDY DESIGN: A retrospective cohort study between the years 2011-2023, in a single university-affiliated medical center, with approximately 12,500 deliveries annually, was conducted. The study population included singleton pregnancies with a trial of vacuum extraction delivery and was divided into two groups; failed vacuum extraction (study group), defined as cases with an extraction duration exceeding 20 minutes or more than 2 cup detachments, leading to an urgent cesarean delivery (CD). The control group was comprised from women who had a successful vacuum extraction delivery. Pregnancy characteristics and outcomes were compared.

RESULTS: 1. Overall during the study period there were 133,024 deliveries, of them, 9,581 (7.2%) by vacuum extraction.

2. The rate of failed vacuum extraction was 186/9,581 (1.9%).

3. Multivariate analysis revealed an increased risk for a failed vacuum delivery associated with the following factors: patient's height < 160 cm. (OR=2.7, 95%CI [1.5-4.8], p< 0.001), induction of labor (OR=2.1, 95% CI [1.2-3.8], p=0.013), presenting part station < Sp+2 (OR=2.4, 95%CI [1.3-4.4], p=0.004), length of 2nd stage of delivery > 3.5 hours (OR=2.2, 95%CI [1.1-4.4], p=0.03), birthweight > 3750 gr (OR=2.4, 95%CI [1.2-5.1], p=0.02), and male gender (OR=2.1, 95%CI [1.1-4.0], p=0.024).

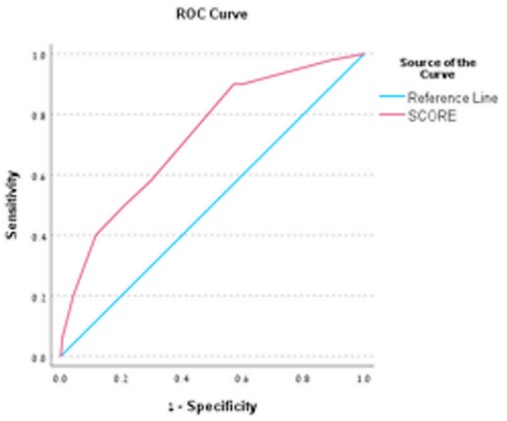
4. Newborns in the study group had increased rates of NICU hospitalization (20.4% vs. 5.6%, p< 0.001), subgaleal hematoma (5.4% vs. 0.3%, p< 0.001), and neonatal death (0.5% vs. 0.1%, p=0.015).

5. The prediction score model, incorporating these risk factors, demonstrated predictive performance with an AUC of 0.727 (95%CI 0.66-0.80), p-value < 0.001).

CONCLUSION: Using a prediction model for failed vacuum delivery may assist for caregivers to identify high risk patients for complicated delivery.

Induction of labor	
Yes	2
No	0
presenting part station <Sp+2	
Yes	2
No	0
patient's height < 160 cm	
Yes	3
No	0
length of 2nd stage > 3.5 hours	
Yes	2
No	0
birthweight > 3750 gr	
Yes	3
No	0
male gender	
Yes	2
No	0

Prediction model for failed vacuum extraction.



CUTOFF = 5

AUC 76%

Sensitivity 75%

Specificity 70%

749 Maternal position effects on middle cerebral artery pulsatility index and associated adverse pregnancy outcome

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OBJECTIVE: We have previously demonstrated that maternal anatomical position changes directly affect the fetal middle cerebral artery (MCA) Doppler pulsatility indices (PI) and may serve as a predictor for adverse pregnancy outcomes. After power analysis of

pilot data, we sought to determine if these PI changes were associated with adverse pregnancy outcomes.

STUDY DESIGN: A prospective cohort study of pregnant people with a singleton, non-anomalous fetus, recruited between 18 and 24 weeks of gestation, in a single tertiary care center from 12/2021- 2/2022. MCA Dopplers were obtained and PI indices were measured and recorded, first in the supine position and then in the maternal left lateral position. Based on our prior findings suggesting a PI Δ of 0.22 being associated with adverse composite pregnancy outcomes (pre-eclampsia, fetal growth restriction and oligohydramnios), we divided the cohort into two groups, those above and below the cutoff of Δ =0.22. Demographic characteristics were compared using univariable analyses. Multivariable logistic regression was performed to compare the composite and individual pregnancy outcomes, adjusting for significant demographic differences between the groups.

RESULTS: We recruited 228 patients and followed them to delivery. There were 107 that had a PI $\Delta < 0.22$ and 121 that had PI $\Delta > 0.22$. Demographics and outcomes are seen in Table 1. The primary outcome of composite adverse outcomes did not differ between the groups. However, among pregnancies with PI $\Delta < 0.22$, pre-eclampsia was more likely to develop than pregnancies with PI $\Delta >$ 0.22 [aOR 95%CI 3.30 (1.02-10.69)].

CONCLUSION: We found that a second trimester fetal MCA PI $\Delta <$ 0.22 with maternal position changes at anatomy ultrasound was associated with developing preeclampsia. This data suggests that there may be an association of early decreased feto-placental reserve and the development of preeclampsia later in the pregnancy.

Table 1: Demographics and outcomes:

Characteristics	MCA Delta <.22 N=107	MCA delta >=.22 N=121	[b]P=	[d]aOR, 95% CI
Demographics				
Age	30.9±5.2	30.6±6.0	0.652	--
Race			0.930	--
White	22 (20.6%)	26 (21.5%)		
Black	16 (15.0%)	19 (15.7%)		
Hispanic	8 (7.5%)	12 (9.9%)		
Asian	35 (32.7%)	31 (25.6%)		
Other	8 (7.5%)	11 (9.1%)		
Unknown	3 (2.8%)	5 (4.1%)		
South Asian	15 (14.0%)	17 (14.1%)		
BMI	27.9±5.6 [97]	29.6±6.2 [112]	**0.034**	--
Maternal CHTN	6 (5.7%) [106]	6 (5.0%) [119]	0.837	--
Pregestational DM	3 (2.8%) [106]	9 (7.6%) [119]	0.115	--
Abnormal analytes	6 (5.7%) [105]	8 (6.8%) [118]	0.743	--
GA at ultrasound, (weeks)	20.7±1.7 [105]	21.2±1.9 [118]	**0.044**	--
EFW at Doppler US (grams)[a]	397 (334, 467) [105]	418 (368, 543) [117]	**0.048**[c]	--
Results				
5-minute APGAR <7	0	0	--	
Maternal preeclampsia	4 (3.8%) [106]	15 (12.4%)	**0.019**	**3.30 (1.02-10.69)**
GA at delivery (weeks)[a]	38.5 (37, 39) [106]	39 (37, 39)	0.714	
FGR	8 (7.6%) [106]	17 (14.1%)	0.118	2.11 (0.83-5.40)
Birthweight (grams)	3187.7±554.4 [106]	3197.4±574.5	0.897	
Oligohydramnios	7 (6.6%) [106]	9 (7.4%)	0.806	0.90 (0.30-2.68)
Composite (PEC, Oligohydramnios, FGR)	15 (14.2%) [106]	30 (24.8%)	0.045	0.53 (0.26-1.08)

CHTN= Chronic Hypertension, DM= diabetes mellitus, GA= gestational age, EFW= estimated fetal weight, FGR= fetal growth restriction, US= ultrasound, PEC= preeclampsia
Variables reported as means ± standard deviation (%), median (interquartile range) [number of records with data] unless reported otherwise
[a] reported as medians with interquartile range (25%,75%)
[b] calculated using Fisher exact test or Student t test.
[c] Wilcoxon rank sum
[d] aOR, adjusted for BMI, EFW at Doppler US and GA at ultrasound

750 The Effect of the ARRIVE Trial on Nulliparous Term Singleton Vertex (NTSV) Cesarean Birth Rate

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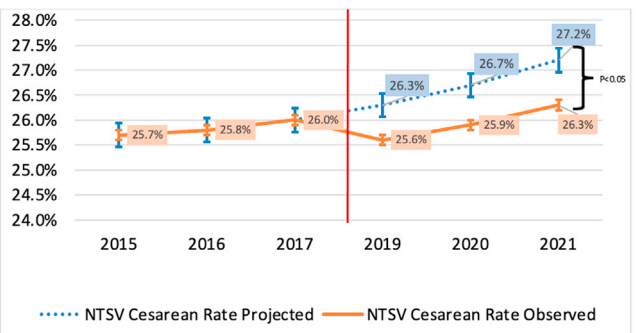
OBJECTIVE: The ARRIVE trial showed lower cesarean birth rates with labor induction at ≥39 weeks among low-risk nulliparas. These findings lowered the threshold for labor induction across all pregnant people, but little is known regarding the effects on nulliparous term (≥37 weeks) singleton vertex (NTSV) cesarean birth rate. Thus, we sought to determine how the cesarean birth rate among all NTSV pregnancies has changed after the ARRIVE trial.

STUDY DESIGN: We conducted a population-based, cohort study of all NTSV (≥37 weeks), non-anomalous births using data from the US Natality database. The pre-ARRIVE group included births between Jan-2015 and Dec-2017 and the post-ARRIVE group included births between Jan-2019 and Dec-2021. We compared the mean NTSV cesarean birth rate between both groups. Multivariable logistic regression was performed to adjust for clinical differences. A logistic regression model was used to project the NTSV cesarean birth rate over time based on the pre-ARRIVE rate and compare the rates, per year, using Wald confidence intervals.

RESULTS: There were 3,611,386 births in the pre-ARRIVE group, and 3,447,887 in the post-ARRIVE group. The NTSV cesarean birth rates pre- and post-ARRIVE were 25.8% and 25.9%, respectively. After adjusting for clinical differences between the groups, there was a decrease in the NTSV cesarean birth rate post-ARRIVE (adjusted odds ratio (aOR) 0.91, 95% confidence interval (CI) 0.908- 0.915). The NTSV cesarean birth rates (both observed and projected) are summarized in Figure 1. The absolute NTSV cesarean birth rate post-ARRIVE remained lower compared to the projected rate based on pre-ARRIVE trends ($p< 0.05$).

CONCLUSION: Despite a lower than projected rate of NTSV cesarean birth, the overall rate continued to increase. This rate increase warrants further investigation into the effects of the ARRIVE trial findings on populations outside the ARRIVE's inclusion criteria.

Figure 1: Observed and projected NTSV cesarean birth rates pre-and post-ARRIVE



NTSV, nulliparous term singleton vertex. CB, cesarean birth
Red line notes ARRIVE trial publication

751 Improving participation in postpartum remote blood pressure monitoring collaborating with community doulas for Black women

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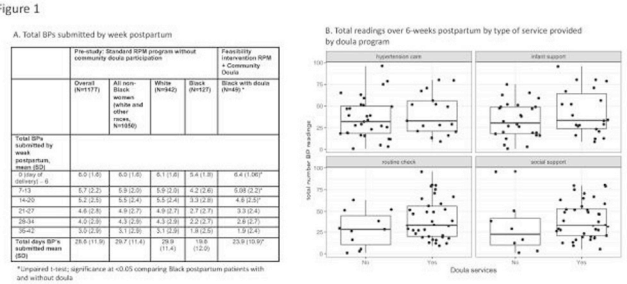
OBJECTIVE: Black persons have a higher incidence of hypertension disorders of pregnancy (HDP) and are 3-4 times more likely to experience mortality than non-Black persons. In an established postpartum (PP) remote patient monitoring program (RPMP) for HDP, daily BP submission was inequitable between non-Black and Black persons through 42-days PP. We aimed to increase participation equity for BP submission by incorporating community-based doulas with the RPMP.

STUDY DESIGN: A prospective feasibility study was performed at a single site from 1/21-10/22. The existing RPMP partnered with a community doula program focused on supporting Black birthing persons. Patients enrolled in the standard RPMP were approached for study participation prior to discharge and if consented were paired with a full service PP doula. Quantitative data was analyzed, and summary data generated. Non-paired t-test was performed comparing the pre-post study periods for BP submission of Black participants with standard RPM compared to RPM with the addition of a doula.

RESULTS: Of eligible Black PP persons, 49/153 (32%) enrolled. Over 42-days PP the mean total BPs submitted were significantly increased from 19.6 ± 12.0 prior to the study compared to 23.9 ± 10.9 when paired with a doula ($p < 0.05$). The percentage of patients who reported ≥ one BP by postpartum week was (week; %): 1; 96.1%, 2; 94.1%, 3; 86.3%, 4; 80.4%, 5; 68.6%, 6; 52.9%.) Of the types of doula services offered, social support was most associated with an increase in total BP submission. BP control improved PP, however 30% of patients continued to have stage 2 hypertension or worse at 6-weeks PP.

CONCLUSION: This study achieved an increase in participation of daily BP submission for Black PP persons through a community-based doula partnership within an established RPMP for HDP. Doula services involving social support were most impactful in increasing the total submissions. Community engagement and social support can improve health engagement of PP Black persons in the first 6-weeks PP.

Figure 1



752 Universal use of aspirin prenatally: Benefit to patients at high-risk for preeclampsia

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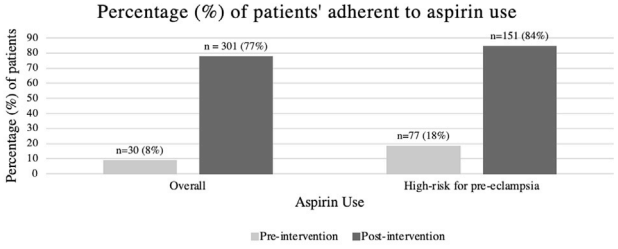
OBJECTIVE: The objective of this study was to evaluate if aspirin (ASA) administration to all obstetric patients increases use. Specifically, we assessed compliance rates in patients at high-risk for preeclampsia.

STUDY DESIGN: A prospective cohort of all obstetric patients who initiated prenatal care from January 2022 – December 2022 at a federally funded health care center and delivered at an academic health institution in New York. ASA 81mg daily was prescribed to all patients initiating care from 12 to 28 weeks' gestation beginning January 2022. Compliance with ASA use was verified at each prenatal visit. Patients who had a contraindication to ASA use, missed abortion, initiated care after 28 weeks' gestation and/or transferred care were excluded. Data was compared to a retrospective cohort of all obstetric patients from January 2021 – December 2021. The included patients were divided into two groups: pre- and post-intervention. Patient characteristics were obtained from the electronic medical record system. In addition to comparing maternal ASA use between the pre- and post-intervention groups, a separate analysis was performed to assess ASA use among patients at high risk for preeclampsia based on ACOG and USPTF guidelines.

RESULTS: A total of 765 patients were included: 373 pre-intervention and 392 post-intervention. Patients were predominately Hispanic, Spanish-speaking, single, and maternal age < 35 years old. The rate of ASA use increased significantly when comparing the pre-intervention to the post-intervention group [8% (n= 30) vs 77% (n=301), p< 0.001; Graph]. 228 patients were classified as high-risk for developing pre-eclampsia: 77 pre-intervention and 151 post-intervention. The rate of ASA use in the high-risk post-intervention group increased [18% (n= 14) vs 84% (n=127), p< 0.001].

CONCLUSION: When ASA is administered universally, patients at high-risk for preeclampsia were four times more likely to adhere to use. Further studies are needed to evaluate preeclampsia outcomes in this patient population.



753 Obstetrical and Perinatal Trends in Hawai'i from 2019 to 2023

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OBJECTIVE: The State of Hawai'i is known to have one of the most diverse populations in the Unites States and faces unique social,

cultural, and geographic barriers that impact maternal health. We aimed to assess the most recent pregnancy outcomes in Hawai'i to identify communities at higher risk.

STUDY DESIGN: Pregnancy outcomes were abstracted from the EHR at Kapiolani Medical Center for Women & Children (KMC) from January 2019 to June 2023 as part of Hawai'i Pacific Health Quality Improvement. KMC is the only tertiary mother-baby referral hospital in the Pacific Basin. A total of 24,303 singleton deliveries with gestational age greater than 20 weeks and birth weight greater than 400g were analyzed. Clinical diagnoses were grouped by ICD-10 codes: e.g., hypertensive disorders (pre-existing and gestational), diabetic disorders (pre-gestational and gestational), and pre-eclampsia. Preterm births were defined as < 37 weeks and very preterm < 32 weeks. Growth disturbances were defined by low birth weight < 2500g and macrosomia >4000g. Descriptive analysis, Chi-square tests, and ANOVA were performed on Intellectus Statistics software.

RESULTS: Table 1 summarizes the results. Pregnant persons identifying as Native Hawaiian and Other Pacific Islander (NHOPI) experienced the highest rate of preterm delivery. Both NHOPI and Black or African American pregnant people had similarly high rates of hypertensive disorders. Asians experienced the highest rate of diabetic disorders in pregnancy. In fact, Asians were diagnosed with diabetes at a much lower BMI than all other racial/ethnic groups.

CONCLUSION: NHOPI people experience the highest rates of preterm birth. Asian pregnant persons experience diabetic disorders at much lower BMI than all other groups. Further studies are necessary to elucidate the pathophysiology of these observations in order to promote health equity.

Table 1.

	NATIVE HAWAIIAN OR OTHER PACIFIC ISLANDER	WHITE	ASIAN	BLACK OR AFRICAN AMERICAN	AMERICAN INDIAN OR ALASKA NATIVE	
	N=8360	N=3778	N=11709	N=379	N=77	*P*
Age mean (SD)	28.0(5.9)	30.8(5.7)	31.5(5.7)	28.5(6.0)	30.6(5.2)	<.001
BMI mean (SD)	35.3 (8.2)	31.1(7.0)	30.2 (6.2)	33.5 (8.1)	31.6 (7.0)	<.001
BMI w/Diabetic disorder (SD)	38.8(8.6)	34.2(8.4)	31.5(6.4)	38.6(14.8)	34.7(7.1)	<.001
Cesarean delivery	2101 (25.1%)	985 (26.1%)	3156 (27.0%)	107 (28.2%)	18 (23.4%)	.089
Hypertensive disorders	1719 (20.6%)	648 (17.2%)	2099 (17.9%)	94 (24.8%)	15 (19.5%)	<.001
Diabetic disorders	1135 (13.6%)	363 (9.6%)	2107 (18.0%)	33 (8.7%)	13 (16.9%)	<.001
Pre-eclampsia	977 (11.7%)	317(8.4%)	1110(9.5%)	39(10.3%)	10(13.0%)	<.001
Preterm birth <37wk	1161 (13.9%)	480 (12.7%)	1350 (11.5%)	45 (11.9%)	8 (10.4%)	<.001
Preterm birth <32wk	221 (2.6%)	80 (2.1%)	204 (1.7%)	9 (2.4%)	0 (0%)	<.001
Low birth weight <2500g	849 (10.2%)	363 (9.6%)	1220(10.4%)	44 (11.6%)	8 (10.4%)	.428
Macrosomia >4000g	611 (7.3%)	262(6.9%)	418 (3.6%)	16 (4.2%)	6 (7.8%)	<.001

754 Ultrasound and Clinical Characteristics of Congenital Pulmonary Airway Malformations (CPAM) and Neonatal Care Needs

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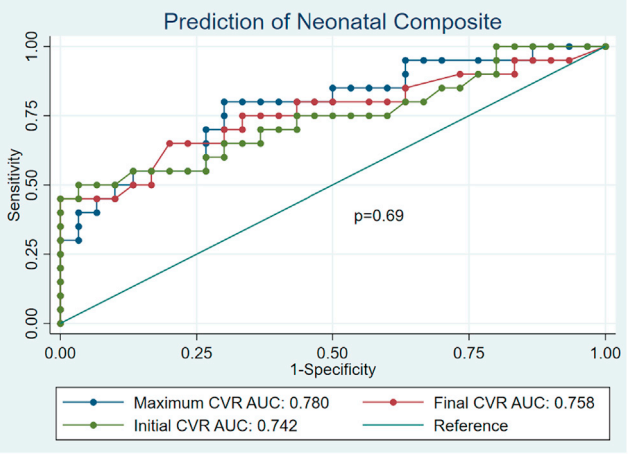
OBJECTIVE: CPAM are a heterogeneous group of congenital abnormalities, with increased prevalence given improvements in ultrasound (US) technology. Clinical factors influence recommendations regarding delivery, but more data is needed to establish a systematic approach to delivery planning. This study aimed to assess the prognostic utility of clinical characteristics to anticipate neonatal support needs.

STUDY DESIGN: We performed a retrospective case control study of patients with fetal CPAM from December 2010 to March 2023. The primary outcome was an adverse neonatal outcome composite (NICU admission, neonatal respiratory distress, respiratory support, neonatal surgery, and death). Receiver operating characteristic (ROC) curves compared the ability of CPAM volume ratio (CVR) and other US factors to predict the neonatal composite. The Liu method was used to determine a CVR cutoff to predict the neonatal composite outcome. CVR cutoff comparisons were performed by the Fisher exact test for categorical variables and the Mann-Whitney-U test for continuous variables. Statistical significance was defined as P value < 0.05.

RESULTS: 68 patients were included in the initial analysis, with 18 patients excluded. The composite neonatal outcome was seen in 18 patients (36%). Analysis using ROC curves found that initial, maximum, and final CVR were equally adequate predictors of the neonatal composite outcome. An initial CVR cutoff of 0.8 (sensitivity 50%, specificity 97%, AUC 0.73), maximum CVR cutoff of 0.8 (sensitivity 80%, specificity 70%, AUC 0.75), and final CVR cutoff of 0.4 (sensitivity 65%, specificity 80%, AUC 0.73) optimized ability to predict the neonatal composite outcome. Type of lesion and the percent change of CVR over the pregnancy were not predictive of adverse neonatal outcome. Likewise, the gestational age at max CVR and US evidence of compression were poor predictors of the neonatal composite outcome.

CONCLUSION: Our study validates the use of CVR to predict outcome and proposes CVR cutoffs that can predict adverse neonatal outcomes and help guide decisions to deliver at a higher level of neonatal care.



755 Increased prevalence of neural tube defects in industrial area in Northwestern Netherlands in 2020-2021

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OBJECTIVE: In the first year of the COVID-19 pandemic, 2020, we perceived an unexpected increase of prenatal diagnosis of neural tube defects (NTDs) in the Northwest region of the Netherlands. Environmental pollutants and exposure to heavy metals are associated with NTDs. The aim of this study is to evaluate the association of possible risk factors to the unexpected increase of prenatal diagnosis of NTDs in our region.

STUDY DESIGN: We performed a retrospective cohort study to examine the prevalence of isolated NTDs in the Northwest region of the Netherlands from 2010-2022. We looked into all possible risk factors for NTDs, including COVID-19. Zipcodes were used to examine exposure to pollution on municipal level. The region was separated into three areas according to levels of pollution: IJmond area (industrial area), Amsterdam (urban area), and all other municipalities. Poisson regression was employed to calculate crude prevalence ratios (PR) and 95% confidence intervals [CI]. PR were described per 10,000 births.

RESULTS: We diagnosed 203 isolated NTDs between 2010 and 2022 of which 41 cases (20%) were in 2020 and 2021. The PR of NTDs between 2010-2022 was 4.4 (95% CI 3.8, 5.1) per 10,000 births on average. In 2020 and 2021 the PR significantly increased to 5.4 (95%-CI 3.2, 8.5) and 7.5 (95%-CI 4.9-11.0) per 10,000 births, respectively (p=0.005). There was no change in lifestyle, obstetric or social-demographic risk factors such as use of folic-acid supplements, medication e.g.. Areal differences were evident only in 2020-2021 (p=0.001).The PR of NTDs in 2020 and 2021 was the highest in IJmond area with 21.0 (95%-CI 7.6, 45.8) NTDs per 10,000 births. Amsterdam and other municipalities of Northwest Netherlands had lower PRs of 7.3 (95%-CI 4.1, 12.1) and 4.5 (95%-CI 2.7, 6.9) per 10,000 births, respectively.

CONCLUSION: There was an increase of NTD prevalence in 2020 and 2021 in the Northwest region of the Netherlands. NTDs were most prevalent in the industrial area (IJmond area), and also increased in the very urban city of Amsterdam. We hypothesize that COVID-19 lockdown measures increased individual exposure of pregnant women to industrial pollution.

756 Perceived Discrimination, Adverse Childhood Experiences, Depression, and Perception of Care in Low Socioeconomic Obstetric Patients

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OBJECTIVE: To examine the associations of perceived discrimination, perception of care, Adverse Childhood Experiences (ACE), depression and the impact on obstetrical and neonatal outcomes in a cohort of pregnant patients.

STUDY DESIGN: This is a prospective observational cohort study of obstetric patients from 2022-2023. At initial prenatal care visit, participants completed baseline questionnaires on ACE; Ethnic Discrimination (PEDQ) analyzed by total score and components of Exclusion/rejection, Stigmatization/devaluation, Threat/aggression, and Discrimination at work; Person-Centered Prenatal Care Scale (PCPC) analyzed by total score and components of Responsive/supportive care, and Communication/autonomy and Dignity/Respect; and Edinburgh Postnatal Depression Scale (EPDS). Obstetrical complications included diabetic and hypertensive disorders and neonatal complications were fetal demise, preterm birth, low birth weight and low Apgar scores.

RESULTS: Of 104 participants; 62% were Hispanic, 23% Black, and 9% White. There was a significant negative correlation between PEDQ, and PCPC (rho= -0.355; p= 0.001). Results showed a positive correlation between PEDQ and ACEs, (r= 0.430; p< 0.001). Black compared to white patients, had lower total mean PCPC scores, (51.4 vs. 71.0, p=0.032), as well as in the domains of responsiveness/support (12.79 vs. 21.17, p=0.047), and dignity/respect (13.21 vs. 18.00, p=0.037). Black compared to Hispanic patients had higher mean scores of discrimination in the domains of stigmatization/devaluation (5.60 vs. 4.57, p= 0.046), and exclusion/rejection (9.60 v. 6.47, p=0.003). Patients with obstetrical complications had lower mean scores in the domain of responsive/supportive (2.361 v 1.423, p=0.037). No differences found in relation to neonatal complications.

CONCLUSION: Our results suggest that experiences of discrimination negatively affect perceptions of person-centered care. Black pregnant patients experienced more discrimination and had lower baseline person-centered prenatal care scores compared to other races.

Table: By Race/Ethnicity and Obstetrical Complications

Variable	White [mean (SD)]	Black [mean (SD)]	P value
Birthweight	3505.00 (241)	3009.83 (639)	0.035
Person-Centered Perception of care score	73.00 (4.98)	51.43(22.18)	0.032
Responsive and supportive positive score	21.17 (3.7)	12.79 (9.2)	0.047
Dignity and respect positive score	18.00 (0.0)	13.21 (5.1)	0.037
	Hispanic [mean (SD)]	Black [mean (SD)]	P value
Exclusion rejection score	6.47 (2.69)	9.60 (5.07)	0.003
Stigmatization devaluation score	4.57 (1.25)	5.60 (2.53)	0.046
	No complications [mean (SD)]	Obstetrical complications [mean (SD)]	P value
Responsive and supportive negative scores	1.42(2.01)	2.36(2.46)	0.037
	No complications [mean (SD)]	Hypertensive disorders [mean (SD)]	P value
Person Centered Perception of care negative score	3.68 (3.80)	6.81 (9.40)	0.027

757 Maternal, Neonatal and Delivery Outcomes Following a SARS-CoV-2 Moratorium on Elective Deliveries

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OBJECTIVE: During the Omicron surge, hospitals experienced staffing shortages. To compensate for the diminished workforce, our institution cancelled *elective* inductions of labor (IOL) and *elective* cesarean deliveries (CD). The purpose of this study was to determine the impact of this moratorium on labor and delivery outcomes.

STUDY DESIGN: Retrospective cohort study of patients with singleton full-term deliveries: (1) three months prior to implementation of the moratorium, (2) the month of the moratorium, and (3) three months following the moratorium. The primary outcome was the rate of nulliparous term singleton vertex (NTSV) CD. Secondary outcomes included select maternal and neonatal outcomes. Outcomes were compared between the three time periods using Chi-square, Kruskal-Wallis, and one-way ANOVA tests as appropriate.

RESULTS: During the study period, 3248 patients meeting inclusion criteria delivered. There were no differences in maternal age, body mass index, race, insurance status, nulliparity, or overall induction of labor across the time periods. NTSV CD rates did not differ across the three time periods (Table 1). There were also no differences in rates of operative vaginal deliveries, trial of labor after CD, vaginal birth after CD, or overall CD rates. Maternal outcomes were similar with no differences in chorioamnionitis, hypertensive disorders of pregnancy, or higher order perineal lacerations. Lastly, there were no differences in neonatal outcomes including 5-minute Apgar < 7, neonatal intensive care unit admission, shoulder dystocia, or Unexpected Term Newborn Complications.

CONCLUSION: Previous studies have evaluated the impact of modifications to labor and delivery practices in response to SARS-CoV-2 and the impact of lockdown measures on preterm birth and CD rates; however, this is the first study to our knowledge to specifically

look at the impact of cancellations of elective IOL or CD. These findings are relevant in the context of potential future surges. It is reassuring that in this analysis there were no significant impacts on maternal, neonatal or delivery outcomes during the moratorium.

Table 1: Delivery-related maternal and neonatal outcomes for patients pre-, post-, and during the moratorium on elective deliveries

	Pre-Moratorium N=1442	Moratorium N=419	Post-Moratorium N=1387	*P*
Delivery Outcomes				
NTSV CD	194 (28.0)	50 (24.6)	202 (30.3)	0.26
Operative VD	64 (4.4)	22 (5.3)	79 (5.7)	0.31
TOLAC	53/440 (26.6)	18 (26.9)	57 (25.0)	0.91
VBAC Success[1]	45/53 (84.9)	14/18 (77.8)	45/57 (79.0)	0.67
VBAC[2]	45 (22.6)	14 (20.9)	45 (19.7)	0.77
Total CD	440 (30.5)	120 (28.6)	202 (30.3)	0.26
Maternal Outcomes				
Chorioamnionitis	68 (4.7)	25 (6.0)	92 (6.6)	0.09
Hypertensive disorders of pregnancy	214 (14.8)	75 (17.9)	219 (15.8)	0.31
Third or fourth degree perineal laceration	11 (0.8)	5 (1.2)	13 (0.9)	0.69
Maternal PPLOS (VD, days)	1.6 ± 0.5	1.6 ± 0.5	1.6 ± 0.6	0.85
Maternal PPLOS (CD, days)	2.8 ± 0.8	3.0 ± 2.9	2.8 ± 0.9	0.47
Neonatal outcomes				
Birthweight (g)	3330 ± 422	3349 ± 432	3357 ± 439	0.23
5 minute Apgar <7	18 (1.3)	6 (1.4)	19 (1.4)	0.94
NICU admission	278 (19.3)	82 (19.6)	277 (20.0)	0.90
PC-06 Overall[3]	32 (2.2)	10 (2.4)	38 (2.7)	0.68
Neonatal LOS (days)	2.4 ± 3.2	2.5 ± 3.0	2.3 ± 1.5	0.10
Shoulder Dystocia	28 (1.9)	7 (1.7)	18 (1.3)	0.40

Data are N (%) or mean ± standard deviation

NTSV, nulliparous term singleton vertex; *CD,* cesarean delivery; *VD,* vaginal delivery; *TOLAC,* trial of labor after cesarean; *VBAC,* vaginal birth after cesarean; *LOS,* length of stay; *PPLOS,* postpartum length of stay; *NICU,* neonatal intensive care unit

[1] successful VBAC / total TOLAC attempts

[2] successful VBAC / total repeat CD + successful VBAC

[3] composite of neonatal death, transfer for higher level of care, severe or moderate birth traumas including intracranial hemorrhage, neurologic damage, sepsis, respiratory complication, or infants who have a NICU admission >5 days.

758 Increased Risk of Metabolic Syndrome Following Delivery of Abnormal Birthweight Babies

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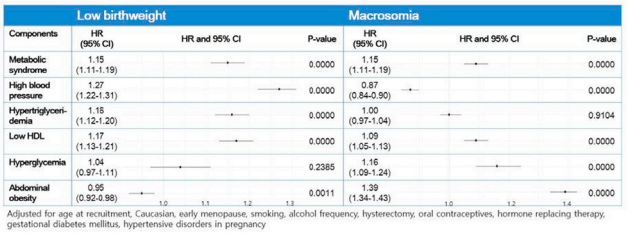
OBJECTIVE: The history of delivering babies with abnormal birthweights has been reported to be associated not only with adverse perinatal outcomes but also with long-term metabolic complications of offspring. However, the potential impact of abnormal birthweight on maternal long-term health has not been well evaluated. This study aimed to evaluate the influence of delivering babies with abnormal birthweights on the long-term development of metabolic syndrome.

STUDY DESIGN: This study was conducted using data from the UK Biobank, which is a large cohort that includes participants in age 40 to 69 years recruited between 2006 and 2010, with ongoing follow-up. Women with at least one livebirth were included in the analysis. The study population was divided into three groups according to the birthweight of their first baby: low birthweight, normal birthweight, and macrosomia. Metabolic syndrome was defined by the presence of 3 or more diagnostic components: abdominal obesity, hypertriglyceridemia, low high-density lipoprotein cholesterol, high blood pressure, and hyperglycemia. The risk of metabolic syndrome and each component were evaluated for both low birthweight and macrosomia cases.

RESULTS: The analysis included 215,882 women, among whom 18,255 had delivered low birthweight babies, and 19,376 had delivered babies with macrosomia. At 40-60 years old, the prevalence of metabolic syndrome was 25.7% (55,517/215,882). Both delivering babies with low birthweight and macrosomia increased the risk of developing metabolic syndrome in middle-aged women.

CONCLUSION: This study highlights that delivering abnormal birthweight babies increase the risk of long-term development of metabolic syndrome, with different effect on each metabolic component. These findings imply the importance of considering both ends of the birthweight spectrum as potential risk factors of adverse maternal health outcomes.

Figure. Adjusted hazard ratio of metabolic syndrome and each components according to the birthweight of offspring



Adjusted for age at recruitment, Caucasian, early menopause, smoking, alcohol frequency, hysterectomy, oral contraceptives, hormone replacing therapy, gestational diabetes mellitus, hypertensive disorders in pregnancy

759 Outcomes of fetoscopic laser surgery across the spectrum of the transfusion syndromes

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OBJECTIVE: Twin Twin Transfusion Syndrome (TTTS) and Twin Anemia Polycythemia Sequence (TAPS) are distinct clinical conditions across the spectrum of the transfusion syndromes. Both can present in isolation or in association with other complications specific to monochorionic twins. Fetoscopic laser surgery (FLS) aims to treat both TTTS and TAPS in a single procedure. We sought to understand if the outcome after FLS was worse in the setting of co-existing or isolated TAPS compared to TTTS.

STUDY DESIGN: Single site secondary analysis of patients presenting with isolated TTTS, TAPS, and TTTS with TAPS. TTTS was defined by Quintero staging and TAPS by middle cerebral artery peak systolic velocity (MCA PSV) discordance criteria. Pregnancy and ultrasound characteristics, primary treatment modality and perinatal outcomes were evaluated using Fisher's exact, Chi-square, Kruskal-Wallis and Mann-Whitney-U tests.

RESULTS: Of 431 patients treated with fetoscopic laser surgery, 371 had TTTS and 12 had TAPS alone, while 48 had both TTTS and TAPS. For cases of isolated TAPS, 9 were stage 2, 1 was stage 3 and 2 were stage 4. There was no difference in maternal body mass index (BMI), gestational age (GA) or fetal size discordance at the time of FLS. Preoperatively, cases with TTTS and TTTS/TAPS had shorter cervical length (CL), higher recipient and lower donor maximum vertical pockets (MVP) than those with isolated TAPS. GA at FLS, fetoscopy time, and joules were not different among groups. Total

number of artery to vein (AV) anastomoses were fewer in TAPS but total AV anastomoses number was not different. The Solomon technique was achieved in 92-98% of cases and recurrence was ≤5% across all groups. Median GA at birth and survival after FLS, birth and >28 days were not different (Table).

CONCLUSION: Despite differences in preoperative characteristics across the spectrum of monochorionic transfusion syndromes of TTTS and TAPS, FLS performs similarly with an overall favorable outcome.

Obstetric outcomes after fetoscopic laser surgery for TTTS, TAPS, and TTTS with TAPS

Characteristic	TTTS (n=371)	TAPS (n=12)	TTTS & TAPS (n=48)	p
Maternal BMI (kg/m²)	28.3 [16.6-61.9]	25.9 [22-35.3]	28.5 [18.5-54]	0.56
TTTS Stage				<0.001
0	0 (0)	12 (100)	0 (0)	
1	75 (20)	0	6 (12)	
2	122 (33)	0	12 (25)	
3	152 (41)	0	22 (46)	
4	21 (6)	0	8 (17)	
5	1 (0.3)	0	0 (0)	
sFGR	263 (71)	8 (67)	27 (56)	0.21
Prior PTB	20 (5)	0 (0)	2 (4)	0.67
Short cervix	75 (20)	0 (0)	8 (17)	0.19
Preoperative CL	37 [0-71]	44 [31-55]	39 [13-65]	0.03
Recipient MVP	10.3 (9-12.1)	6.5 (5.5-8.6)	10.2 (8.8-12)	<0.001
Donor MVP	0.9 (0-1.5)	3.4 (2.2-3.4)	1.3 (0-1.7)	<0.001
MCA MoM discordance	0.2 (0.1-0.3)	1.1 (0.9-1.5)	0.8 (0.6-1.1)	<0.001
GA at Laser	19.5 [15.4-28.2]	19.4 [17.1-24.3]	21.2 [16.1-28.1]	0.96
Fetoscopy time (min)	53 [18-209]	43 [23-99]	53 [15-91]	0.28
Joules	7970 [1042-39190]	5267 [1765-16220]	6884 [1030-17650]	0.32
Total AV anastomoses	10 [0-29]	5 [0-15]	8 [1-28]	0.001
Total anastomoses	15 [1-45]	11.5 [2-30]	15 [4-36]	0.24
Solomon technique	363 (98)	11 (92)	46 (96)	0.31
Laser complete	334 (90)	11 (92)	44 (92)	0.92
Recurrence	17 (5)	0 (0)	2 (4)	0.96
Relaser	9 (2)	0 (0)	2 (4)	0.66
PPROM	134 (36)	8 (67)	19 (40)	0.05
GA at birth	32.2 [18.2-39.3]	32.3 [23.4-34.3]	33 [22-37.5]	0.41
Laser survivors				0.15
2	333 (90)	11 (92)	38 (79)	
1	34 (9)	1 (8)	10 (21)	
0	4 (1)	0 (0)	0 (0)	
Birth survivors				0.54
2	292 (79)	10 (83)	48 (73)	
1	55 (15)	2 (17)	11 (23)	
0	24 (6)	0 (0)	2 (4)	

Data are n (%), median [range], or median (interquartile range).

760 Trends in delayed cord clamping documentation and performance at an urban hospital

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OBJECTIVE: Delayed cord clamping (DCC) has beneficial effects on neonates, specifically in preterm infants where it has been shown to decrease the incidence of necrotizing enterocolitis, intracranial bleeds, anemia and subsequent need for blood transfusions, and hospital mortality. Despite these well studied effects, DCC is not universally performed or documented. We aimed to evaluate the trends in DCC documentation and performance with the goal of identifying areas for improvement.

STUDY DESIGN: This is a retrospective study of DCC documentation and performance at our urban hospital. In October 2022 we implemented formal documentation of DCC performance and duration - documentation was performed by the primary nurse and verified by the primary obstetrician.

RESULTS: From October 2022 – July 2023, 4352 deliveries of live neonates were performed. Throughout the study period documentation improved from 73.8% to 93.7%. Documentation was more commonly performed in vaginal deliveries (VD) compared to cesarean deliveries (CD) (91.5% vs. 73.8%; Figure 1). When documented, the rate of DCC performance was high in both VD and CD (98.0% vs. 94.4%; Figure 1). When comparing extremely preterm (22-27+6w), very preterm (28-31+6w), moderately preterm (32-33+6w), late preterm (34-36+6w) and term (37+w) deliveries, DCC was less likely to be performed at earlier gestational ages (87.5% vs. 89.5% vs. 95.2% vs. 95.8% vs. 97.2%) and more likely to be performed for shorter duration than in term infants (data not shown).

CONCLUSION: Documentation and performance of DCC was overall high, but documentation was lower for cesarean deliveries and performance was poorer and of shorter duration at earlier gestational ages. We identified cesarean deliveries and preterm gestations as areas for improvement in documentation and performance, respectively, and plan to develop educational curricula to improve these measures as well as evaluate the associated neonatal outcomes.

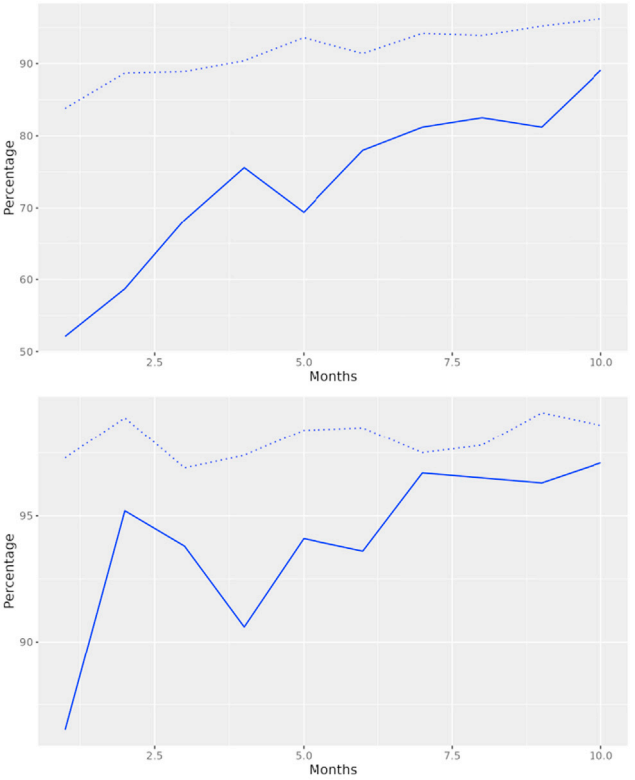

Figure: Documentation and performance of delayed cord clamping by mode of delivery over the study period
(Top – Documented, Bottom – Performed)
(Dashed Line – Vaginal Delivery, Solid Line – Cesarean Delivery)

761 Impact of Retained Placenta on Breastmilk Production in Individuals Undergoing Conservative Management of PAS

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OBJECTIVE: Conservative management of placenta accreta spectrum (PAS) includes delivery of the infant with retention of the placenta in situ. It has been suggested that retained placenta may adversely impact milk supply. There is insufficient data on the impact of leaving the placenta in situ with PAS and ability to establish lactation. Progesterone is believed to disrupt prolactin binding to alveolar cell

receptors within the breast. Placenta delivery with subsequent fall in progesterone removes this inhibitory effect and allows full milk supply. Our objective is to gather information related to lactation in women with planned placental retention.

STUDY DESIGN: We performed a prospective cohort study among pregnant individuals diagnosed with PAS in a tertiary county hospital system. We obtained progesterone and beta hCG levels for individuals undergoing either conservative management (with placenta left in situ and delayed hysterectomy) or cesarean hysterectomy. Chart review of lactation notes from each individual's inpatient hospitalization assessed whether they were breastfeeding or not, and, if breastfeeding, the approximate time for milk production to come in.

RESULTS: The percentage of individuals who breastfed in the cesarean hysterectomy group was 62.5%. The percentage of individuals who breastfed in the conservative management group was 66.7%. The average progesterone levels postpartum were 62.9 ng/mL in the conservative management group compared to 1.86 ng/mL in the cesarean hysterectomy group. The average time for milk supply to come in was 5.6 days for conservative management and 3 days for cesarean hysterectomy.

CONCLUSION: This information is important for future counseling on the impact of retained placenta on breastfeeding outcomes among the pregnant individuals considering conservative management of PAS. Continued research efforts are needed to better understand changes in progesterone and beta hCG levels associated with planned placental retention and implications on breastfeeding and milk supply.

Table 1: Differences in lactation in subjects opting for conservative management of placenta accreta spectrum vs. cesarean hysterectomy

	Conservative Management (n= 30)	Cesarean Hysterectomy (n= 96)
Number breastfeeding (n, %)	20, 66.7	60, 62.5
Progesterone level pre-delivery in ng/mL (mean, SD)	115.6, 63.1	138, 10.2
Progesterone level post-delivery in ng/mL (mean, SD)	62.9, 31.3	1.86, 2.1
hCG level in mIU/mL (mean, SD)	11410.9, 10143.0	15848.5, 12282.6
Number of days for milk supply to come in (mean, SD)	5.6, 2.8	3.5, n/a
Gestational age at delivery (mean, SD)	33w4d, 8.4 days	32w2d, 7.2 days

762 Neonatal intensive care unit admission and maternal postoperative pain experience

Jennifer L. Grasch

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OBJECTIVE: To evaluate whether there is a relationship between newborn admission to the neonatal intensive care unit (NICU) and maternal pain experience and analgesic requirements after cesarean delivery (CD).

STUDY DESIGN: Secondary analysis of a multicenter randomized trial of individuals who underwent CD at 31 US hospitals (2020-22). Those whose pregnancies were complicated by major congenital anomalies, fetal or immediate neonatal death, or with missing data on the level of neonatal care required were excluded. The primary outcome was severe pain in the 24 hours prior to discharge: ≥7 on a scale from 0-10 on the Brief Pain Inventory. Secondary outcomes included assessments of opioid use and pain at defined time points. Univariable and multivariable analyses were performed.

RESULTS: 5265 individuals (95% of parent study participants) were included in this analysis. The 1348 (25.6%) participants whose newborns were admitted to the NICU were younger, of higher BMI, more likely to self-identify as non-Hispanic Black and to have comorbidities. There was no difference in the primary outcome (54.9 vs 57.2%, aOR 0.87, 95% CI 0.75-1.00) or rates of severe pain at 1 (Table), 2, 6 weeks, or 90 days postoperatively between the two groups (data not shown). Rates of moderate pain (≥4) at enrollment (88.1 vs 90.4%, aOR 0.70, 95% CI 0.57-0.88) and 1 week postpartum (57.5 vs 60.9%, aOR 0.81, 95% CI 0.70-0.94) were lower for people with infants in NICU.

Despite similar pain scores, people with infants in NICU had higher average daily and total postoperative inpatient opioid use (adjusted median difference 13.2 morphine milligram equivalents, 95% CI 7.8-18.7; Table).

CONCLUSION: In the postoperative period, parents whose infants were admitted to the NICU required higher doses of opioids to achieve similar pain control after CD.

Table. Maternal postoperative pain outcomes by highest level of neonatal care required

Outcome	Infant admitted to NICU (n=1348)	Infant not admitted to NICU (n=3917)	OR (95% CI)	Adjusted OR (95% CI)[a]
At enrollment, self-rated worst pain in last 24 hours				
Severe (≥7)	740 (54.9)	2238 (57.2)	0.91 (0.80, 1.03)	0.87 (0.75, 1.00)
Moderate or severe (≥4)	1188 (88.1)	3538 (90.4)	0.79 (0.65, 0.96)	0.70 (0.57, 0.88)
One week postpartum, self-rated worst pain in last 24 hours				
Severe (≥7)	233 (18.8)	657 (18.2)	1.04 (0.88, 1.23)	0.96 (0.79, 1.16)
Moderate or severe (≥4)	712 (57.5)	2192 (60.9)	0.87 (0.76, 0.99)	0.81 (0.70, 0.94)
			Median difference (95% CI)	Adjusted median difference (95% CI)[a]
Total inpatient opioid use, *MME*	45 (7.5, 101.3)	30 (0, 67.5)	15.0 (9.0, 21.0)	13.2 (7.8, 18.7)
Daily inpatient opioid use, *MME*	14 (3.1, 28.3)	10.5 (0, 25.2)	3.6 (2.0, 5.1)	2.0 (0.5, 3.6)

Data are reported as n (%), median (IQR) or OR (95% CI).
NICU, neonatal intensive care unit; MME, morphine milligram equivalents
[a] Adjusted for maternal BMI, race/ethnicity, chronic pain condition, history of depression/anxiety, prior cesarean delivery, induction of labor, multifetal gestation and general anesthesia.

763 Obstetric Care and Pregnancy Health among Autistic Individuals in an Integrated Healthcare Setting in California

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OBJECTIVE: Early evidence, mainly from European samples, suggests that individuals with autism spectrum disorder (ASD) face unique challenges around reproductive health, including increased risks of perinatal depression and pregnancy complications. Autistic people also commonly report traumatic experiences in healthcare, particularly in obstetric care. Our study aimed to describe pregnancy health and obstetric care utilization in autistic individuals in the United States.

STUDY DESIGN: Among members of Kaiser Permanente Northern California (KPNC) who had a clinician-documented ASD diagnosis,

we identified all pregnancies that occurred between January 1997 and July 2022 (n=235). From electronic health records, we extracted data on sociodemographic factors, diagnoses during pregnancy and postpartum, birth outcomes, and obstetric care utilization. We matched pregnancies among non-autistic members 100:1 on birth year to the autistic group (n=235,000). We used adjusted logistic regression to compare outcomes and utilization between the two groups.

RESULTS: Autistic individuals were more likely than non-autistic peers to be younger at pregnancy onset (average age 26 vs. 30 years old), White, non-Hispanic (58% vs. 35%), and to have government-subsidized insurance (25% vs. 10%). Autistic individuals also had higher rates of therapeutic abortion (27% vs. 15%), depression during pregnancy (54% vs. 14%) and postpartum (20% vs. 9%), and pre-term birth (13% vs. 6%). Pregnancy conditions such as gestational diabetes and pre-eclampsia, and prenatal care utilization, such as timing of prenatal care initiation, screenings, and C-section, did not significantly differ between the groups. However, autistic individuals were more likely to visit the emergency department within 6 months postpartum (Adjusted-OR: 1.56, 95% CI: 1.00, 2.46).

CONCLUSION: These findings emphasize the importance of addressing the obstetric needs of autistic individuals, including improving access to family planning services, enhancing the quality of prenatal and postpartum care, and providing adequate perinatal mental health support.

764 Optimizing Glucose Control and User Satisfaction with a Diabetes in Pregnancy Order Set Algorithm

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OBJECTIVE: Correctional insulin is frequently ordered for pregnant patients on Labor and Delivery however preexisting insulin order sets are designed for non-pregnant patients. We aimed to create an obstetrics specific insulin order set in our electronic health record to improve efficiency, standardization, and user satisfaction.

STUDY DESIGN: With joint collaboration between maternal-fetal medicine, endocrinology, and nursing, we created a standardized insulin order set for use in pregnant patients with antepartum, intrapartum, and postpartum orders for each phase of care. A 20-item REDCAP survey was administered to MD and RN providers prior to and after implementation. Users rated on a Likert scale various statements assessing user satisfaction across 4 domains: usability of orders, communication between providers, clarity of orders, and efficiency of use. Chi-square or independent samples t-test were used to compare groups as appropriate. The study was deemed IRB exempt #22-000102.

RESULTS: Total 59 providers completed the survey prior to implementation of the order set and 24 completed it up to 12 months post-implementation. Demographics of survey participants did not vary between groups. After implementation of the new order set, there was significant improvement in perceived usability of the orders interface, including adaptability, clarity, and standardization of instructions across patients ($p< 0.001$). Providers reported decreased rates of miscommunication, incorrect orders, avoidable mistakes, and safety concerns ($p< 0.001$). Providers felt improved clarity of orders including blood glucose checks and insulin coverage ($p< 0.001$). There was also reported improvement in efficiency, with decreased amounts of time spent on orders and overall increased satisfaction with the orders interface ($p< 0.001$).

CONCLUSION: Implementation of a standardized obstetric specific insulin order set can significantly improve provider satisfaction on Labor and Delivery, helping improve usability, communication, and efficiency.

Table 1: Pre- and Post-Implementation Survey Results

Survey Question	Pre (n=59)	Post (n=24)	P-value[a]
Usability			
The orders interface is user-friendly.	2.46±0.92	4.13±1.03	**<0.001**
The orders interface is easy to adapt to pregnant patients.	2.31±0.88	3.92±1.21	**<0.001**
The orders interface is clear in the instructions.	2.34±0.90	4.13±1.03	**<0.001**
The orders interface is standardized between patients.	2.24±1.04	4.17±1.09	**<0.001**
The orders interface is efficient to use.	2.36±1.0	4.17±1.05	**<0.001**
Communication			
There is frequent miscommunication between providers.	3.69±0.88	2.88±1.33	**0.002**
There is frequent need to clarify orders.	4.41±0.53	3.0±1.45	**<0.001**
There are often incorrect orders.	3.78±0.94	2.42±1.28	**<0.001**
There are avoidable mistakes that happen.	3.52±1.01	2.46±1.10	**0.002**
There are safety concerns that arise.	3.74±1.00	2.38±1.24	**<0.001**
Clarification of Orders			
It is clear how often to check blood sugars.	2.60±0.92	3.88±1.26	**<0.001**
It is clear when to continue or discontinue standing insulin.	2.41±0.90	3.92±1.18	**<0.001**
It is clear how much insulin coverage to give.	3.0±0.99	4.33±0.82	**<0.001**
It is clear how often insulin coverage should be given.	2.78±0.97	4.29±0.81	**<0.001**
It is clear when to start pregnant patients on an insulin drip.	2.72±0.97	4.21±0.88	**<0.001**
Efficiency			
It is difficult identifying the orders needed.	3.69±0.75	2.0±1.02	**<0.001**
It is time consuming clarifying orders.	4.12±0.86	2.42±1.32	**<0.001**
It is frustrating taking care of diabetic pregnant patients.	3.69±0.99	2.25±1.26	**<0.001**
The amount of time I spend on the EHR for diabetic pregnant patients is significantly greater than for other patients.	3.78±0.90	2.79±1.22	**<0.001**
I am overall satisfied with the orders interface for diabetes management in our pregnant patients.	2.26±0.85	4.04±1.04	**<0.001**

765 Intended conservative management versus cesarean hysterectomy for known/suspected placenta accreta spectrum: a cost-effectiveness analysis

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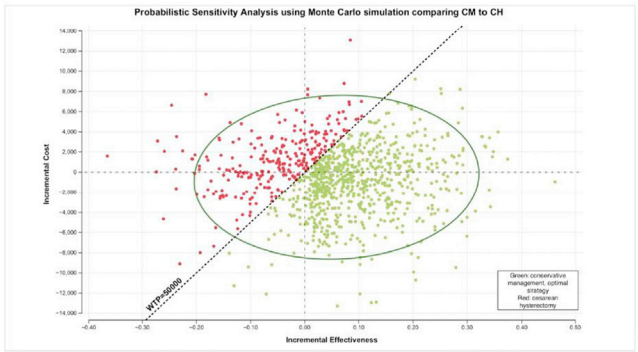
OBJECTIVE: Although the standard of treatment for placenta accreta spectrum (PAS) is planned cesarean hysterectomy (CH), an alternative approach in which the placenta and uterus are left in situ, conservative management (CM), is gaining acceptance. CM reduces immediate PAS morbidity, but delayed morbidity may lead to greater costs over time. We examined the cost-effectiveness of offering CM compared to CH as standard treatment for PAS.

STUDY DESIGN: A decision analysis (DA) compared CH with CM for 1000 persons with known or suspected PAS > 20 weeks gestation. In the base case analysis, we assumed 20-40% of patients with PAS would be eligible for CM and 50% would accept the intervention. Using probabilities derived from the literature, 78% would achieve successful CM at delivery and 82% would meet their intended delivery date. The DA was conducted from a healthcare system perspective with the analytic horizon the first postpartum year. Incremental cost-effectiveness ratios (ICER) for each strategy were calculated and compared. Utilities and costs were derived from the literature and Healthcare Cost and Utilization Project and adjusted to 2023 US dollars. An ICER of $50,000 per QALY defined cost-effectiveness. Standard sensitivity analyses were performed.

RESULTS: For base-case estimates, CM was the dominant strategy. Compared to CH, CM resulted in 905 fewer hysterectomies, 80 fewer instances of surgical site infection, and 5 fewer deaths. CM resulted in 149 more admissions with length of stay >5 days and 25 more ICU admissions. CM was the cost-effective strategy in 72% of runs and the dominant strategy in 41% of runs. In our threshold analysis, 23% of patients would need to accept and undergo successful CM

for it to be cost-effective, while it would remain cost-effective if no more than 51% were admitted to the ICU.

CONCLUSION: CM was the cost-effective or cost-saving management strategy compared to CH for PAS. However, modeling demonstrated significant uncertainty in the comparative effectiveness of the two strategies, highlighting the need for prospective research evaluating the effectiveness of CM.



766 Obstetric and fetal outcomes with high risk and non-reportable low fetal fraction cell-free DNA results

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OBJECTIVE: Low fetal fraction of cell-free fetal DNA (cfDNA) is associated with a risk for adverse pregnancy outcomes and aneuploidy. This study compares outcomes for pregnancies with non-reportable low fetal fraction (NR-LFF) versus high-risk low fetal fraction (HR-LFF) results.

STUDY DESIGN: Retrospective study of singleton pregnancies with LFF cfDNA results from a SNP-based platform from 1/2020 to 1/2023 at a single institution. Patients received a HR result (1/17 risk for trisomy 18, trisomy 13 or triploidy) or a NR result based on a fetal fraction-based risk (FFBR) model that incorporates maternal age, weight and gestational age into risk assessment. Primary outcomes included aneuploidy and live birth rate. Secondary outcomes included preterm delivery (PTD), small for gestational age (SGA) and preeclampsia (preE).

RESULTS: There were 214 women with LFF during the study period: 61 HR-LFF and 152 NR-LFF. Women in the HR-LFF group were older, had lower BMI, and lower fetal fraction (table). Those in the NR-LFF group were more likely to repeat the screen and those in the HR-LFF group were more likely to pursue diagnostic testing, likely representing differences in counseling. Aneuploidy rates were comparable between the two groups, including no pregnancies with trisomy 18, trisomy 13 or triploidy in the HR-LFF group. Pregnancy outcomes were available for 204 (95.3%) of the cohort and were similar between groups, although there was a trend towards a lower rate of liveborn neonates in the HR-LFF group. Rates of PTD and preE were high. Most miscarriages in the cohort did not have genetic testing, which may have limited sensitivity to detect aneuploidy.

CONCLUSION: Rates of aneuploidy were low in both HR-LFF and NR-LFF groups, although they may be underestimated due to incomplete genetic testing. Live birth rates trended lower in the HR-LFF group suggesting a greater risk for pregnancy loss. Overall rates of adverse pregnancy outcomes were relatively high, although there was no difference in outcomes between the HR-LFF and NR-LFF groups, suggesting these metrics are not influenced by the FFBR model.

Table 1. Maternal and pregnancy outcomes

	Non-reportable LFF N=152	High Risk LFF N=61	P value
Maternal Characteristics			
Maternal age (year)	28.97 ± 4.90	34.03 ± 6.45	<0.00001
BMI (kg/m2)	41.50 ± 8.42	32.97 ± 6.38	<0.00001
Enoxaparin use at time of draw	4 (2.6)	6 (9.8)	0.035
Aspirin use at time of draw	30 (19.6)	19 (41.7)	0.074
Screening Outcomes			
Gestational age at initial screen (weeks)	12.95 ± 1.47	13.18 ± 2.08	0.349
Fetal fraction (%)	2.88 ± 1.03	2.42 ± 0.51	0.0009
Repeat cfDNA screen	109 (71.7)	9 (14.8)	<0.00001
Diagnostic test	7 (4.6)	16 (26.2)	<0.00001
Abnormal diagnostic test	3 (2.0)	2 (3.3)	0.626
Trisomy 21	1 (0.6)	0 (0)	
Trisomy 18	2 (1.3)	0 (0)	
Monosomy X	0 (0)	1 (1.6)	
2q deletion	0 (0)	1 (1.6)	
Pregnancy Outcomes			
	Non-reportable LFF N=146*	**High Risk LFF N=53***	**P value**
Birth category			
Live birth	138 (94.5)	46 (86.8)	0.068
Stillbirth	0 (0)	1 (1.9)	
Miscarriage	8 (5.6)	6 (11.3)	
	Non-reportable LFF N=138^	**High Risk LFF N=47^**	**P value**
Gestational age at delivery (weeks)	37.96 ± 2.52	37.30 ± 3.51	0.165
Preterm delivery	31 (22.5)	9 (19.1)	0.534
Birthweight (g)	3203 ± 697.05	3077 ± 896.09	0.325
Small for gestational age	17 (12.3)	4 (8.5)	0.477
Preeclampsia	37 (26.8)	9 (19.1)	0.294

*excludes unknown outcomes and terminations

^excludes delivery < 24 weeks

Data are in mean ± standard deviation or n (percent).

767 Differential Packaging of Nuclear and Membrane Progesterone Receptors in Myometrial and Decidual Cell Exosomes

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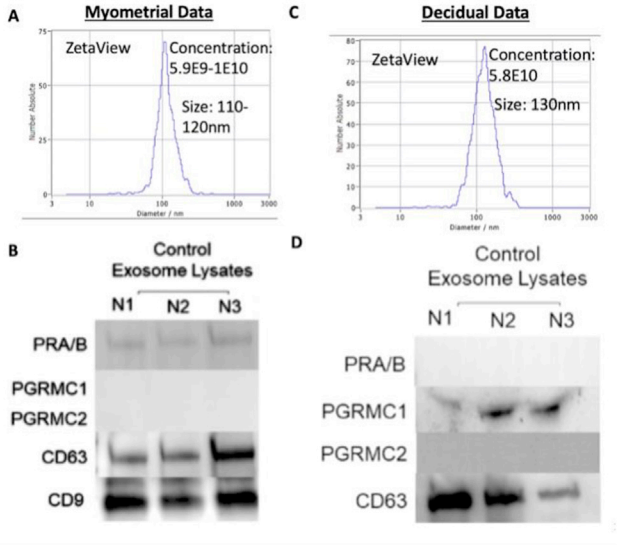
OBJECTIVE: Progesterone and its receptors (progesterone receptor membrane components-1/2 [PGRMC1/2] and nuclear progesterone receptors A/B [PRA/B]) play a crucial role in pregnancy maintenance by promoting decidualization, immunomodulation, uterine quiescence, and cervical integrity. The paracrine signaling functions they may provide when propagated via uterine cell-derived exosomes are unclear.

STUDY DESIGN: Lysates of myometrial and decidual cells grown in a 2D culture were prepared, and extracellular vesicles (exosomes) were isolated from media using differential ultracentrifugation and size exclusion chromatography. Immunocytochemistry and western blots localized receptors within cells and exosomes. ZetaView determined exosome size, concentrations, and exosomal-enriched CD markers.

RESULTS: Immunocytochemistry and western blot analysis of myometrial and decidual cell lysates confirmed the expression of both membrane (PGRMC1/PGRMC2) and genomic receptors (PRA/PRB). Myometrial and decidual cell-derived exosomes were around 110-130nm (**Fig.1A; Fig.1C**), concentrated within 10^9 -10^{10} per/ml (**Fig.1A; Fig.1C**), and expressed CD63 or CD9 (**Fig.1B; Fig.1D**). Myometrial exosomes predominantly expressed genomic receptors PRA/B (**Fig.1B**), while decidual exosomes expressed PGRMC1 (**Fig.1D**). These differences highlight the potential distinction in progesterone paracrine signaling and could be later used to target either cell type depending on the pathology.

CONCLUSION: We confirmed the expression of progesterone receptors and report their differential expressions in exosomes from myometrial and decidua cells. Given that a subset of pregnant women does not respond to progesterone treatment due to functional progesterone withdrawal, PR-containing exosomes could be utilized to deliver these receptors to gestational tissues during pregnancy. Potentially making them responsive to progesterone. Functional studies are still needed to understand the role of exosome-derived progesterone receptors.



768 Mid-gestation pregnancy serum level of placenta-specific miR-519c is inversely associated with infection-related preterm birth risk

Jessica A. Meyer[1], Agata Kantorowska[2], Jenna Silverstein[1], Whitney Cowell[1], Xinhua Lin[3], Leonardo Trasande[1], Ashley S. Roman[1], Shilpi Mehta-Lee[4], Nazeeh Hanna[3]

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OBJECTIVE: Placenta-specific miRNA-519c plays a crucial role in mitigating excessive placental inflammatory responses to repeated infections. Due to its predominant expression in the placenta, it has the potential to serve as a valuable maternal serum biomarker reflecting placental immune status. This study aimed to explore the association of low mid-gestation serum miR-519c with subsequent infection-related preterm birth.

STUDY DESIGN: This was a multicenter case-control study of pregnant patients for whom serum was collected during a routine prenatal visit ≤24 weeks and the placenta was histopathologically examined for chorioamnionitis postnatally. Preterm birth (< 37 weeks) cases were compared to term birth controls. miR-519c expression was assessed by qRT-PCR and presented as -dCt using cel-miR-39-3p as a control. The relationship between serum miR-519c level and the outcome of infection-related preterm birth was examined using unpaired t-test, ANOVA, and receiver operating characteristic curves as applicable.

RESULTS: Sera from 114 patients were analyzed: 54 preterm deliveries (13 with chorioamnionitis) and 60 term controls (21 with chorioamnionitis). Lower miR-519c levels were found among those with eventual preterm chorioamnionitis compared to term births (p=0.03) and uninfected preterm births (p< 0.01), as shown in Figure Panel (a). Preterm birth was not associated with lower miR-519c levels in the absence of peripartum infection compared to term birth (Panel (a)), nor was the presence of chorioamnionitis alone associated with lower miR-519c levels among those who delivered at term (Panel (b)). Mid-gestation serum miR-519c level was a good predictor of infection-related preterm birth (Panel (c): AUC 0.76, 95% CI 0.62-0.90).

CONCLUSION: Decreased levels of mid-gestation anti-inflammatory miR-519c were associated with subsequent development of infection-related preterm birth. Further investigation is warranted to explore the role of miR-519c in obstetrical outcomes and its utility as a pregnancy biomarker of placental immune status.

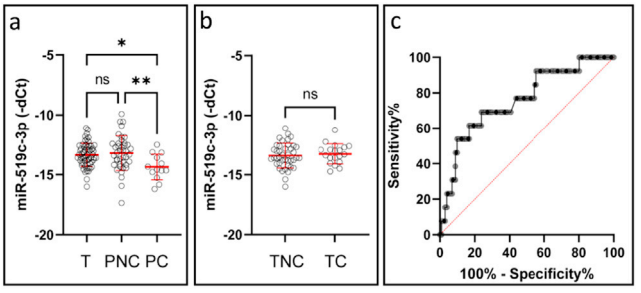

Figure: Mid-gestation pregnancy serum miR-519c-3p levels in relation to pregnancy outcomes

a) Relative mid-gestation expression of serum miR-519c-3p among patients that ultimately delivered at term (T, n=60), preterm without chorioamnionitis (PNC, n=41), or preterm with chorioamnionitis (PC, n=13). Analysis via one-way ANOVA with Turkey's multiple comparisons test; * (p<0.05), ** (p<0.01), and ns (p>0.05).

b) Relative mid-gestation expression of serum miR-519c-3p among patients that ultimately delivered at term without chorioamnionitis (TNC, n=41) or term with chorioamnionitis (TC, n=19). Analysis via unpaired t-test; ns (p>0.05).

c) Receiver operating characteristic curve (ROC) for serum miR-519c-3p levels predictive of infection-related preterm birth. Area Under the Curve (AUC) was 0.76 (95% CI 0.62–0.90, p=0.003). Generated using GraphPad Prism v 10.0.1 with Wilson/Brown method.

769 Rationalization of obstetric hysterectomy trays: A quality-improvement initiative

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OBJECTIVE: While obstetric hysterectomy is a rare event, it is associated with high morbidity and possible mortality. Surgical instrument trays with inappropriate instruments may contribute to intraoperative disorganization, causing increased costs and delays during these critical cases. We aimed to improve OR efficiency by rationalizing surgical instrument trays for obstetric hysterectomy cases.

STUDY DESIGN: This is a prospective quality improvement study critically appraising obstetric hysterectomy instrument trays at a single urban academic institution. Qualitative surveys were distributed to surgical technicians and senior surgeons (Maternal-Fetal Medicine and Gynecologic Oncology) to identify targets for

improvement. Existing obstetric trays were inventoried and compared to gynecologic hysterectomy trays to facilitate removal of unnecessary instruments and supplementation of necessary missing instruments. Post-rationalization instrument lists were approved by senior surgeons prior to tray modification and cost analysis.

RESULTS: A total of 4 trays containing 176 instruments were rationalized to 2 trays containing 129 instruments (27% reduction). Nearly one third of instruments (N=55/176) in the pre-rationalization trays were deemed unnecessary. The post-rationalization trays had 77% crossover (N=99/129) with the pre-rationalization obstetric hysterectomy trays and 23% crossover (N=30/129) with gynecologic hysterectomy trays, reflecting the inadequacy of the original trays to include all necessary instruments. Based on institutional case volume for obstetric hysterectomies, tray rationalization amounted to $4075.91 savings in purchase costs and $690 annual savings in tray processing costs.

CONCLUSION: Interdisciplinary appraisal of surgical instrument trays can effectively improve their clinical appropriateness while also reducing costs. Future steps for quality improvement will integrate the rationalized trays into a simulation curriculum to ensure familiarity and competency of all operating room staff and surgeons with the updated obstetric hysterectomy trays.

Table: Pre- and post-rationalization instrument use, costs, and savings

Tray Name	SIs per Tray	SIs per Case	SITs per Case	Cost per Case [a]	Annual Savings [b]
Pre-rationalization Trays					
L&D Z Clamps	29	176	4	Purchase $9938.29 Processing $115	$4765.91
L&D Abdominal Hysterectomy Clamp A	46				
L&D Abdominal Hysterectomy Clamp B	71				
L&D Abdominal Retractor	30				
Post-rationalization Trays					
L&D Hysterectomy Clamps	113	129	2	Purchase $5862.38 Processing $115	
L&D Hysterectomy Retractors	16				

Abbreviations: Surgical Instruments (SIs), Surgical Instrument Trays (SITs)
a Cost including purchase cost of all instruments in tray and cleaning/processing cost per case
b Savings calculated per year, assuming average case volume of 3 obstetric hysterectomies annually

770 Neonatal outcomes associated with clinically significant red blood cell antibody seroconversion in pregnancy

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OBJECTIVE: To determine neonatal outcomes associated with clinically significant red blood cell (RBC) antibody seroconversion in pregnancy.

STUDY DESIGN: This is a retrospective cohort study of all pregnant patients who delivered at a multi-hospital system from 2016-2023. In this system, a type and screen (T&S) is obtained at entry to prenatal care, at time of admission for delivery, prior to administration of Rh(D) immune globulin (RhIG), or as clinically indicated. Patients with missing RBC antibody screen at delivery or no record of T&S at entry to prenatal care were excluded. All other patients with a positive screen at delivery were categorized as passively immunized due to RhIG, alloimmunized (antibody previously identified during the pregnancy), or seroconverted (antibody not previously identified in the pregnancy). Antibodies were described as clinically significant if associated with hemolytic disease of the fetus and newborn (HDFN) to any degree per ACOG Practice Bulletin 192. For neonates born to seroconverted patients with clinically significant antibodies, neonatal outcomes were chart abstracted. The highest total bilirubin was recorded prior to 96 hours of life as was phototherapy for hyperbilirubinemia, need for RBC transfusion, and neonatal intensive care unit (NICU) admission.

RESULTS: There were 58,912 pregnant individuals with 71,384 eligible deliveries. 351 (0.5%) deliveries had clinically significant antibodies associated with HDFN, and among those, 168 (0.2%) seroconverted in pregnancy. Among those deliveries, there was one case of unexplained stillbirth at 29 weeks and another pregnancy loss at 19 weeks. Of the remaining 166 liveborn neonates, 78 had a total bilirubin level drawn (median 9.1, ranged from 1.1 to 30.1) and 22 required phototherapy. 27 neonates required NICU admission, 5 of which were primarily due to hemolytic disease (Table).

CONCLUSION: Development of new clinically significant RBC antibody in pregnancy occurred at a rate of 0.2% with low incidence of associated neonatal morbidity. Routine third trimester assessment of maternal antibody status may not be indicated.

Table: Characteristics of neonatal cases admitted to NICU with component of hemolytic anemia

Case	Maternal antibodies	Antepartum PUBS/IUT	GA at birth	Neonatal DAT	Highest total bilirubin (mg/dL)	Time of bilirubin (hours of life)	Photo-therapy	First Hgb (mg/dL)	Transfusion	NICU LOS (days)	Comments
1	Anti-JkA	IUT x5, hydrops fetalis	33w2d	Negative	9.9	76	Yes	10.1	Simple pRBC and platelet	52	Prenatal diagnosis of pathogenic variants associated with bone marrow failure
2	Anti-D, anti-S, Anti-C, anti-JkA	IUT x5	35w2d	Negative	5.6	32	Yes	10.6	Simple pRBC	38	Abnormal microarray, congenital hydrocephalus
3	Anti-E	n/a	36w4d	1+	13.9	80	Yes	20.0	n/a	13	n/a
4	Anti-D	n/a	37w4d	1+	30.1	68	Yes	16.1	Double volume exchange transfusion	7	n/a
5	Anti-c	n/a	37w3d	Positive	17.5	65	Yes	16.8	n/a	3	IVIG infusion

PUBS=percutaneous umbilical blood sample, IUT=intrauterine transfusion, GA=gestational age, DAT=direct antiglobulin test, pRBC=packed red blood cells, NICU=neonatal intersive care unit, LOS=length of stay, IVIG=intravenous immunoglobulin

771 TTTS staging stratification for fetal death with donor twin middle cerebral artery evaluation without TAPS

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OBJECTIVE: To determine the association of elevated (> 1.5 MoMs) middle cerebral artery peak systolic velocity (MCA-PSV) with fetal demise in donor twins among twin-to-twin transfusion syndrome (TTTS) cases without twin anemia polycythemia sequence (TAPS).

STUDY DESIGN: This prospective cohort study included TTTS cases that underwent laser surgery from 2011 to 2022 at a single center. The distribution of donor fetal demise was stratified according to TTTS staging and elevated donor MCA-PSV without TAPS. Regression analysis was done to determine the association of isolated increased donor MCA-PSV and fetal demise, adjusted for TAPS, TTTS stage, selective fetal growth restriction (sFGR), and other confounders (Table 1). A cox regression model was used to evaluate the association of elevated donor MCA-PSV without TAPS and surgery-to-delivery interval adjusting for confounders.

RESULTS: Out of 660 TTTS cases, donor MCA-PSV was unavailable in 46 (7%) cases. Of the remaining 614 patients, 9 (1.5%) were lost

to follow up. High donor MCA-PSV without TAPS was seen in 5.6% (34/605) of the study population and its frequency doubled with each TTTS stage (1.2%, 3.6%, 6.9%, and 16.7%; at stages I, II, III, and IV, respectively; p=0.003). Among donor fetal demise cases (n=85) the percentage of elevated donor MCA-PSV without TAPS was 0% (0/6), 7.1% (1/14), 22.6% (14/62), and 100% (3/3) at TTTS stages I, II, III, and IV, respectively (p=0.005). High donor MCA-PSV without TAPS was an independent factor for donor fetal demise (aOR: 10.7; 95 % CI: 4.84-23.6; p< 0.001), after adjusting for confounders (Table 1). Elevated donor MCA-PSV without TAPS was independently associated with shorter surgery-to-delivery interval (Hazard ratio: 0.38; 95% CI: 0.22-0.67).

CONCLUSION: Elevated donor MCA-PSV without TAPS prior to laser surgery is associated with shorter procedure-to-delivery interval and with an 11-fold increased risk for donor fetal demise, adjusted for TAPS, sFGR, TTTS stage, and other confounders. Doppler evaluation of donor MCA PSV prior to laser surgery can further stratify TTTS staging to evaluate the risk for donor fetal demise.

Table 1. *Logistic regression analysis to identify variables determining donor fetal death*

Predictor Variables	Crude Odds Ratio (95% CI)	p	Adjusted Odds Ratio (95% CI)	p
Maternal age (years)	0.98 (0.95-1.02)	0.362	1.01 (0.97-1.06)	0.591
Maternal BMI (kg/m²)	0.99 (0.97-1.03)	0.931	1.00 (0.97-1.05)	0.778
Cervical length (mm)	0.99 (0.98-1.01)	0.633	1.00 (0.98-1.02)	0.900
GA at surgery (weeks)	0.98 (0.97-0.99)	0.003	0.98 (0.97-0.99)	0.012
Male gender	1.21 (0.78-1.88)	0.395	1.04 (0.62-1.75)	0.889
GA at delivery (weeks)	0.98 (0.97-0.99)	<0.001	0.98 (0.98-0.99)	<0.001
sFGR	3.45 (1.88- 6.30)	<0.001	3.26 (1.62- 6.55)	0.001
Anterior placenta	1.44 (0.94-2.21)	0.095	1.64 (0.98-2.75)	0.061
Preterm PROM	1.19 (0.77-1.84)	0.440	1.64 (0.92-2.94)	0.096
TAPS	0.63 (0.22-1.82)	0.394	1.14 (0.38-3.45)	0.818
TTTS Quintero staging				
Stage 1	Reference	0.002	Reference	0.184
Stage 2	0.44 (0.13- 1.52)	0.195	1.12 (0.21-6.07)	0.895
Stage 3	0.48 (0.16- 1.43)	0.189	0.79 (0.16-3.86)	0.769
Stage 4	1.23 (0.46-3.33)	0.680	1.61 (0.36-7.32)	0.377
Donor MCA-PSV >1.5 MoM without TAPS	9.37 (4.59-19.1)	<0.001	10.69 (4.84-23.62)	<0.001

GA: gestational age, BMI: body mass index; sFGR: selective fetal growth restriction (EFW or birthweight discordance ≥25% and EFW < 10th percentile); MCA: middle cerebral artery; PSV: peak systolic velocity. TAPS: twin anemia polycytemia sequence [donor MCA-PSV>1.5 multiples of the median (MoMs) and recipient MCA-PSV< 1 MoM]; CI: confidence interval.

772 Hypertensive disorders of pregnancy and severe maternal morbidity according to race/ethnicity, California 2007-2018

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OBJECTIVE: The goal of this study was to assess the relationship between hypertensive disorders of pregnancy (HDP) and severe maternal morbidity (SMM) at delivery through 6-weeks postpartum (PP) by race/ethnicity. Racial/ethnic disparities in HDP and SMM are well known, and HDP confers increased risks of SMM and PP readmission.

STUDY DESIGN: This historical cohort study contained birth and fetal death certificates linked to hospital discharge records for the delivery admission and PP readmissions up to 6 weeks after delivery, for nearly all inpatient deliveries in California from 2007-2018. PP readmissions excluded transfers from the delivery hospitalization. HDP were identified by International Classification of Diseases codes from the delivery hospitalization. SMM was defined by the Centers for Disease Control and Prevention index and analyzed as any SMM from delivery up to 6 weeks PP as well as by time of occurrence: at delivery only, PP only, or delivery and PP SMM. We calculated the frequency of SMM among people with and without HDP stratified on race/ethnicity. We performed logistic regression to assess the association of HDP and SMM by race/ethnicity and adjusted confounders.

RESULTS: The frequency of SMM by race/ethnicity was between 1-2% of people without HDP and 4-7% of those with HDP (Table 1). SMM by each time of occurrence was highest among non-Hispanic Black people both with and without HDP. The highest odds ratio (OR) for HDP and SMM was observed among Hispanic people (OR=4.26, 95% confidence interval (4.17, 4.36), but the associations were similar and significantly elevated for all race/ethnicities (Table 1).

CONCLUSION: SMM at delivery or up to 6-weeks postpartum was 3 to 4 times more likely among pregnant people with HDP compared to those without HDP. The magnitude of the relationship between HDP and SMM was similar for all race/ethnicities although the absolute percentage of SMM was the highest among non-Hispanic Black people. These results confirm that HDP is a major risk factor for SMM, regardless of race/ethnicity.

Table 1. Frequency of severe maternal morbidity by time of occurrence and odds ratios for all severe maternal morbidity (SMM) at delivery through 6-weeks postpartum, by race/ethnicity and hypertensive disorders of pregnancy status at delivery

Race/ethnicity	HDP at delivery*	Total deliveries	SMM by time of occurrence			Any SMM		
			Delivery SMM only	Postpartum SMM only	Delivery and Postpartum SMM			
		n	n (%)	n (%)	n (%)	n (%)	cOR (95% CI)***	aOR (95% CI)****
Asian	No	688,276	8,500 (1.23)	1,189 (0.17)	111 (0.02)	9,800 (1.42)	1.0 (ref)	1.0 (ref)
	Yes	45,891	2,297 (5.01)	264 (0.58)	63 (0.14)	2,624 (5.72)	4.20 (4.02,4.39)	3.72 (3.55,3.89)
Hispanic	No	2,441,821	28,827 (1.18)	4,492 (0.18)	363 (0.01)	33,682 (1.38)	1.0 (ref)	1.0 (ref)
	Yes	198,250	10,236 (5.16)	994 (0.5)	251 (0.13)	11,481 (5.79)	4.39 (4.30,4.49)	4.25 (4.17,4.36)
Non-Hispanic Black	No	252,272	4,180 (1.66)	1,091 (0.43)	132 (0.05)	5,403 (2.14)	1.0 (ref)	1.0 (ref)
	Yes	37,935	2,204 (5.81)	388 (1.02)	121 (0.32)	2,713 (7.15)	3.52 (3.36,3.69)	3.43 (3.27,3.61)
Non-Hispanic White	No	1,360,280	12,900 (0.95)	2,919 (0.21)	288 (0.02)	16,107 (1.18)	1.0 (ref)	1.0 (ref)
	Yes	120,996	4,591 (3.79)	705 (0.58)	167 (0.14)	5,463 (4.52)	3.95 (3.82,4.07)	3.69 (3.57,3.81)
Other**	No	46,721	692 (1.48)	139 (0.3)	13 (0.03)	844 (1.81)	1.0 (ref)	1.0 (ref)
	Yes	5,829	303 (5.2)	48 (0.82)	14 (0.24)	365 (6.26)	3.63 (3.20,4.12)	3.44 (3.01,3.93)

*Hypertensive disorders of pregnancy (HDP): included pre-existing hypertension, gestational hypertension, preeclampsia with and without severe features, eclampsia, preeclampsia superimposed on pre-existing hypertension
**Other: American Indian/Alaskan Native, Pacific Islander, and Other
***Crude odds ratio (95% confidence interval): cOR (95% CI)
****Adjusted odds ratio (aOR): adjusted for birthing parent age, parity, education, medical payment, pre-pregnancy body mass index, country of birth, and initiation of prenatal care

773 Utility of maternal cultures In laboring patients with isolated maternal fever or suspected intra-amniotic infection

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OBJECTIVE: There are no guidelines regarding the practice of taking cultures in laboring parturients with isolated intrapartum fever or suspected intra-amniotic infection. The objective of this study was to determine the utility of maternal cultures in febrile parturients and to examine risk factors for positive cultures.

STUDY DESIGN: In this retrospective cohort study from 2005-2015, all parturients at term at a tertiary medical center with a fever of ≥ 38°C during a trial of labor of a singleton fetus were included. In our institution, urine, blood, and vaginal cultures are routinely taken in all laboring patients with isolated intrapartum fever or suspected intra-amniotic infection. Clinical and demographic data, including results of cultures and neonatal results, were collected by chart review. Routine statistical tests were applied and multivariable logistic regression was performed to identify risk factors for positive cultures.

RESULTS: There were 1813 febrile patients included, with a mean maximum fever of 38.2°C; of these 1734 (95.6%) had blood cultures taken, 1327 (73.2%) had vaginal cultures, and 1612 (88.9%) had urine cultures, and 288 had placental cultures. Of the blood cultures, 1653 (95.3%) were negative and 25 (1.4%) were likely contaminated; leaving 56 (3.2%) positive cultures. Of the vaginal cultures, 1158 (87.3%) were negative; the majority of the positive cultures were GBS. Of the urine cultures, 1442 (89.4%) were negative, and the majority of the positive cultures were either GBS, Klebsiella, or E. coli. Neonatal cultures were taken in 1668 (92%) of cases, of these, 1645 (98.7%), were negative. In multivariable analysis, patients with higher fever were more likely to have positive blood cultures aOR 2.9 (95%CI 1.7, 5.2).

CONCLUSION: The yield of maternal blood cultures in labors complicated by fever is extremely low. The organisms identified in the 10.6% of positive urine cultures are treated by the empiric antibiotics started in cases of suspected chorioamnionitis. The practice of routinely collecting maternal cultures in all labors complicated by fever is not supported by evidence.

TABLE: Culture Results

Type of culture	Result	Frequency
Vaginal (n=1327)	Negative	1111(83.7%)
	Candida albicans	49(3.7%)
	GBS	134(10.1%)
	Other	33(2.5%)
Maternal blood (n=1734)	Negative	1653(95.3%)
	GBS	9(0.5%)
	Contaminated	16(0.9%)
	Streptococcus mitis\oralis	9 (0.5%)
	Other	47(2.7%)
Maternal urine (n=1612)	Negative	1444 (89.6%)
	GBS	33(2%)
	Escherichia coli	38(2.4%)
	Klebsiella pneumoniae	9(0.6%)
	Other	88(5.5%)
Placenta (n=288)	Negative	199(69.1%)
	GBS	14(4.9%)
	Enterococcus faecalis	8(2.8%)
	Escherichia coli	14(4.9%)
	Lactobacillus	18(5.3%)
	Other	35(12.2%)
Neonatal blood (n=1668)	Negative	1651 (99%)
	Other	17(1%)

774 Hospital-level variation in cesarean birth after nulliparous term induction of labor

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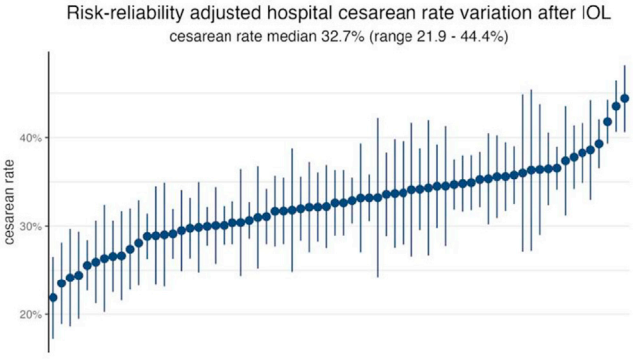
OBJECTIVE: To estimate the variation in cesarean birth rates among nulliparous, term, singleton, vertex (NTSV) births that 1) underwent induction of labor (IOL) and 2) had an elective IOL.

STUDY DESIGN: This is a cross-sectional study across 68 birthing hospitals using clinically abstracted values from the Obstetrics Initiative, a quality improvement initiative supported by Blue Cross Blue Shield of Michigan. We included NTSV births undergoing IOL from 01/2020 to 12/2022. Risk and reliability adjusted cesarean rates were calculated using logistic linear mixed models with random intercepts for hospitals. The model included age, admission BMI, pre-gestational diabetes, gestational diabetes, hypertensive disorders of pregnancy, substance use disorder, social vulnerability index (SVI), hospital teaching status, and neonatal care level.

RESULTS: Among 39,139 NTSV patients undergoing IOL, 13,364 (34.1%) had a cesarean birth. Most births occurred in a teaching hospital (87%). The median number of IOL per hospital was 352 (IQR: 192-844) with high variation in observed cesarean rates ranging from 18.8% to 46.3% (median 33.4%). In the model-based analysis, pre-pregnancy diabetes (aOR: 2.09), higher SVI (aOR: 1.57), older age (aOR: 1.06) and higher BMI (aOR: 1.06) were associated with cesarean birth ($p < 0.05$). Variation in cesarean was only slightly reduced after risk and reliability adjustment (median adjusted cesarean rate, 32.7%, range 21.9% to 44.4% [**Figure**]). In a sensitivity analysis among 10,971 elective IOL, we found similar results with risk and reliability adjusted cesarean rates ranging from 22.1% to 44.1% (median 30.2%).

CONCLUSION: High variability in risk-adjusted cesarean rates across hospitals after IOL highlights that lower rates of cesarean are achievable. Practice sharing regarding IOL management may lead to lower cesarean rates.



775 Optimizing latent phase duration during inductions to minimize morbidity and cesarean delivery

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OBJECTIVE: A prolonged latent phase (PLP) is associated with maternal/neonatal morbidity. Although ACOG recommends against cesarean for PLP, the rising rate of patients undergoing induction of labor (IOL) demands identification of meaningful latent phase timepoints that can guide counseling/management. We aim to define the optimal latent phase length during IOL using maternal, neonatal, and cesarean risks.

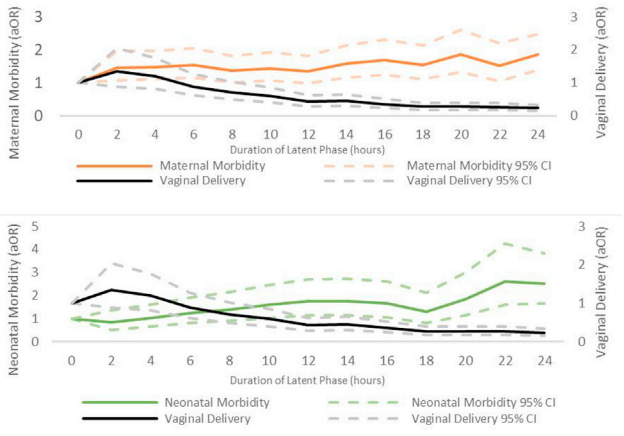
STUDY DESIGN: This was a secondary analysis of the Consortium for Safe Labor study, a multicenter retrospective study of consecutive

births at 19 hospitals from 2002-2008. We included singleton, cephalic gestations at ≥ 37 weeks who underwent IOL and completed the latent phase. Pregnancies with prior uterine incisions, major congenital anomalies, and incomplete labor curve information were excluded. Composite maternal and neonatal morbidities (see figure) and likelihood of vaginal delivery (VD) were analyzed at each four-hour interval of latent phase past 12 hours. Results were stratified by parity. Multivariable logistic regression was used to determine adjusted odds ratios for cumulative risk.

RESULTS: 13,161 patients were included with 6128 (47%) nulliparas and 7033(53%) multiparas. The composite maternal and neonatal morbidities were seen in 13% and 8% of patients, respectively. Among nulliparas undergoing IOL, cumulative risks of maternal and neonatal morbidity consistently increased after 16 and 20 hours, respectively. Although the odds of a VD decreased consistently with each time extension past 12 hours, the absolute chance of VD remained high at 74% even at >24 hours of latent phase for nulliparas. Among multiparas undergoing IOL, the odds of neonatal morbidity increased at 12 hours but then remained stable, whereas maternal morbidity did not increase with time. The odds of VD decreased at each time point after 12 hours, but VD rates remained >78% at >24 hours for multiparas.

CONCLUSION: In nulliparous patients undergoing IOL, 20 hours of latent labor is a reasonable timepoint to engage in shared decision-making about increased risks of maternal and neonatal morbidity and chances of VD.

Comparison of adjusted odds ratio of maternal and neonatal morbidity and vaginal delivery throughout the latent phase for induction of labor in nulliparous patients



Composite maternal morbidity is defined as chorioamnionitis, endometritis, postpartum hemorrhage, blood transfusion, third-or-fourth degree perineal lacerations, or ICU admissions. **Composite neonatal morbidity** is defined as respiratory distress syndrome, sepsis, mechanical ventilation, birth trauma, seizures, hypoxic ischemic encephalopathy, NICU admission, or neonatal death.
Adjusted odds ratio (aOR): Morbidity adjusted for obesity and delivery mode. Vaginal delivery adjusted for obesity

776 Maternal-Perinatal Outcomes in Pregnancies Exposed to Hydroxyurea

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OBJECTIVE: Hydroxyurea (HU) is an oral chemotherapeutic agent. Despite therapeutic efficacy, it is not recommended during pregnancy due to concerns of potential teratogenicity. Our objective was to assess maternal-perinatal outcomes among patients exposed to HU during pregnancy.

STUDY DESIGN: A systematic literature review using PubMed, Scopus, CINAHL, Clinicaltrials.gov and the Cochrane library was performed from inception through January 2023. This systematic review was performed according to the Preferred Reporting Item for Systematic Reviews and Meta-Analyses (PRISMA) statement and the protocol was registered with PROSPERO (CRD42020203416). All studies that reported outcomes in pregnancy exposed to HU, including case reports and case series, were included. Exclusion criteria included patient self-reported outcomes. Pregnancy outcomes were live birth, early pregnancy loss (< 20 weeks), stillbirth, infant death, or termination of pregnancy (TOP). Perinatal outcomes were presence of congenital anomaly, fetal growth restriction (FGR), and preterm birth (PTB).

RESULTS: A total of 225 pregnancies exposed to HU across 35 publications were included. HU indications were sickle cell disease 142 (61.3%), chronic myeloid leukemia 35 (15.6%), essential thrombocytopenia 28 (12.4%), and other conditions 15 (6.7%). First trimester exposure was documented in 195 (86.7%). Among continuing pregnancies (n=185), outcomes included live birth (84.3%), early pregnancy loss (13.5%), stillbirth (2.2%), and infant death (0.5%) (Table 1). Among continuing pregnancies at > 20 weeks (n=160), perinatal outcomes included FGR 7 (4.4%), PTB 22 (13.8%) and congenital anomaly 3 (1.9%) including pilonidal cyst, unilateral renal dilatation, and hip dysplasia. Of these 160 pregnancies, 125 (78.1%) had no reported adverse perinatal outcomes.

CONCLUSION: Pregnant patients should be counseled that exposure to HU does not appear to increase the risk of early pregnancy loss nor congenital malformation. Additionally, the rate of stillbirths, FGR and PTB appear favorable in the context of high-risk pregnancy with sickle cell disease or malignancy.

Table 1. Pregnancy Outcomes with Exposure to Hydroxyurea

Pregnancy Outcomes	Any Exposure (N=225)	1st Trimester Exposure (N=195)	2nd/3rd Trimester Exposure (N=21)
Live Births	156 (84.3)	130 (82.8)	17 (89.5)
Early Pregnancy Loss	25 (13.5)	24 (15.3)	0 (0.0)
Stillbirth	4 (2.2)	3 (1.9)	1 (0.5)
Infant Death	1 (0.5)	1 (0.5)	0 (0.0)
Termination of Pregnancy	40 (17.8)	38 (19.5)	2 (9.5)

*Data presented as n (%). Percentages of outcomes calculated based on pregnancies that were not terminated

777 Normative values of monocyte distribution width in pregnancy

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OBJECTIVE: The volumetric measurement of the monocyte, known as the monocyte distribution width (MDW), has been shown to increase as the infection severity increases in the nonpregnant population. However, there is an absence of data regarding baseline values in pregnancy and whether a normal value of less than 20 units applies to pregnancy. The primary aim of this study was to define monocyte distribution width values in each trimester of pregnancy. The secondary analysis sought to correlate MDW with other infection-associated markers, specifically white blood cell (WBC) and neutrophil counts.

STUDY DESIGN: In 2023, we performed a retrospective electronic chart review of outpatient antepartum visits over a 2-month interval in an urban safety net hospital. Subjects were included in the data analysis if a complete blood count with MDW was performed. Exclusion criteria were the presence of an active or recent infection (including COVID-19) and antibiotic, immunotherapy, or corticosteroid use in the 14 days before the lab results. Chi-square, Spearman's rank-order, and Kruskal-Wallis tests were utilized for statistical analyses.

RESULTS: Seven hundred eighty-four charts were reviewed, and 259 were included in the analysis. First-trimester MDW values were significantly lower than the second and third-trimester values ($p< 0.001$). However, there was no significant difference between second and third-trimester values on post hoc analysis ($p=0.85$) (Table 1). MDW values greater than 20 U also differed between trimesters, notably increasing in the second and third trimesters ($p=0.03$) (Table 1). The participants had no correlation between MDW values and WBC or neutrophil counts ($r=0.171$, 0.124, respectively).

CONCLUSION: This is the first study that describes normative MDW values in pregnancy and suggests that several normal gravidas without clinical evidence of infection have MDW values above the nonpregnant upper limit of normal (20 U). Further studies are needed to prospectively analyze MDW values in pregnancy to identify values indicative of infection and sepsis.

Table 1: Monocyte distribution width (MDW), white blood cell (WBC), and neutrophil values per trimester*

	First trimester (n=89)†	Second trimester (n=76)†	3rd trimester (n=94)†	p value
Gestational age (weeks)	10.4 (8.2-11.9)	23.3 (17.2-26.9)	30.3 (28.5-33.7)	--
Body mass index (kg/m^2)	28.0 (23.8-37.7)	29.1 (26.3-34.6)	30.8 (26.4-37.6)	0.20
MDW (U)	17.0 (15.5-18.3)	18.4 (17.0-19.9)	18.5 (17.3-19.8)	<0.001
MDW values >20 U, n (%)	8 (9.0)	17 (22.4)	20 (21.3)	0.03
WBC	8.3 (6.7-10.5)	9.1 (7.6-11.1)	8.8 (7.3-10.3)	0.14
Neutrophil count	5.9 (4.2-7.6)	6.6 (5.1-8.2)	6.1 (4.8-7.7)	0.84

*Median and interquartile range values
†Sample size for MDW, WBC and neutrophil count values

778 Obstetrical patient comorbidity according to hospital volume of delivery: a retrospective cohort study

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OBJECTIVE: Our study objective is to determine whether obstetrical patients with more comorbidities are more likely cared for at hospitals with higher patient loads.

STUDY DESIGN: A retrospective cohort study was conducted on all admissions with a delivery or maternal death from October 2015 to December 2019 from the American database Healthcare Cost and Utilization Project-Nationwide Inpatient Sample. The cohort was weighted to be representative of the entire population and births in the United States. The cohort was stratified using the validated Expanded Obstetric Comorbidity Scoring System, a tool designed to predict the risk of severe maternal morbidity. The cohort was divided in four categories of scores. The strata were then divided by hospital sizes at which the births were recorded. Frequencies were calculated for each sub-category of maternal comorbidity index and hospital size.

RESULTS: The cohort included 15,669,785 deliveries. Of those, 45.0% had a comorbidity score of 0, 19.2% had a score of 1-10, 19.2% had a score of 11-20 and 16.5% had a score of 21+. In hospitals with less than 500 deliveries annually, 48.2% had a score of 0, 20.2% had a score of 1-10, 18.40% had a score of 11-20 and 13.3% had a score of 21 or higher. In hospitals with 500-< 1000 deliveries annually, for the same score categories, the frequencies were as follow: 46.3%, 19.9%, 18.8% and 15.1%. In hospitals with 1000 to < 2000 deliveries, the frequencies were as follow: 44.5%, 19.1%, 19.4% and 17.0%. Lastly, in hospitals with >2000 deliveries, the frequencies were as follow: 44.1%, 18.7%, 18.7% and 17.8%.

CONCLUSION: In conclusion, more than 50% of women delivering at American hospitals have comorbidity increasing the risk of severe maternal morbidity. As hospital volume of deliveries increases, the proportion of comorbid patients delivering also increases. Nonetheless, all hospital sizes care for patients of every risk level.

779 Patient Perspectives on Sources of Conflict and Support During Periviability Counseling: A Qualitative Analysis

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OBJECTIVE: Families facing delivery during the periviable period must make high-stakes, time-sensitive, and often irrevocable decisions about how to care for their infant after birth. There is a paucity of literature regarding patients' experiences with periviable counseling. Understanding patient experience can help us improve communication and may aid high-quality decision making. The purpose of this study was to highlight patient-identified sources of support and conflict from conversations with their health care team when delivering during the periviable period.

STUDY DESIGN: We contacted birthing people who delivered between 22 - 25 weeks gestational age from 2011 - 2014. We conducted semi-structured interviews focused on counseling and decision-making at the time of periviable birth. Interviews were transcribed and coded to perform thematic analysis.

RESULTS: We interviewed 20 women who delivered during the periviable period and 6 important others. Average age was 27.3, 35% identified as Black and 50% had private insurance. The average gestational age at delivery was 24 weeks. We identified 14 themes during our analysis. Here, we focus on sources of conflict and support which were most frequently coded and actionable. Sources of conflict included a mismatch between patients' and providers' understanding of prognosis, patient perception of excessive hopelessness by providers, and lack of provider acknowledgement of family values. Sources of support included relationships with and understanding from nursing and ancillary staff, providers acknowledging family emotional processing, as well as patient's perception of time and effort spent by provider.

CONCLUSION: Our findings suggest areas for improvement in our periviablity counseling include provider acknowledgement of patient hope and family values, whilst ensuring patient understanding of prognosis. Our findings emphasize adequate time for counseling and addressing patient emotions throughout, with potential benefit in providing nursing training in patient support during the periviable period.

Theme	Representative Quote
Sources of Conflict	
Understanding of prognosis	*"If I knew then what I know now...I probably would've been pushing...for the [corticosteroid] shots...for more than I got but I didn't know. And I didn't know what I didn't know."*
Lack of acknowledgement of family values	*"I wish I had been armed with information... I could feel differently about what decisions I made if the outcome had been different, but I have a great deal of regret for giving up my ability to give birth for a baby that was not viable..."*
Emphasis on hopelessness	*"I totally understand they have to tell you the possibilities...but I feel like you can't just be like 'IF your baby even lives, it's going to be all doom and you have no hope of anything'...And honest to god I laid in that bed and I just quit listening to him."*
Sources of Support	
Importance of nursing	*"The nurses they were wonderful...Even in the operating room, I'm like 'hold my hand don't leave'. Because it's so scary and the one nurse was there all the time."*
Acknowledging family emotional processing	*"The difference...was the way they laid it out to me and the way they presented the information while still being honest but being encouraging as well..."*
Perceived time spent/effort of provider	*"it was helpful that she just sat down...she wasn't getting on to the next room. she just took as much time as we needed...which I don't think we needed much time. But you know, just if we needed it then she would've stayed there for an hour, it felt like that to us."*

780 Resolution of fetal discordance after laser is predicted by twin growth before twin-to-twin transfusion syndrome

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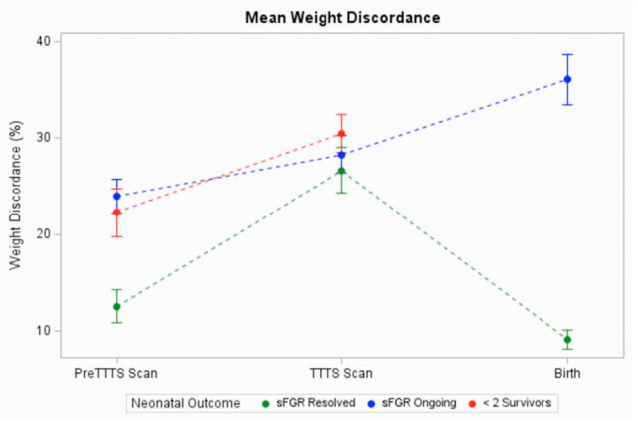
OBJECTIVE: To determine if resolution of fetal growth discordance after laser surgery for Twin-to-Twin Transfusion Syndrome (TTTS) with concurrent selective fetal growth restriction (sFGR) is predicted by estimated fetal weight discordance (EFWD) prior to the development of TTTS (pre TTTS).

STUDY DESIGN: This is a single center, retrospective analysis of monochorionic twins with TTTS and sFGR who underwent laser surgery and had available growth ultrasound records at a pre-TTTS scan. Demographics, pregnancy characteristics, and outcomes were compared between 3 outcome groups: double survival (DS) with birth weight discordance (BWD) < 20%, DS with ongoing BWD ≥ 20%, or demise after laser. Continuous data were analyzed using Student's t-tests or Wilcoxon Rank Sum test. Categorical data were analyzed using Chi-square test orFisher's Exact test. A multivariate logistic regression model was constructed based on univariate associations.

RESULTS: Ninety-seven patients underwent laser at 19.1 [17.4-22.1] weeks with a mean EFWD of 28.7%. The pre-TTTS scan occurred at 16.9 [16.1-19.6] weeks. After laser, 34 (35.1%) had resolved BWD (mean 9%), 34 (35.1%) had ongoing BWD (mean 36.5%), and 29 (29%) had a single or double fetal demise. Demographics, TTTS stage, recipient umbilical artery Dopplers, and donor middle cerebral artery Dopplers did not differ by patient groups. Pre-TTTS EFWD was significantly lower among cases with resolved BWD relative to persistent BWD (P< .0001). EFWD at the time of TTTS diagnosis did not differ between patient groups (P=0.071). Donor umbilical artery qualitative flow (P=0.0087) and pulsatility index (P=0.0061) were associated with ongoing BWD and fetal loss following laser therapy; however, after logistic regression, EFWD at the pre-TTTS scan was the only predictor of growth resolution at birth (p = 0.0063).

CONCLUSION: Concordant growth prior to the development of TTTS is associated with resolution of fetal growth discordance after laser treatment. These findings suggest that TTTS pathophysiology also contributes to growth discordance noted at the time of TTTS diagnosis.



781 Multiethnic Growth Standards for Fetal Body Composition and Organ Volumes Derived from 3D Ultrasonography

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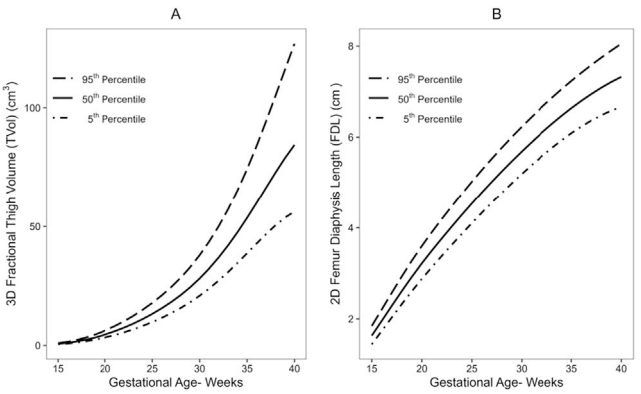
OBJECTIVE: For three-dimensional (3D) ultrasound to live up to its potential to improve estimated fetal weight precision and characterize fetal growth abnormalities, it is first necessary to establish population-based standards for 3D measures including indicators of body composition (fractional limb volumes (arm [AVol], thigh [TVol])) and organ volumes. Growth in fat and lean mass and organ size may be differentially altered by nutritional, metabolic or environmental influences and in complicated pregnancies, in ways not identifiable using corresponding 2D measures. Our objective was to create standards for fetal 3D measures and compare with traditional 2D measures.

STUDY DESIGN: The Fetal 3D Study included banked research-quality images of singletons from 12 U.S. sites, up to 5 scans per fetus, and was racially and ethnically diverse. All gravidas had low-risk profiles, and their neonates had normal outcomes (N=1,730). Volumes were measured by protocol and estimated, weighted curves (5^{th}, 50^{th}, 95^{th} percentiles) derived from 15-41 wks using mixed models with cubic splines.

RESULTS: Subcutaneous thickness of abdomen, arm, and thigh increased linearly, with slight acceleration around 27-29 wks. AVol, TVol, and lean limb volume increased along a quadratic curvature, with acceleration around 29-30 wks.(Fig A) In contrast, 2D humerus and femur lengths demonstrated a logarithmic shape, with fastest growth in the 2^{nd} trimester.(Fig B) Cerebellar 2D diameter increased linearly, while cerebellar 3D volume growth gradually accelerated until 32 wks and then decelerated. Lung, kidney, and liver volumes all had gradual early growth followed by a linear acceleration beginning at 25 wks for lungs, 26-27 wks for kidneys, and 29 wks for liver.

CONCLUSION: Growth patterns and timing of maximal growth for 3D limb (lean and fat tissue) and organ volumes differed from traditional 2D growth measures. Multiethnic standards for 3D growth measures may complement 2D, particularly in the 3^{rd} trimester. Future studies will investigate 3D as potential indicators of abnormal growth and association with adverse pregnancy outcomes.



782 Phenotyping Labor Dystocia: A Pilot Study Triangulating Cytokines and Uterine EMG Parameters

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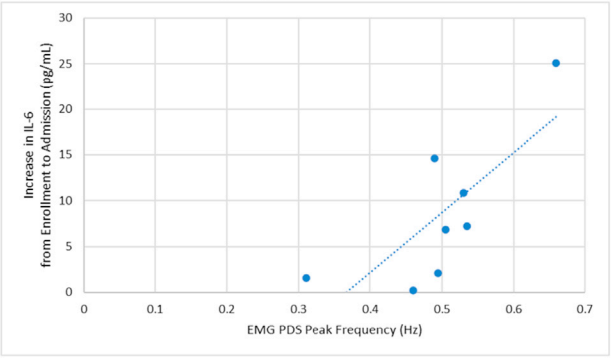
OBJECTIVE: The purpose of this pilot study is to evaluate feasibility of triangulating physiologic data to differentiate etiologies of labor dystocia. We aimed to establish preliminary data on associations and correlations of biomarkers with labor outcomes to support hypothesis development.

STUDY DESIGN: In this prospective pilot, we measured IL-6 at ~37 weeks gestation and upon admission for labor and analyzed a 30-minute segment of uterine electromyography (EMG) during labor using the 128hz 12bit Lovelace FT device (Bloomlife) in (N = 8) low-risk nulliparas planning vaginal birth. The three EMG channels were band pass filtered between 0.1 and 1 Hz using a second order Butterworth filter, then adaptively combined based on their signal-to-noise ratio. The output was then down-sampled at 16 Hz and normalized and the mean contraction duration and power density spectrum (PDS) median and peak frequency were calculated for each contraction.

RESULTS: Change in IL-6 from enrollment to admission was associated with the EMG PDS peak frequency (Spearman's Rho = .593, p = .044); admission IL-6 also trended toward correlation with EMG PDS peak frequency (Spearman's Rho = .733, p = .079) (Figure 1). Although not statistically significant, IL-6 on admission, change in IL-6, and EMG PDS peak frequency were lower in those with induction, dystocia, and cesarean.

CONCLUSION: Generalizability is limited by small sample size, multiple exploratory comparisons, and incomplete timing data to link the EMG data to labor events. Despite the limitations of the data, the significant association between EMG PDS peak frequency and IL-6 supports our original hypothesis and suggests that IL-6 may have a role in uterine contractility during labor. Researchers can improve quality of intrapartum EMG data by reducing skin impedance < 10kOhms, utilization of hardware to log accelerometer data and electrode locations, and real-time synchronous logging of the labor events (including medications).

Figure 1: EMG PDS Peak Frequency is Correlated with Change in IL-6



Note: 1. IL-6 on enrollment (~37 weeks gestation) was often below the lowest detectable limit (6.14 pg/ml)
2. For most patients, IL-6 increased between enrollment and admission to the hospital. Patients in spontaneous labor had a great change in IL-6.
3. EMG PDS Peak Frequency is correlated with change in IL-6 (p = .044) and trends toward a correlation with admission IL-6 (p = .079).

783 Risk of Severe Maternal Morbidity among Pregnancies complicated by Pregestational Diabetes

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OBJECTIVE: Severe Maternal Morbidity (SMM) is an indicator of pregnancies at risk of mortality and is an important indicator of the health of a population. High-risk pregnancies with pregestational diabetes (PGDM) are also at risk of adverse pregnancy outcomes, however there is a paucity of data on its relationship with severe maternal complications, SMM.

STUDY DESIGN: Retrospective population-based cohort study of all US live births using vital statistics birth certificate records, 2014-2019. Demographic, medical, and pregnancy factors were compared between mothers with PGDM and those without. The primary outcome was composite SMM, defined as maternal ICU admission, eclampsia, blood transfusion, unplanned hysterectomy, or ruptured uterus. Multivariate logistic regression estimated the relative influence of risk factors associated with SMM in pregnancies complicated by PGDM.

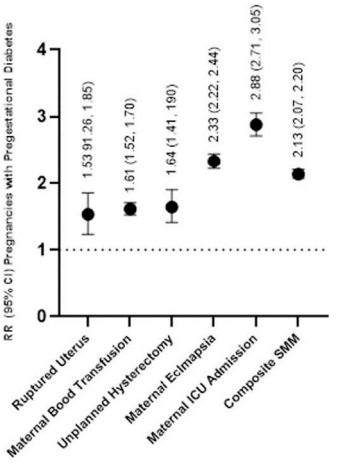
RESULTS: Of 23,839,716 live births in the US during the study period, 439,895 (1.8%) had pregnancies complicated by PGDM. The overall rate of the primary outcome in the population, composite SMM was 0.71% in pregnancies with no diabetes, and significantly higher (2.2%) among those with PGDM, adjRR 2.13 (95%CI 2.07, 2.20). PGDM was also associated with significantly increased risk of all individual measures of SMM, even after adjustment for the confounding influences of advanced maternal age, Non-Hispanic Black race, chronic hypertension, and obesity, see figure.

CONCLUSION: Pregestational diabetes is associated with over 2-fold increased risk for severe maternal morbidity even after accounting for the influence of co-existing risk factors. These findings highlight the importance of individualizing care among pregnancies with PGDM and consider delivery at higher level maternity centers with capacity to provide care to the most complex pregnancies, especially when co-existing risk factors are present.

Figure 1: Rate and risk of severe maternal morbidity associated with pregestational diabetes.

	Pregnancies without diabetes n=21,738,321	Pregnancies with pregestational diabetes n=439, 895	Adjusted RR (95% CI)
Composite SMM	150,405 (0.71%)	4,349 (2.2%)	2.13 (2.07 – 2.20)
Maternal Eclampsia	49,733 (0.24%)	1,832 (0.92%)	2.33 (2.22 – 2.44)
Maternal ICU Admission	31,143 (0.15%)	1,332 (0.67 %)	2.88 (2.71 – 3.05)
Unplanned Hysterectomy	8,713 (0.04%)	198 (0.10%)	1.64 (1.41 – 1.90)
Ruptured Uterus	6,459 (0.03%)	112 (0.06%)	1.53 (1.26 – 1.85)
Maternal Blood Transfusion	72,395 (0.34%)	1,332 (0.67%)	1.61 (1.52 – 1.70)

Severe Maternal Morbidity defined as: blood transfusion, ICU admission, unplanned hysterectomy, maternal eclampsia or ruptured uterus.
All RRs in this table are adjusted for Non-Hispanic Black race, advanced maternal age, obesity and chronic hypertension.



784 Neonatal Outcomes Among Individuals with Depressed Fetal Heart Tracings at Methadone and Buprenorphine Peak Levels

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OBJECTIVE: Medications for opioid use disorder (MOUD) have been shown to have depressive effects on the fetal heart tracing (FHT) in the antenatal setting however the impact of these findings at the time of labor and delivery is not well characterized. We evaluated a cohort of birthing persons administered MOUD during the delivery hospitalization and compared neonatal outcomes in those with and without fetal heart tracing alterations at peak dose.

STUDY DESIGN: We studied a retrospective cohort of term singleton pregnancies with MOUD administration during labor and delivery at an academic urban hospital from 2016-2023. MOUD dose, dosing time, psychotropic medications, non-prescribed substance exposures, pregnancy complications, and mode of delivery were obtained via chart review. Clinically documented FHT variability and accelerations were collected at pharmacological trough and peak levels. FHTs with greater than 45 minutes of minimal variability during the peak period were characterized as minimal, and those without accelerations for more than 1 hour were characterized as absent. Tracings with minimal variability and absent accelerations were compared to reassuring tracings for differences in neonatal outcomes.

RESULTS: Of the 77 dyads who met inclusion criteria, 15 (19%) had fetal heart tracings with minimal variability and 43 (56%) had absent accelerations. Individuals who received methadone at delivery were more likely to exhibit minimal variability at peak dose (p= .03). Individuals cotreated with SSRIs/SNRIs were more likely to exhibit absent accelerations at peak dose (p=.001). However, there were no statistically significant difference in APGARS, NICU admission, respiratory distress or cesarean section rates in the cohort with reassuring fetal heart tracings versus those with predominantly minimal variability or absent accelerations.

CONCLUSION: Fetal heart rate tracing depression should be interpreted with caution among birthing individuals receiving methadone or buprenorphine treatment at the time of labor and delivery.

	Overall cohort* (n=77)	Reassuring variability during peak (n=62)	Minimal variability during peak** (n=15)	p-value	Reassuring accelerations during peak (n=34)	Absent accelerations during peak*** (n=43)	p-value
Received buprenorphine at delivery	57 (75%)	49 (81%)	8 (53%)	**0.03**	25 (76%)	32 (74%)	0.84
Received methadone at delivery	20 (25%)	13 (19%)	7 (47%)	**0.03**	9 (24%)	11 (26%)	0.84
Buprenorphine dose (mean, range)	15.9 (0.25-40)	16.5 (0.25-40)	12.5 (4-24)	0.12	16.97 (0.25-40)	15.1 (0.9-32)	0.42
Methadone dose (mean, range)	114.4 (24-280)	108 (24-280)	125.7 (50-235)	0.62	119.3 (24-235)	110 (40-280)	0.76
Neonatal outcomes							
1-minute Apgar (median, IQR)	8 (7, 8)	8 (7, 8)	8 (7, 8)	0.42	8 (8, 8)	8 (6, 8)	**0.03**
5-minute Apgar (median, IQR)	9 (9, 9)	9 (9, 9)	9 (8, 9)	0.50	9 (9, 9)	9 (8, 9)	0.11
SCN or NICU admission for indication other than NOWS	12 (15%)	10 (16%)	2 (13%)	0.92	2 (6%)	10 (23%)	0.06
Respiratory distress	4 (5%)	4 (6%)	0 (0%)	0.58	0 (0%)	4 (9%)	0.13
Sepsis workup	3 (4%)	3 (5%)	0 (0%)	1.00	1 (3%)	2 (5%)	1.00
Hypoglycemia	2 (3%)	1 (2%)	1 (7%)	0.35	0 (0%)	2 (5%)	0.50
HIE	1 (1%)	1 (2%)	0 (0%)	1.00	0 (3%)	1 (2%)	1.00
Other	7 (9%)	6 (10%)	1 (7%)	1.00	2 (6%)	5 (12%)	0.45
NICU LOS (median, IQR)	8 (1, 25)	6 (1, 32)	13 (0, 25)	1.00	5.5 (.5, 17.5)	9.5 (2, 32)	0.45
Respiratory distress during hospitalization	9 (12%)	7 (11%)	2 (13%)	0.87	2 (6%)	7 (16%)	0.22
Mode of delivery				0.39			.09
Vaginal unassisted	52 (68%)	41 (66%)	11 (73%)		27 (79%)	25 (58%)	
Vaginal operative	7 (9%)	7 (11%)	0 (0%)		1 (3%)	6 (14%)	
Cesarean delivery	18 (23%)	14 (23%)	4 (27%)		6 (18%)	12 (28%)	

*Term singleton pregnancies in which MOUD was administered during labor and delivery, with at least 30 minutes of FHT data during the trough period (1 hour prior to the dose) and at least 1 hour of FHT data during the peak period (1 to 4 hours after the dose)
**Greater than 45 minutes of FHT categorized as such
***Greater than 1 hour of FHT categorized as such

785 Utilizing ecological momentary assessment in the postpartum evaluation of patients with hypertensive disorders of pregnancy

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OBJECTIVE: Hypertensive disorders of pregnancy affect 10-20% of pregnancies, and are a leading cause of maternal mortality in the United States. A subset of women will develop worsening hypertension after delivery with resultant increased risk of morbidity and mortality. A smartphone-based application utilizing ecological momentary assessment (EMA) technology was developed for monitoring and intervention of postpartum patients with a history of hypertension in pregnancy. This innovative method allows for frequent evaluations and timely interventions of positive screens.

STUDY DESIGN: A prospective study was conducted at a quaternary care academic hospital from November 2021 through June 2023. Inclusion criteria included: postpartum status, delivery of liveborn neonate, English-speaking, aged 18 and above, owning a smartphone, agreeing to download app, and prenatal diagnosis of gestational/chronic hypertension, or pre-eclampsia/eclampsia. Participants received a blood pressure cuff and were prompted to assess blood pressure via the app daily for 2 weeks, then weekly for 4 weeks. A positive screen was defined as a blood pressure $\geq$ 140/90 and resulted in nurse follow-up contact.

RESULTS: A total of 545 participants were enrolled. Clinical and demographic characteristics revealed: 57% enrolled in Medicaid, 58% white, 30% black, 15% Hispanic, 57% delivered vaginally, and 43% had Covid-19 in pregnancy. There were a total of 7,578 in-app assessments resulting in 219 positive screens (40.2% of the total enrolled) that prompted contact by the study nurse. Of positive screens, 74.9% required no referrals, 8.7% had medication adjustments/referred for clinic visit, 6.4% were sent to Labor & Delivery, and 6.4% were admitted to the hospital.

CONCLUSION: This smartphone-based EMA app allowed for prompt assessment and intervention of postpartum patients with hypertension, and resulted in 40.2% of participants requiring follow-up contact after an elevated blood pressure reading. Further studies are needed to assess the impact of the intervention with respect to morbidity, mortality, and health-system related cost savings.

Table: Follow-Up Actions Due to Postpartum Hypertension Positive Screens Recorded in the App

Actions from Positive Screens (enrolled=545)	Number of Participants with Action (%)
Follow-up resulted in hospital admission	14 (6.4%)
Clinic referrals or medication adjustments	19 (8.7%)
Referred to Labor & Delivery	14 (6.4%)
Offered appointment but declined	2 (0.9%)
Follow-Up resulted in unable to contact	6 (2.7%)
Other follow-up	6 (2.7%)
No referral necessary (continued monitoring)	164 (74.9%)
Number of Participants Receiving Any Follow-Up Contact (of % enrolled)	**219 (40.2%)**

786 Hemoglobin A1c among patients without diabetes and risk of large for gestational age neonates

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OBJECTIVE: To describe the association between an early pregnancy Hemoglobin A1c (HbA1c) as obtained on universal screening with large for gestational age (LGA) neonates among patients without a diagnosis of diabetes.

STUDY DESIGN: This is a retrospective cohort study of patients with a singleton pregnancy who underwent universal HbA1c screening in early pregnancy ($\leq$16 weeks) at a single urban tertiary care center between 2016 and 2018. We included those who delivered $\geq$32 weeks with documented maternal weight at the first prenatal visit and at delivery. We excluded patients with preexisting or gestational diabetes, fetal demise, or those without glucose tolerance screening. The exposure of interest was an elevated A1c (5.7-6.4%). The primary outcome was a diagnosis of LGA, defined by a birthweight $\geq$90thile by INTERGROWTH-21.

RESULTS: Of 2594 eligible patients, 2272 (87.6%) had normal HbA1c levels (< 5.7%) and 322 (12.4%) had elevated HbA1c (5-7-6.4). Patients with an elevated HbA1c were more likely to be older, Black, multiparous, publicly-insured, obese at the initial prenatal visit, or have chronic hypertension compared to those with a normal HbA1c level. There was no significant difference in the rate of LGA neonates between patients with an elevated compared to normal HbA1c (12.7% vs. 11.9%, p=0.67). Among patients with obesity (BMI $\geq$30), however, an increasing HbA1c was significantly associated with LGA (OR=1.95, 95% CI 1.04-3.678). This remained significant after adjusting for maternal age, parity, insurance status, and chronic hypertension (aOR=2.85, 95% CI 1.41-5.74). The relationship between HbA1c and LGA remained regardless of whether Institute of Medicine gestational weight gain guidelines were met or exceeded.

CONCLUSION: In obese patients, an elevated HbA1c in early pregnancy increases the risk of delivering an LGA infant in the absence of diabetes and irrespective of weight gain in pregnancy. This underscores the importance of achieving normal HbA1c levels prior to pregnancy for improved neonatal outcomes.

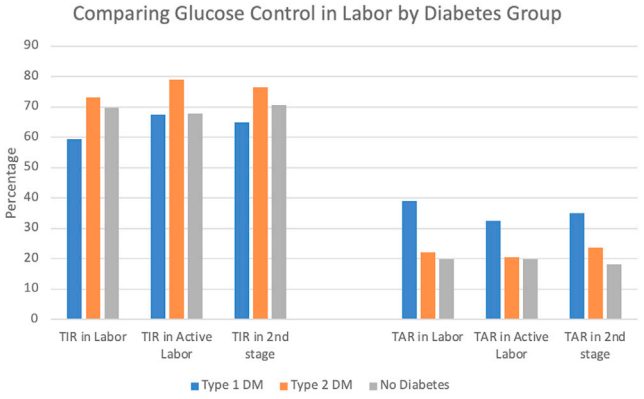
Table 1: Baseline characteristics and birthweight outcomes for patients with normal vs. elevated HbA1c

	Normal Screening HbA1c (<5.7%) (N=2272) n(%)	Elevated Screening HbA1c (5.7-6.4%) (N=322) n(%)	*p*-value
Demographics			
Maternal age (yrs)*	29.3 [25, 33]	30.2 [26, 34]	0.008
Maternal race			
Black	1190 (52.4%)	244 (75.8%)	
White	649 (28.6%)	30 (9.3%)	<0.001
Other	433 (19.0%)	48 (14.9%)	
Hispanic Ethnicity	83 (3.6%)	11 (3.4%)	0.83
Nulliparous	1185 (52.2%)	112 (34.7%)	<0.001
Public insurance	931 (41.0%)	168 (52.0%)	<0.001
BMI categories			
<18.5	57 (2.5%)	3 (1.0%)	
18.5-24.9	1006 (44.3%)	61 (18.9%)	<0.001
25-29.9	581 (25.6%)	83 (25.8%)	
≥ 30	628 (27.6%)	175 (54.3%)	
Chronic hypertension	109 (4.8%)	26 (8.0%)	0.01
Birthweight outcomes			
Large for gestational age	271 (11.9%)	41 (12.7%)	0.68
Birthweight ≥ 4000g	147 (6.5%)	23 (7.1%)	0.74
Mean birthweight	3245 ± 538	3203 ± 584	0.11

Data are presented as n(%) unless otherwise indicated.
* Median [IQR]

multivariable analysis, higher birthweight, T1DM, and T2DM were associated with neonatal hypoglycemia with T1DM conferring the most risk (OR 13.2, 95% CI 2.0-89.6).

CONCLUSION: Hyperglycemia in labor was common and did not differ in gravidas with and without diabetes. Neonatal hypoglycemia was more common in gravidas with T1DM, T2DM, and in heavier neonates. Further study is needed to define optimal glucose in labor among gravidas with diabetes.



787 Glycemic control in labor: Comparing time in range (TIR) among gravidas with and without pre-gestational diabetes

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OBJECTIVE: Hyperglycemia in labor is associated with adverse neonatal outcomes in gravidas with diabetes (DM) including neonatal hypoglycemia. Our objective was to use continuous glucose monitors (CGM) to compare glucose control in gravidas in labor with and without DM. We hypothesized that gravidas without DM would have higher TIR compared to gravidas with DM.

STUDY DESIGN: Prospective cohort study of term gravidas with CGM placed in early labor. TIR was defined as 70-120 mg/dl with time above range (TAR) >120 mg/dL and time below range (TBR) < 70mg/dL assessed at several labor stages. Gravidas with DM and their neonates were managed per standard institutional monitoring protocols with treatment of hyper- and hypoglycemia. Gravidas without DM and their neonates had glucose tested only if clinically indicated. CGM values were blinded. Chi-square, ANOVA and Python 3.10.4 were used for analysis.

RESULTS: 90 gravidas were included: 72/90 (80%) without diabetes, 11/90 (12%) with type 1 diabetes (T1DM), and 7/90 (7.8%) with type 2 (T2DM). Mean TIR from CGM placement to delivery was 68.8%, 68.6% in active labor, and 70.5% in 2nd stage and did not differ between groups (Fig 1). The mean TAR from CGM placement to delivery was 22.4%, 21.2% in active labor, and 20.4% in 2nd stage and did not differ between groups. The glucose at delivery was highest in T1DM at 118±25 mg/dl and lowest in those without DM at 109±27 mg/dl (p=0.02). Overall, 11/90 (12%) of neonates were treated for hypoglycemia: 4/11 (36%) in the T1DM group, 2/7 (28.5%) in the T2DM group, and 5/72 (6.9%) in group without DM (p=0.008). Mean birthweight did not differ between groups. In

788 Impact of anemia on perinatal outcomes by race and ethnicity

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OBJECTIVE: Anemia in pregnancy is common and associated with substantial morbidity. Racial and ethnic disparities in recognition and treatment of anemia exist, despite routine screening. The objective of this study was to evaluate perinatal outcomes associated with anemia in pregnancy, stratified by race and ethnicity in a large US-based cohort.

STUDY DESIGN: Secondary analysis of California linked hospital discharge-vital statistics data from 2016-2019 was performed. Deliveries 23-42 weeks' gestation were included and anemia was identified using birth certificate and International Classification of Disease (ICD-10) codes. Race and ethnicity were categorized into Non-Hispanic White (NHW), non-Hispanic Black (NHB), Hispanic, Asian/Pacific Islander (API), and American-Indian and Alaskan Native (AIAN). Multivariable logistic regressions were created to assess the association of anemia with adverse perinatal outcomes in the total cohort and by race and ethnicity.

RESULTS: A total of 1,719,596 births met inclusion criteria; 303,718 (18%) had maternal diagnosis of anemia. Anemia prevalence was highest among NHB (31%), followed by AIAN (20%), Hispanic (19%), and NHW (16%; p< 0.001). Anemia was significantly associated with hypertensive disease in NHW (aOR=1.44, 95% CI: 1.40, 1.48), NHB (aOR=1.47 (1.40, 1.53), Hispanic (aOR=1.53 (1.50, 1.56), API (aOR=1.62 (1.54, 1.69), and AIAN (aOR=1.31 (1.05, 1.64). Similarly, across all racial categories, individuals with anemia had higher rates of preterm delivery (< 37 weeks and < 32 weeks), NICU admission, small for gestational age, respiratory distress syndrome, hypoglycemia, and low birth weight compared to those without anemia (Table 1).

CONCLUSION: Anemia in pregnancy is associated with increased odds of adverse perinatal outcomes, that were overall similar among diverse racial and ethnic backgrounds. Given higher rates of anemia

in Hispanic, AIAN, and NHB pregnant individuals in this cohort, further investigation is warranted.

Table 1. Multivariable logistic regression models showing association of anemia with perinatal outcomes in whole cohort (n=1,719,596) and each race and ethnicity.

	No Anemia	Total cohort, aOR (95% CI)*	Non-Hispanic White, aOR (95% CI)*	Non-Hispanic Black, aOR (95% CI)*	Hispanic, aOR (95% CI)*	Asian/Pacific Islander, aOR (95% CI)*	American Indian and Alaska Native, aOR (95% CI)*
Hypertensive disease	Reference	1.51 (1.49, 1.53)	1.44 (1.40, 1.48)	1.47 (1.40, 1.53)	1.53 (1.50, 1.56)	1.62 (1.54, 1.69)	1.31 (1.05, 1.64)
Preterm delivery<37 weeks	Reference	1.30 (1.28, 1.32)	1.45 (1.40, 1.48)	1.27 (1.21, 1.33)	1.26 (1.23, 1.28)	1.27 (1.21, 1.32)	1.38 (1.09, 1.74)
Preterm delivery<32 weeks	Reference	1.49 (1.45, 1.54)	1.80 (1.67, 1.94)	1.29 (1.17, 1.42)	1.41 (1.34, 1.47)	1.60 (1.43, 1.78)	1.67 (0.93, 2.98)
NICU admission	Reference	1.12 (1.11, 1.14)	1.16 (1.13, 1.19)	1.11 (1.06, 1.16)	1.11 (1.09, 1.13)	1.13 (1.09, 1.18)	1.16 (0.93, 1.44)
Respiratory distress syndrome	Reference	1.33 (1.31, 1.35)	1.41 (1.37, 1.46)	1.23 (1.16, 1.30)	1.30 (1.27, 1.33)	1.36 (1.29, 1.43)	1.27 (0.96, 1.68)
Hypoglycemia	Reference	1.34 (1.31, 1.37)	1.38 (1.32, 1.43)	1.27 (1.18, 1.37)	1.32 (1.28, 1.37)	1.39 (1.29, 1.48)	1.09 (0.74, 1.58)
Low birth weight (<2500 gm)	Reference	1.22 (1.20, 1.24)	1.36 (1.31, 1.41)	1.17 (1.11, 1.23)	1.18 (1.15, 1.21)	1.19 (1.14, 1.24)	1.23 (0.93, 1.61)

*Adjusted by maternal age, education, pre-pregnancy body mass index, insurance, parity, prenatal visits, chronic hypertension and pre-existing diabetes.
aOR=Adjusted odds ratio, CI-Confidence interval

789 Perinatal Cannabis Use Adversely Impacts Pregnancy and Neonatal Outcomes

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OBJECTIVE: Cannabis use in pregnancy has been markedly rising. There is an existing gap in knowledge regarding the safety of prenatal cannabis use, partly because prior studies had either small sample size or did not adjust for potential cofounders. The purpose of this study is to examine recent data from a large, population-based birth cohort to understand the impact of maternal cannabis use on perinatal outcomes.

STUDY DESIGN: This is a retrospective cohort study of California linked hospital discharge-vital statistics data from 2012-2019. We included singleton, live-born infants with gestational age of 23-42 weeks. Our maternal outcomes of interest included hypertensive disease, preterm delivery (PTD) of < 37 weeks & < 32 weeks), severe maternal morbidity (SMM). As blood transfusion is the major contributor to SMM, we also examined non-transfusion SMM. Neonatal outcomes included NICU admission, small for gestational age (SGA), respiratory distress syndrome (RDS), and infant death. Chi-squared and multivariable logistic regression were utilized for statistical analyses.

RESULTS: A total of 3,551,167 pregnant people were included. 37,417 (1.05%) had a cannabis related diagnosis at delivery. Patients with cannabis related diagnosis were more likely to experience SMM (aOR 1.35; 99% CI: 1.26,1.46), non-transfusion SMM (aOR 1.40; 99% CI:1.24, 1.58), PTD< 37 weeks (aO 1.68; 99% CI:1.62, 1.73), PTD< 32 weeks (aOR 1.86; 99% CI:1.73, 2.00) and hypertensive disease (aOR1.36; 99% CI: 1.31, 1.40). Neonatal outcomes were also significantly higher for those with a cannabis related diagnosis (Table), including NICU admission (aOR 1.43; 99% CI: 1.39, 1.47), SGA (aOR1.48;1.43, 1.52), RDS (aOR 1.50; 99% CI: 1.43, 1.57), and infant death (aOR 1.93; 99% CI:1.69, 2.20).

CONCLUSION: Our study suggests that use of prenatal cannabis is associated with increased odds of maternal and neonatal morbidity. Given the legislative changes to cannabis legalization and the prevalence of use, our results can inform prenatal care and counseling.

Table 1. Multivariable logistic regression models showing association of cannabis related diagnosis with perinatal outcomes.

	Cannabis related diagnosis	No cannabis related diagnosis	Cannabis related diagnosis** aOR (99% CI)
Hypertensive disease	13.0%	8.1%	1.36 (1.31, 1.40)
Preterm delivery (<37 weeks)	14.0%	6.8%	1.68 (1.62, 1.73)
Very Preterm delivery (<32 weeks)	2.5%	0.9%	1.86 (1.73, 2.00)
Severe maternal morbidity (SMM)*	2.4%	1.3%	1.35 (1.26, 1.46)
Non-transfusion SMM	0.89%	0.42%	1.40 (1.24, 1.58)
NICU admission	17.9%	10.3%	1.43 (1.39, 1.47)
Small for gestational age	15.3%	8.7%	1.48 (1.43, 1.52)
Respiratory distress syndrome	6.3%	3.4%	1.50 (1.43, 1.57)
Infant deaths	0.8%	0.2%	1.93 (1.69, 2.20)

aOR = Adjusted odds ratio, CI=Confidence interval
* Severe maternal morbidity (SMM) was defined using a published and previously validated list of ICD codes from the center of Disease Control and Prevention.
**Adjusted for maternal race/ethnicity, age, education, pre-pregnancy BMI, insurance, parity, smoking, alcohol use, nicotine use, chronic hypertension, pre-existing diabetes, anxiety, depression and bipolar disorders.

790 Opioid Use in Pregnancy Adversely Affects Perinatal Outcomes

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OBJECTIVE: Perinatal opioid use affects almost 4 million pregnancies annually and has become a leading cause of maternal mortality. Studies on prenatal opioid use are limited by varying methodology, inconsistently controlling for confounders, and focusing on a narrow scope of outcomes. Existing population-based data is largely from outside the United States (US) with different demographics. The objective of this study is to examine US-based population-level associations between perinatal opioid use, and maternal and neonatal outcomes.

STUDY DESIGN: This is a secondary data analysis using California linked vital statistics and hospital discharge data from 2008-2019. We included singleton, live-born infants with gestational age of 23-42 weeks. Opioid-related diagnosis during pregnancy was identified using ICD-9 and ICD-10 codes from hospital discharge data. Chi-squared and multivariable logistic regression were utilized for statistical analyses.

RESULTS: A total of 5,470,747 pregnancies met inclusion criteria, and 13,026 (0.24%) had opioid-related diagnosis. Opioid use was associated with higher risk of hypertensive disorders (aOR 1.57; 95% CI: 1.48-1.67), severe maternal morbidity (aOR 2.36; 95% CI: 2.14-2.62), blood transfusion (aOR=2.29, 95% CI: 2.06-2.56)), venous thromboembolism (aOR 2.34; 95% CI: 2.09-2.62), and primary cesarean delivery (aOR 1.21; 95% CI: 1.13-1.29). Neonates exposed to *in utero* opioids had higher risks of neonatal intensive care unit admission (aOR 5.08; 95% CI: 4.89-5.29), respiratory distress syndrome (aOR 2.24; 95% CI: 2.09-2.39), neonatal opioid withdrawal syndrome (aOR 137.1; 95% CI 129.1-145.7), small for gestational age (aOR 1.71; 95% CI: 1.62-1.79), and infant death (aOR 1.51; 95% CI 1.23-1.85).

CONCLUSION: Our study suggests that a prenatal opioid-related diagnosis is associated with a significantly increased risk of maternal and neonatal morbidity. As the perinatal opioid crisis persists, our findings can help inform patient care and counseling.

Table 1: Logistic regression model showing raw percentages and adjusted odds ratios for perinatal outcomes among patients with and without opioid-related diagnoses in California

	No opioid use disorder N=5,457,721	Opioid use disorder N=13,026	p*	aOR (95% CI)[a]
Maternal outcomes				
Hypertensive disease of pregnancy	7.0%	11.3%	<0.001	1.57 (1.48, 1.67)
Severe maternal morbidity	1.2%	3.7%	<0.001	2.36 (2.14, 2.62)
Venous thromboembolism	0.0%	0.2%	<0.001	4.21 (2.86, 6.19)
Maternal Blood transfusion	1.0%	2.9%	<0.001	2.34 (2.09, 2.62)
Cesarean in nulliparous	30.3%	34.2%	<0.001	1.21 (1.13, 1.29)
Cesarean in multiparous with prior cesarean	90.3%	92.1%	0.001	1.25 (1.09, 1.44)
Cesarean in multiparous without prior cesarean	9.1%	15.1%	<0.001	1.54 (1.42, 1.66)
Postpartum hemorrhage	3.3%	4.3%	<0.001	1.25 (1.14, 1.37)
Preterm premature rupture of membranes	1.8%	5.1%	<0.001	2.18 (2.00, 2.37)
Neonatal outcomes				
Preterm delivery<37 weeks	6.9%	19.7%	<0.001	2.59 (2.47, 2.72)
Preterm delivery<32 weeks	0.9%	2.9%	<0.001	2.35 (2.09, 2.64)
NICU admission	10.5%	43.2%	<0.001	5.08 (4.89, 5.29)
Small for gestational age	8.7%	15.9%	<0.001	1.71 (1.62, 1.79)
Respiratory distress syndrome	2.6%	10.0%	<0.001	2.24 (2.09, 2.39)
Infant deaths (Death within one year of birth)	0.2%	0.9%	<0.001	1.51 (1.23, 1.85)
Congenital anomalies	9.8%	12.3%	<0.001	1.18 (1.12, 1.25)
Hypoglycemia	1.7%	5.1%	<0.001	1.86 (1.71, 2.02)
Neonatal opioid withdrawal	0.1%	26.1%	<0.001	137.1 (129.1, 145.7)

aOR=Adjusted odds ratio, CI-Confidence interval
[a] Adjusted for maternal race and ethnicity, age, education, body mass index, parity, insurance, alcohol, nicotine use, chronic hypertension, pre-existing diabetes and mental health disorders.

791 Timing of exam-indicated cerclage and pregnancy outcomes: To emergently or urgently schedule?

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OBJECTIVE: Exam-indicated cerclage (EC) is an important treatment for cervical insufficiency with the goal of preventing preterm birth (PTB). How the interval from diagnosis of cervical dilation to EC affects pregnancy outcomes is not known.

STUDY DESIGN: A retrospective cohort study was conducted at a single academic center from 2015-2023. Patients with a dilated cervix < 24 weeks gestation (GA) recommended for EC were included. Multiples and patients with incomplete delivery data were excluded. The time interval (hours) from ultrasound with dilated cervix to operating room anesthesia was calculated and analyzed categorically (< 12, 12-24, > 24). Age, parity, GA at EC, cervical length, dilation, and prior PTB were collected. The primary outcome was GA at delivery. Secondary outcomes included latency from EC to delivery, PTB, PPROM, and NICU admission. Categorical variables were analyzed by Fisher's exact test. Continuous variables were assessed by ANOVA or Kruskal-Wallis test. Time-to-event curves were created to display time-to-delivery by group. Linear regression was used to assess the association between interval to EC and the primary outcome after adjusting for potential confounders.

RESULTS: 155 patients with EC were identified. The median GA at diagnosis was 21.0 weeks (IQR 19.7-21.9) and cervical dilation 1.0cm (IQR 0.5-1.0). The median GA at delivery was 37.1 weeks (IQR 30.0-39.1). As a continuous variable, there was no correlation between interval to EC and GA at delivery (ρ=-0.02, p=0.83). Comparing groups, baseline characteristics were not significantly different aside from parity (p=0.048) and pre-EC amniocentesis (p=0.001). Linear regression showed no significant difference in GA at delivery between those receiving EC < 12 (β [95% CI]: 0.36 [-1.87,2.59]) or 12-24 hours (β [95% CI]: 0.83 [-1.75,3.41]) from diagnosis, compared to those at > 24 hours. There was no difference in secondary outcomes.

CONCLUSION: We observed no significant correlation between interval to EC placement and GA at delivery. These results suggest that EC can be scheduled urgently rather than emergently with similar outcomes.

Table 1. Interval to cerclage and pregnancy outcomes

		< 12 hrs N = 68	12-24 hrs N = 37	> 24 hrs N = 50	p
Baseline Characteristics					
Parity Median (IQR)		0 (0.0 to 1.0)	1 (0.0 to 2.0)	0 (0.0 to 1.0)	0.048
History of Preterm Birth N (%)	Yes	10 (14.7)	7 (18.9)	3 (6.0)	0.15
	No	58 (85.3)	30 (81.1)	47 (94.0)	
Pre-cerclage Amniocentesis N (%)	Yes	23 (33.8)	21 (56.8)	33 (67.3)	0.001
	No	45 (66.2)	16 (43.2)	16 (32.7)	
Gestational Age at Diagnosis Median (IQR)		20.8 (19.4 to 21.9)	21.4 (20.6 to 22.1)	20.4 (19.6 to 20.6)	0.08
Cervical Dilation Median (IQR)		1.0 (0.9 to 1.0)	1.0 (0.5 to 1.0)	1.0 (0.5 to 1.0)	0.74
Pregnancy Outcomes					
Gestational Age at Delivery Median (IQR)		37.1 (30.2 to 39.1)	37.7 (32.7 to 39.0)	36.9 (28.6 to 39.1)	0.86
Cerclage to Delivery Latency (days) Median (IQR)		114.0 (71.5 to 127.2)	112.0 (92.0 to 119.0)	107.0 (60.0 to 122.8)	0.60
Preterm Birth N (%)	Yes	33 (48.5)	15 (40.5)	25 (50.0)	0.67
	No	35 (51.5)	22 (59.5)	25 (50.0)	
PPROM N (%)	Yes	17 (25.0)	7 (18.9)	19 (38.0)	0.12
	No	51 (75.0)	30 (81.1)	31 (62.0)	
NICU Admission N (%)	Yes	20 (33.3)	12 (33.3)	19 (43.2)	0.56
	No	40 (66.7)	24 (66.7)	25 (56.8)	

792 Medium postpartum hemorrhage risk: do multiple medium risk factors increase risk to high?

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OBJECTIVE: The ACOG Practice Bulletin on Postpartum hemorrhage (PPH; #183) suggests that all parturients be risk stratified into low-, medium- and high-risk. We noticed that within medium-risk, the composite maternal hemorrhagic outcome (CMHO) rate varied by the number of risk factors. Thus, we hypothesized that parturient with 2 or more medium risk factors would have significantly higher rates of CMHO compared to those with only one medium risk factor.

STUDY DESIGN: This is a retrospective cohort study of all singleton gestations delivered at a Level-IV center within one year. The components of CMHO are described in the table. Chi-squared and Kruskal Wallis analysis was used to compare categorical variables. The adjusted relative risks (aRR) of CMHO and its components were calculated between the studied groups using Poisson regression, adjusted for confounders from the univariate analysis.

RESULTS: Of the 4,544 deliveries, 1,376 (30%) were cataloged as medium risk, and within those, 1,132 (82%) had one medium risk factor and 244 (18%) had more than 1. Patents were significant different in maternal age, race, Marial status, insurance type, BMI at delivery, gestational age, diabetes and hypertension diagnosis. The three most common "medium" risk factors were: prior uterine surgery (n-738, 54%), prolonged oxytocin use (292, 21%) or magnesium sulfate use at delivery (n=282, 20%). The risk for CMHO was significantly higher in those with two or more medium risk factors compared to a single risk factor (aRR 0.78, 95% CI (0.63-0.98). This difference is largely driven by uterotonic use, which was significantly higher in the multiple medium risk factor group compared to the single medium risk factor groups (aRR 0.67, 95% CI 0.51 − 0.88

CONCLUSION: In our study population, participants with two or more medium PPH risk factors had a higher rate of CMHO than those with a single medium risk factor, largely driven by treatment for atony, and may be more appropriately treated as high-risk.

Table 1: Composite Maternal Hemorrhagic Outcome

	1 Medium Risk Factor n = 1,132 (%)	≥2 Medium Risk Factors n = 244	Adjusted RR**	(95% CI)	
Composite Maternal Hemorrhagic Outcome	238 (21.0%)	81 (33.2%)	**0.78**	**0.63**	**0.98**
EBL or QBL >=1000 mL	96 (8.5%)	34 (13.9%)	0.76	0.52	1.12
Uterotonic use	159 (14.0%)	59 (24.2%)	**0.67**	**0.51**	**0.88**
Transfusion	23 (2.0%)	11 (4.5%)	0.71	0.33	1.49
Tamponade	2 (0.2%)	1 (0.4%)	-	-	-
Surgical intervention*	9 (0.8%)	6 (2.5%)	-	-	-
Venous thromboembolism	1 (0.1%)	2 (0.8%)	-	-	-
ICU admission	4 (0.4%)	1 (0.4%)	-	-	-
Hysterectomy	2 (0.2%)	0	-	-	-
Maternal death	0	0	-	-	-

Note: –, Not calculated if the cell has zero or infrequent events (<10).
* includes O'Leary, B-Lynch and uterine artery embolization
**Adjusted for maternal age, race ethnicity, insurance status, prenatal care, marital status, mode of delivery, and gestational age

793 Maternal risk factors for preeclampsia and prescription practices of low dose aspirin for preeclampsia prophylaxis

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OBJECTIVE: To determine how prophylactic low dose aspirin (LDA) prescription rates differed across different maternal risk factors for preeclampsia.

STUDY DESIGN: Retrospective study of patients that met SMFM criteria to initiate LDA ppx who received prenatal care and delivered at a single academic center between January - May 2021. Exclusion criteria: age < 18 years old, transfer of care >28 weeks, and delivery < 20 weeks gestation. Patient characteristics, moderate risk (MR) and high risk (HR) criteria, and pregnancy outcomes were collected. Rate of aspirin prescription across different MR and HR factors for preeclampsia groups were compared. Statistical analysis was performed using Chi square and univariate analysis with significance defined as $p < 0.05$.

RESULTS: Of the 622 patients who were included in the study, 60.3% of patients met criteria to initiate LDA prophylaxis with either 2 MR factors or at least 1 HR factor. Risk factors that were more likely to be prescribed LDA were a history of preeclampsia, chronic hypertension, pregestational diabetes, autoimmune disease, and APLS (Table 1). 82 patients (67.8%) with 1 high risk factor were prescribed LDA, compared to only 13.8% (n=35) of patients with 2 moderate risk factors (OR 13.15, 95% CI 7.8-22.2). When comparing patients with 2 or more high risk factors to patients with 1 high risk factor or 2 moderate risk factors only, providers prescribed LDA at a rate of 92.3% vs. 29.0% (OR 29.4, 95% CI 3.8-228.7), respectively. Risk factors with no significant differences in rates of LDA prescription included obesity (BMI >30), class III obesity (BMI >40), kidney disease, cardiac disease, gestational diabetes, thrombophilia, obstructive sleep apnea, hypothyroidism, AMA, and interpregnancy interval >10 years.

CONCLUSION: Patients with 2 or more high risk factors for preeclampsia were more likely to be appropriately prescribed LDA than patients with only 1 high risk factor or only moderate risk factors.

Table 1. Individual Maternal Risk Factors Associated with Higher Low Dose Aspirin Prescription

Factor	Prescribed Aspirin (n = 117)	Not Prescribed Aspirin (n = 258)	p-value
High Risk Factors			
Multifetal Gestation	15 (12.8%)	14 (5.4%)	0.013
History of Preeclampsia	36 (30.8%)	7 (2.7%)	<0.001
Chronic Hypertension	22 (18.8%)	5 (1.9%)	<0.001
Pregestational Diabetes Mellitus	9 (7.7%)	3 (1.2%)	0.002
Autoimmune Disease	17 (14.5%)	19 (7.4%)	0.029
Moderate Risk Factors			
Nulliparity	23 (19.7%)	116 (45%)	<0.001
Assisted Reproductive Technology (ART)	11 (9.4%)	6 (2.3%)	0.002

*Data presented as N (%)

794 MRI After Ultrasound Consistent with Accreta Incorrectly Changes Diagnosis to Negative in up to One-Third

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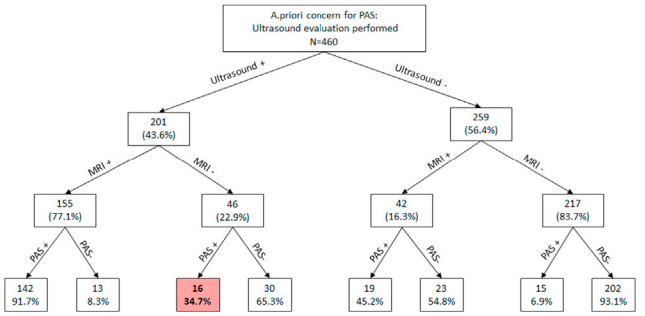
OBJECTIVE: Many studies have demonstrated similar sensitivity of MRI and ultrasound (US) for placenta accreta spectrum (PAS) detection; however, since all patients get an ultrasound, the relevant clinical question is not if MRI is more sensitive but whether it adds value to ultrasound in PAS diagnosis or management. **Our goal was to evaluate the added value of obtaining an MRI after ultrasound in suspected PAS.**

STUDY DESIGN: We reviewed 21 references from 2 recently published systematic reviews comparing the sensitivity and specificity of MRI and US in patients with clinical risk factors for PAS. Included studies reported, either directly or in a way that it could be mathematically derived, 1) # of patients with discordant or concordant MRI and US results and 2) pathologic presence or absence of PAS at delivery. Data were abstracted as follows: Discordant: 1) # MRI true positive(TP) /US false negative(FN), 2) # MRI true negative(TN) /US false positive(FP), 3) # MRI FP / US TN, 4) # MRI FN / US TP). Concordant: 1) # MRI TP/ US TP, 2) # MRI TN / US TN, 3) # MRI FP / US FP, 4) # MRI FN / US FN). We created pooled estimates for each category to estimate the added value of MRI under different scenarios.

RESULTS: 460 patients with suspected PAS from 10 studies met inclusion criteria. 201 (43.6%) were US+ and 259 (56.4%) US(-) for PAS (Figure). MRI was concordant with US in 155 (77.1%) of US+ and 217 (83.7%) US(-) (Figure 1). In 46 US+ patients (22.9%), MRI was negative for PAS. Of those US+/MRI-, MRI incorrectly changed the diagnosis to negative in 16 (34.7%), and correctly changed to negative in 30 (65.3%). Of those US− /MRI+, MRI correctly

changed the diagnosis to positive in 45.2% of cases and incorrectly confirmed the negative diagnosis in 23 (54.8%) of cases.

CONCLUSION: Routinely obtaining an MRI after a positive US can lead to incorrectly changing the diagnosis to negative in up to 1/3 of patients. MRI thus may be best utilized in cases of negative ultrasound where PAS is strongly suspected or US imaging is suboptimal.



795 High school diploma rate is associated with neonatal glucose Instability and macrosomia among non-diabetic patients

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OBJECTIVE: To characterize the impact of high school (HS) diploma rates in a patient's home zip code on the development of neonatal glucose instability and macrosomia in non-diabetic patients.

STUDY DESIGN: We conducted an IRB-approved retrospective cohort study using the Obstetrical Care Outcomes Assessment Program (OBCOAP) at the University of Washington Medical Center. We included the first pregnancy in the data set for each non-diabetic patient with complete data on neonatal glucose instability, birthweight, and patient home zip code. We evaluated the association between the percent of people in the patient's home zip code with a HS diploma and a composite variable of neonates with glucose instability and/or macrosomia. Multiple logistic regression was used to adjust for maternal age and body mass index.

RESULTS: There were 8026 patients in the cohort, of which 660 (18.5%) had a neonate with either glucose instability or macrosomia. Compared to patients living in zip codes where >95% of people have a HS diploma, patients living in zip codes with lower educational rates have an increased risk of neonatal glucose instability or macrosomia (adjusted OR [aOR] 1.69, 95% CI 1.35-2.13 for 85-95% HS diploma rate and aOR 1.84, 95% CI 1.38-2.46 for < 85% HS diploma rate.) (Table 1). When evaluated individually, the association appears to be driven by glucose instability, with aOR 1.68 (95% CI 1.33-2.14) and 1.87 (95% CI 1.38-2.52) for zip codes with 85-95% and < 85% HS diploma rates, respectively.

CONCLUSION: Among non-diabetic patients, living in a zip code with lower rates of obtaining a HS diploma is associated with an increased risk of having neonatal glucose instability and/or macrosomia. HS education is an indicator of socioeconomic status, nutritional education, and availability of healthy foods as well as literacy rates, all of which likely contribute to this finding. This finding gives insight into additional avenues to direct efforts to prevent adverse neonatal outcomes.

Table 1. Association between high school diploma rate by zip code and neonatal glucose instability or macrosomia among non-diabetic patients

Percent with a HS diploma	Unadjusted		Adjusted*	
	OR (95% CI)	p-value	OR (95% CI)	p-value
>95%	1.0 (ref)	-	1.0 (ref)	-
85-95%	1.80 (1.48-2.19)	<0.001	1.69 (1.35-2.13)	<0.001
<85%	1.98 (1.55-2.51)	<0.001	1.84 (1.38-2.46)	<0.001

Adjusted for maternal BMI and age

796 Impact of Oxytocin Timing and Duration on TOLAC Outcomes: A Retrospective Study

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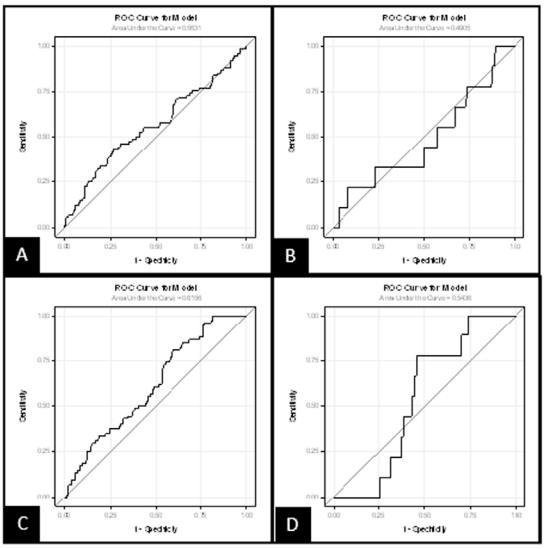
OBJECTIVE: Oxytocin is commonly used to enhance labor progression. Its application in Trial of Labor after Cesarean Section (TOLAC) requires special considerations, due to the risk of uterine rupture. Currently, limited data exists on the influence of oxytocin administration timing and duration on adverse outcomes during TOLAC. Our study aims to explore the correlation between the timing of oxytocin initiation, the duration of oxytocin administration, and the rates of uterine rupture and successful vaginal deliveries during TOLAC.

STUDY DESIGN: In this retrospective cohort study conducted from 2012 to 2020 at a single tertiary medical center, we included women with a prior single cesarean delivery attempting their first TOLAC and with no history of vaginal deliveries. Exclusions were made for women with multiple gestations or those who underwent cervical ripening. Outcome evaluation was performed using Receiver Operating Characteristic (ROC) curves.

RESULTS: A total of 385 women met the inclusion criteria. The mean age was 31.8 (±4.3) and Median gestational age at delivery was 40+3 weeks (37+0 - 41+6). Of women, 311 (80.78%) achieved successful vaginal delivery, while nine (2.34%) experienced uterine rupture. ROC analysis did not reveal significant associations between the timing of oxytocin administration and the primary outcomes: successful vaginal delivery (AUC= 0.56, p= 0.244) [Fig. 1A] and uterine rupture (AUC= 0.49, p= 0.902) [Fig. 1B]. However, the duration of oxytocin administration demonstrated a noteworthy correlation with successful vaginal delivery (AUC= 0.62, p= 0.008) [Fig. 1C], but not with uterine rupture (AUC= 0.54, p= 0.354) [Fig. 1D].

CONCLUSION: Early initiating of oxytocin did not contribute to a higher rate of vaginal delivery during TOLAC. However, extended use of oxytocin was associated with improved success rates. Importantly, commencing oxytocin early and using it for an extended period did not elevate the risk of uterine rupture. Further extensive studies are required to comprehend the potential risks and benefits of early or prolonged oxytocin administration during TOLAC.

Figure 1: Receiver Operating Characteristic (ROC) Curves for Oxytocin Timing and Duration in Relation to Vaginal Delivery and Uterine Rupture.



A) ROC Curve for Oxytocin Timing and Vaginal Delivery

B) ROC Curve for Oxytocin Timing and Uterine Rupture

C) ROC Curve for Duration of Oxytocin Administration and Vaginal Delivery

D) ROC Curve for Duration of Oxytocin Administration and Uterine Rupture

2. Higher cholesterol (205±35 vs 190±27, mg/dl*), triglycerides (127±70 vs 92±40, mg/dl*) and lower HDL (50±11 vs 60±12, mg/dl*)

3. Higher values across 20 indexes of glucose control and variability of continuous glucose monitoring (CGM) indicating increased glucose fluctuation and longer durations of hyperglycemia

4. Body composition (DXA scan) showed higher visceral fat mass (901±320 vs 590±230 gr*)

5. Sleep monitoring indicated a higher rate of sleep apnea (Oxygen Desaturation Index, number of desaturation episodes per hour) (4±5 vs 2.8±4*)

6. Microbiome: lower bacterial richness which is associated with obesity and metabolic disorders

CONCLUSION: GDM has long lasting effects on multiple physiological systems relating to metabolic syndrome. Insights provided can aid long-term monitoring and interventions to reduce cardiovascular and metabolic disease risks linked to GDM

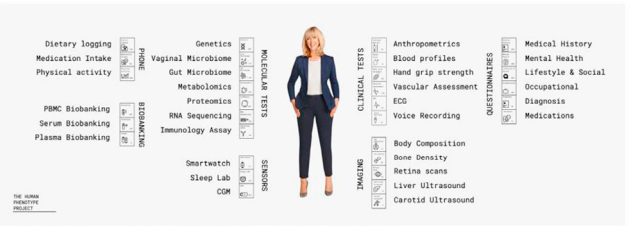


Figure | Data collected or analyzed in the Human Phenotype Project
The project combines innovative medical tests and wearables (such as CGM, and sleep monitoring). It profiles participants at unprecedented depth, including physiological assessment of their muscular, skeletal, liver, blood, heart, vascular, immune, gastrointestinal, and cognitive body systems. The multi-omics profiling of each participant includes genetics, microbiome, metabolomic, transcriptomic, proteomic, and immune system evaluation. A life-style questionnaire and medical records are obtained.

797 Molecular and Physiological Profile of Women with a History of Gestational Diabetes Mellitus

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OBJECTIVE: Gestational diabetes mellitus (GDM) can be a risk factor for subsequent cardiovascular and metabolic diseases. However, there is a paucity of information regarding diverse cardiovascular, metabolic and multi-omic measurements in elderly women after GDM. We assessed the molecular and physiological profile of women with a history of GDM

STUDY DESIGN: Data collected as part of large-scale, prospective, longitudinal study with more than 10,000 healthy adults aged 40−70 years, between the years 2019 and 2022. The participants underwent physiological assessments through special medical tests and wearables, molecular profiling and collection of medical records and lifestyle questionnaires (**Figure**). We included women who reported at least one live birth and compared the profiles of women with a history of GDM to control subset, matched by the number of pregnancies and the time elapsed since the GDM pregnancy

RESULTS: Our study consisted of 300 and 800 women in GDM and the control group, respectively (mean of 17 years post-pregnancy). Women with a history of GDM displayed notable findings compared to the control group (*p< 0.001 for all)

1. Higher sonographic liver attenuation; indicative of fatty liver

798 Personalized Machine Learning Model for Predicting Successful Vaginal Delivery during the Active Phase of Labor

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OBJECTIVE: Accurate personalized prediction of delivery mode during the active stage improves resource allocation, reduces unnecessary interventions, and enhances patient-centered care. However, current machine learning models lack focus on active labor and effective use of labor-related data. The "black box" problem further impedes understanding, accuracy, and patient safety. We developed a personalized model using real-time data to predict successful vaginal delivery in the active phase and provide an explanation of the model's decision-making process.

STUDY DESIGN: Labor records from a single university affiliated tertiary medical center with approximately 12,500 deliveries annually, over a 10-year period. Three models were trained using both "static features" (e.g demographics) and "dynamic features" (e.g cervical dilatation, efficacy, and newly derived features calculated as ratios between adjusted dynamic measures and time differences). To assess the explainability of the best-performing model, we employed SHAP (SHapley Additive exPlanations) analysis, which is used to explain model prediction and show which features had most influenced the prediction.

RESULTS: 1. A total of 94,386 cases in which a trial of labor was attempted were identified. Of them 70,000 admitted to the active phase of labor (6 cm dilatation).

2. We trained three types of classifier models predicting successful vaginal delivery: Random Forest classifier, Histogram-Based Gradient Boosting classifier, and neural network model

3. Histogram-Based Gradient Boosting model achieved the highest scores: ROC AUC score and Precision recall AUC score was 0.87 (95% confidence interval, 0.858-0.892) and 0.52 (95% confidence interval, 0.511-0.542) respectively (Figure)

4. SHAP analysis of the best model revealed key contributing features: rate of fetal descent, cervical opening rate, maternal age, and clinical fetal weight estimation.

CONCLUSION: Our model accurately predicts delivery mode during active labor and and enhances decision-making by providing insights into prediction factors, improving transparency and validation

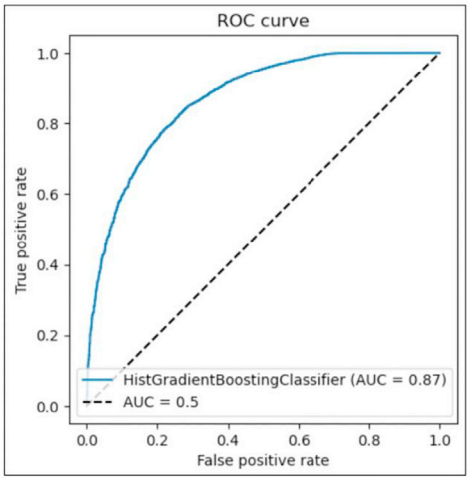

Figure | ROC curve plot with AUC of 0.87 indicates a high classifier performance and that it can distinguish between the classes.

Model's performance for binary classification of vaginal vs. CS Labor outcome classification task. The histogram-Based Gradient Boosting model achieved the highest scores in the combination of precision-recall and ROC AUC.

799 Prophylactic Aspirin Treatment for Preeclampsia Prevention in Dichorionic-Diamniotic Twin Pregnancies

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OBJECTIVE: Preeclampsia (PE) is a pregnancy-related hypertensive disorder associated with significant maternal and neonatal morbidity and mortality. Definitive treatment requires delivery, hence primary prevention is crucial. Aspirin has shown success in preventing early PE in singleton pregnancies. However, its efficacy in twin gestation is unknown.

We aimed to evaluate whether prophylactic use of aspirin initiated prior to 16 weeks gestation reduces PE incidence in dichorionic (DC) pregnancies

STUDY DESIGN: Retrospective cohort study of 1,008 DC pregnancies between 2015 and-2022 in a single tertiary center, of whom 180 (90 treated vs 90 untreated) were compered using propensity score matching to estimate the effect of aspirin treatment on PE occurrence. The propensity scores were estimated using logistic regression based on maternal age, BMI, chronic hypertension, antiphospholipid antibodies syndrome (APLA), parity, in vitro fertilization (IVF), smoking status, history of PE, history of preterm delivery and history of gestational diabetes

RESULTS: We found no significant difference between the groups in the rate of PE with or without severe features (8.9% vs 12% p=0.467 ;8.9% vs 4.4%, p=0.232), respectively. Furthermore, the groups did not differ in the incidence of gestational hypertension, superimposed PE, HELLP syndrome, gestational diabetes, and fetal growth restriction. When comparing gestational age at PE diagnosis, no difference was found between the groups before and after 37 weeks gestation (16% vs 22%, p=0.253; 2.2% vs 1.1%, p >0.999), respectively (Table 1). Further logistic regression analysis failed to demonstrate that aspirin treatment reduces rates of any hypertensive disorders, PE with or without severe features (OR 1.496 95% CI 0.762 - 2.937; OR 0.701 95%CI 0.267 -1.841; OR 2.098 CI 95% 0.651 - 6.760), respectively, independent of the differences of gestational ages at birth. The need for induction due to PE did not differ between the groups (OR 0.551 CI 95% 0.169 - 1.801)

CONCLUSION: Administration of prophylactic aspirin in DC pregnancies did not result in a reduction of PE incidence

Table 1: Hypertensive Disorders Outcome in DC Twins with and without Aspirin

Variable	No Aspirin n = 90	Aspirin n = 90	p-value
Gestational Hypertension	0 (0%)	2 (2.2%)	0.497
PE with severe features (All):	13 (14%)	13 (14%)	>0.999
PE with severe features	11 (12%)	8 (8.9%)	0.467
HELLP syndrome	2 (2.2%)	5 (5.6%)	0.444
PE without severe features	4 (4.4%)	8 (8.9%)	0.232
Superimposed PE	0 (0%)	3 (3.3%)	0.246
Fetal growth restriction	12 (13%)	14 (16%)	0.672
Gestational diabetes mellitus	22 (24%)	21 (23%)	0.861
Gestational age at PE diagnosis			
After 37 Weeks	2 (2.2%)	1 (1.1%)	>0.999
Before 37 Weeks	14 (16%)	20 (22%)	0.253
Before 34 Weeks	6 (6.7%)	9 (10%)	0.418
Before 32 Weeks	3 (3.3%)	3 (3.3%)	>0.999

PE – Preeclampsia, HELLP – Hemolysis, Elevated Liver Enzymes and Low Platelets

Data presented as frequency, n(%)

Statistical analysis was done by Pearson's Chi-squared test; Fisher's exact test; Wilccxon rank sum test

800 Variation in genetic workup of polyhydramnios: An international and inter-specialty survey

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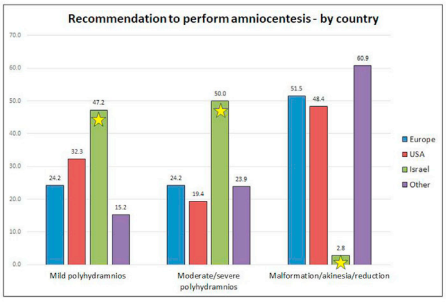
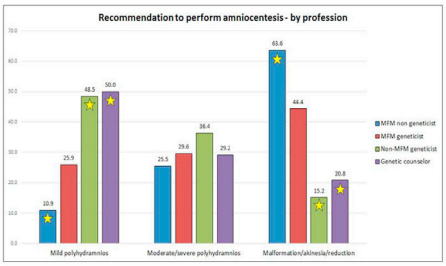
OBJECTIVE: To evaluate the opinions of health professionals regarding the definition of polyhydramnios in which invasive testing is considered, as well as the optimal genetic testing in such cases.

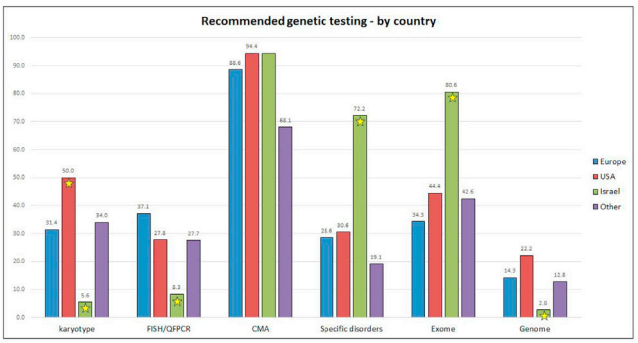
STUDY DESIGN: This anonymous electronic survey was conducted using the Fetal Sequencing Consortium and COGEN mailing list. The survey included questions about the country of origin, the main specialty of the respondent (i.e., clinical geneticist, MFM geneticist, MFM non-genetics professional, genetic counselor, and others), sonographic criteria for recommendation of invasive testing in cases of polyhydramnios (i.e., mild polyhydramnios, moderate/severe polyhydramnios or only in the presence of additional sonographic aberrations such as fetal akinesia or malformations), as well as the recommended genetic testing in such cases.

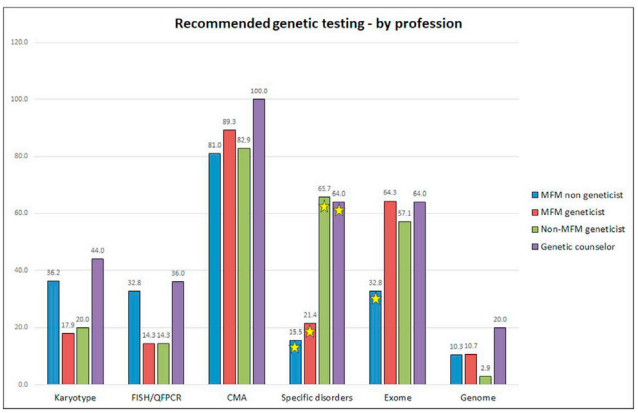
RESULTS: Of the 154 healthcare practitioners participatung in the survey, 17.8% would recommend invasive testing in any case of mild polyhydramnios (defined as amniotic fluid index (AFI) of ≥24 cm or maximal vertical pocket (MVP) of ≥8 cm), 19.9% - only in moderate and severe polyhydramnios (AFI of ≥30cm or MVP ≥12 cm), while 41.8% - only in the presence of additional sonographic anomalies. 30.5% recommend fetal karyotyping for genetic testing, 25.3% - FISH/QF-PCR, 85.1% - chromosomal microarray analysis, 50.0% - exome sequencing, 13.0% - genome, and 36.3% - genetic testing for specific genetic disorders (Myotonic Dystrophy, Spinal Muscular Atrophy and Prader-Willi syndrome). The answers differed by country of origin, as well as the medical specialty of the respondents (Figure 1, statistically significant differences noted by star).

CONCLUSION: Pronounced differences in the genetic management of polyhydramnios were noted, partly depending on geographic and professional factors. Large-scale studies should be performed to facilitate the establishment of uniform guidelines on this matter.









801 Moderate to severe thrombocytopenia is associated with postpartum hemorrhage but not increased anemia

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OBJECTIVE: Recent studies have demonstrated an increased incidence of postpartum hemorrhage (PPH) among patients presenting for delivery with mild thrombocytopenia. Our objective was to evaluate

the effect of thrombocytopenia at delivery on rates of PPH and anemia in the immediate postpartum period.

STUDY DESIGN: This was a retrospective cohort study of all patients delivering at a single academic institution. Patients with HELLP syndrome and pre-eclampsia with severe features were excluded. Cohorts included normal platelet count (^{3}150k), mild thrombocytopenia (100k−149k), and moderate/severe thrombocytopenia (< 100k) on admission for delivery. Perinatal outcomes were obtained from an obstetric database with clinical data entry by trained research nurses. The primary analysis was to evaluate the frequency of PPH according to platelet count on admission. Secondary outcomes included hematocrit levels, anemia prior to discharge, and transfusion. Outcomes were compared using chi-square for categorical measures and ANOVA for continuous measures. Multiple comparisons were made using the Tukey-Kramer adjustment.

RESULTS: Between Jan 2019 and Dec 2020, 21,640 met inclusion criteria with 133 (6/1,000) patients having moderate/severe thrombocytopenia. Patients with moderate/severe thrombocytopenia on admission had significantly higher rates of PPH compared with those with normal or mildly decreased platelet levels. (Table) Patients with moderate/severe thrombocytopenia had higher average hematocrit levels (32.0 ± 3.4%) immediately postpartum and lower anemia rates (30%) compared with patients with normal platelet levels (30.9 ± 3.6%, 35%). Rate of transfusion postpartum was similar among all three cohorts.

CONCLUSION: Patients with moderate/severe thrombocytopenia on admission for delivery had significantly higher rates of PPH compared with patients with normal or mildly decreased platelet levels. However, this increase did not translate to increased rates of transfusion or postpartum anemia.

	Normal Platelet Count	Mild Thrombocytopenia	Moderate to Severe Thrombocytopenia	P value
Patients delivered (n)	18,639 (86.1%)	2,868 (13.3%)	133 (0.6%)	
Demographics				
Age (mean +/-SD)	27.6 + 6.5	28.4 + 6.4	29.4 + 6.4	<0.001
Non-Hispanic Black	3062 (16%)	458 (16%)	29 (22%)	
Hispanic	14326 (77%)	2192 (76%)	98 (74%)	
Nulliparity	5254 (28%)	794 (28%)	38 (29%)	0.85
BMI ≥ 30 kg/m^2	11992 (64%)	1593 (56%)	64 (48%)	
Outcomes				
Postpartum Hemorrhage	2303 (12%)	368 (13%)	27 (20%)	**0.018**
Hematocrit delivery admission	34.5 + 4.3	34.1 + 4.4	35.3 + 5.1	<0.001
Anemia (Hct <30% delivery admission)	1620 (14%)	286 (16%)	8 (11%)	0.041
Hematocrit delivery discharge	30.9 + 3.6	31.4 + 3.6	32.0 + 3.4	<0.001
Anemia (Hct <30% delivery discharge)	4138 (35%)	545 (30%)	22 (30%)	<0.001
Postpartum Blood Transfusion	732 (3.5%)	107 (3.4%)	5 (3.4%)	0.87

802 Nausea and vomiting during pregnancy, cannabis use, and health implications among an international Latina subgroup

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OBJECTIVE: Nausea and vomiting during pregnancy (NVP) can result in severe weight loss and affect maternal and fetal health. Hispanic/Latinas (HL) experience a higher prevalence of NVP than White women and are more likely to use cannabis to self-medicate NVP symptoms. This study investigated the prevalence of HL who took medication as prescribed for NVP yet also used cannabis.

STUDY DESIGN: This prospective study used data from the HER Foundation that anonymously surveys women internationally about NVP symptoms, treatment for NVP, and cannabis use during their most recent pregnancy. Data were responses collected electronically between April 2022 to June 2023.

RESULTS: Data were collected from HL experiencing NVP (N=283). Respondents were from 18 countries, nearly half lived in suburban regions, and had a mean age of 29.63 (SD=4.83). On average, most HL were about 15 weeks pregnant at the time of completing the survey and 28% self-reported that they had lost about 10% of their pre-pregnancy weight due to NVP. The majority had been prescribed medication for NVP (95%) with 84% reporting that they had taken the medication as prescribed. About 17% of HL self-reported using cannabis products (THC/CBD) during their pregnancy. Adjusting for residential context and age, there was a trend toward an inverse association between using NVP medication as prescribed and using cannabis to self-medicate for NVP. Although not statistically significant, women who used NVP medication as prescribed were less likely to use cannabis than women who did not use medication (OR: -0.13, 95% CI: [0.33−2.32], p >.05).

CONCLUSION: Based on these preliminary findings, more research with large, diverse participants are needed to better understand cannabis use among pregnant women of color. Qualitative analysis can support reasons why women are using cannabis and inform tailored educational approaches to treat weight loss caused by NVP.

803 Impact of labor and delivery unit acuity on labor length and risk of cesarean delivery

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OBJECTIVE: Extensive research has investigated the impact of individual patient- and hospital-level factors such as delivery volume on labor management and perinatal outcomes. Our objective was to understand the impact of labor and delivery unit acuity and patient volume on labor management.

STUDY DESIGN: This is a retrospective cohort study between 3/2021 and 11/2022 at 8 hospitals in an integrated healthcare system. All laboring patients with viable, liveborn deliveries with an admission Obstetric Comorbidity Index (OB-CMI) score recorded were included. We measured the association of unit acuity (mean patient OB-CMI score on a unit in a 24-hour period) on length of labor and cesarean delivery (CD) using multivariable linear and logistic regressions. Fixed effects for hospital were included, and standard errors were clustered by hospital. Models were adjusted for volume (number of deliveries in 24-hour period) and patient factors. These analyses were also performed in the subset of nulliparous patients with term, singleton, vertex-presenting fetuses (NTSV). As sensitivity analyses, we assessed other measures of unit acuity, including relative unit acuity, proportion of patients with OB-CMI >5, maximum OB-CMI, and unit presence of a patient with OB-CMI >5.

RESULTS: There were 22,159 patients included, of which 11,766 (53.1%) were NTSV patients. In models with only hospital fixed effects, mean daily OB-CMI was associated with length of labor (β=1.21, 95%CI 0.40-2.01) and unscheduled CD (OR 1.18, 95% CI 1.12-1.23). The association was not affected by delivery volume. After adjusting for patient characteristics, there was no longer an association (Table 1). This pattern persisted for all alternate measures of unit acuity and among NTSV patients.

CONCLUSION: In a large healthcare system, measures of daily unit acuity were not associated with length of labor or risk of CD after controlling for hospital- and patient-level factors. This suggests that despite higher patient acuity or delivery volume, unit resources can compensate such that other patients' outcomes are unaffected.

Table 1 - Association of mean daily unit OB-CMI with length of labor and cesarean delivery

	Length of labor		Cesarean Delivery	
	All deliveries N=22,159	NTSV N=11,741	All deliveries N=22,159	NTSV N=11,741
Mean OB-CMI	Coef (95% CI)	Coef (95% CI)	OR (95% CI)	OR (95% CI)
Model adjusted for fixed effects of hospital	1.21 (0.40-2.01)	1.35 (1.05-1.64)	1.18 (1.12-1.23)	1.13 (1.05-1.22)
Model further adjusted for delivery volume[a]	0.96 (0.70-1.22)	1.35 (1.05-1.64)	1.17 (1.12-1.23)	1.13 (1.05-1.22)
Model further adjusted for delivery volume and patient characteristics[b]	-0.15 (-0.51-0.22)	-0.04 (-0.37-0.30)	1.00 (0.92-1.08)	0.98 (0.89-1.08)

a - Delivery volume defined as number of patients delivered on the unit in 24 hour period

b - Patient characteristics include patient OB-CMI, preterm, nulliparity, induced labor, and neonatal birthweight in length of labor model and OB-CMI, nulliparity, and preterm in cesarean delivery model (excluding nulliparity and preterm for NTSV)

Abbreviations: OB-CMI, Obstetric Comorbidity Index; NTSV, Nulliparous, term, singleton, vertex; Coef, coefficient; OR, odds ratio

804 Women with one previous preterm delivery or second-trimester loss: history-indicated-cerclage versus ultrasound cervical length screening

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OBJECTIVE: International guidelines regarding the management of women with one unique previous preterm delivery (PTD) or second-trimester loss are inconsistent.

Our objective was to compare history-indicated cerclage to ultrasound cervical length screening in women with one previous severe PTD or second-trimester loss.

STUDY DESIGN: We conducted a retrospective bicentric cohort study from 01/2015 to 12/2022. We compared two French tertiary care maternity units with different standards of care for women with one previous severe PTD or second-trimester loss: history-indicated cerclage in the 1st trimester in center 1, and ultrasound cervical length screening, with cerclage placement reserved for women whose cervical length shortens in center 2. We included women with one unique previous spontaneous PTD before 28 weeks or second-trimester loss. We excluded women whose previous PTD was not evocative of cervical insufficiency: bleeding from placenta previa or placental abruption, intrauterine fetal death, delivery following invasive prenatal testing. We also excluded women with more than one previous PTD or second-trimester loss and women with multiple pregnancies. Our primary outcome was delivery before 34 weeks, including second-trimester loss. We performed a sensitivity analysis after excluding the women who were not treated according to the protocol of their center.

RESULTS: The study included 314 women: 165 in center 1 and 149 in center 2. Twenty-six (15.8%) women delivered before 34 weeks in center 1 versus 38 (25.5%) in center 2 (p=0.032). In the multivariable analysis, the risk of delivery before 34 weeks was significantly lower for women with history-indicated cerclage compared to ultrasound screening (adjusted OR 0.47[0.23—0.97]). The results were unchanged in the sensitivity analysis. In center 2, 73 (49%) women underwent cerclage due to cervical shortening.

CONCLUSION: In women with one previous PTD or second-trimester loss, history-indicated cerclage is associated with a lower risk of delivery before 34 weeks compared to ultrasound screening of cervical length.

Outcome	Group 1 n=165 History indicated cerclage n (%)	Group 2 n=149 US cervical length screening n (%)	OR (IC 95%)	ORa* (IC 95%)
PTD < 34 WG or second trimester loss	26 (15.8)	38 (25.5)	0.55 (0.31 – 0.95)	0.47 (0.23 – 0.97)
Second trimester loss	10 (6.1)	14 (9.4)	0.62 (0.27 – 1.45)	0.63 (0.20 – 1.99)
sPTD < 34 WG or second trimester loss	24 (14.6)	37 (24.8)	0.52 (0.29 – 0.91)	0.45 (0.21 – 0.94)
PTD < 28 WG or second trimester loss	17 (10.3)	29 (19.5)	0.48 (0.25 – 0.91)	0.50 (0.22 – 1.17)
PTD < 37 WG or second trimester loss	46 (27.9)	55 (36.9)	0.66 (0.41 – 1.06)	0.78 (0.43 – 1.43)

Gestational age at delivery according to cervical insufficiency management

US: ultrasound, OR: odd ratio, aOR: adjusted odd ratio, PTD: preterm delivery, sPTD: spontaneous preterm delivery, WG: weeks of gestation
* multivariable logistic regression, covariates: maternal age, ethnicity, smoking status, history of delivery ≥ 37SA, chorioamnionitis in previous pregnancy

805 Morphometric analysis of spina bifida (SB) to associate pre-operative severity and clinical outcomes after fetal repair

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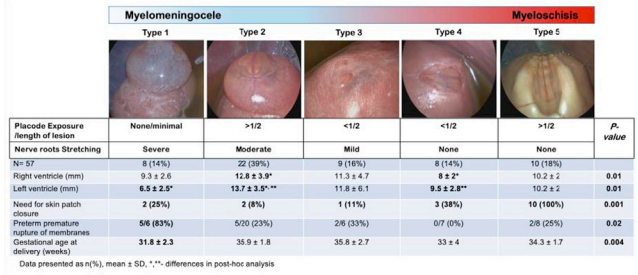
OBJECTIVE: Spina bifida lesions have conventionally been categorized into two types: with sac (myelomeningocele) and without sac (myeloschisis). However, the correlations of these types with baseline status and outcomes remains unknown. This study utilized the unique opportunity provided by in-utero fetoscopic repair to assess spina bifida lesions directly and to correlate with pre-operative presentation and post-operative outcomes.

STUDY DESIGN: We studied a prospective cohort of patients who underwent fetoscopic spina bifida repair from 2020-2023. We used high-resolution images and videos obtained during surgery to categorize lesions into 5 types (Table) based on placode exposure and stretching nerve roots. Pre-operative baseline characteristics such as ventricle measurement, tonsillar herniation level, lower extremities movement, and lesion dimensions were compared. Also, surgical time, need for patch for skin closure, gestational age at delivery, PPROM, and neonatal CSF diversion were compared. The reproducibility of the lesion classification was confirmed via Kappa inter-rater agreement.

RESULTS: 57/60 lesions had available images of sufficient quality for classification. The most common lesion type was Type 2. Baseline characteristics show greater lateral ventricle dimensions in Type 2 than in Type 1 and Type 4 lesions (Table), but no differences in other variables. Type 4 and 5 lesions received patch skin closure. However, the PPROM rate was high in Type 1 lesion pregnancies, which resulted in earlier gestational age at delivery. For lesion classification, there was 96.4% agreement between examiners ($p < 0.0001$).

CONCLUSION: Type 2 lesions present with severe ventriculomegaly; plausible explanation is nerve roots stretching and placode exposure leading to altered CSF dynamics or vice a versa. The surgical approach for skin closure varies based on the type. Also, the unusually high rate of PPROM and preterm birth in Type 1 lesions

needs further investigation. Findings have important implications in patient counseling.



	Type 1	Type 2	Type 3	Type 4	Type 5	P-value
Placode Exposure /length of lesion	None/minimal	>1/2	<1/2	<1/2	>1/2	
Nerve roots Stretching	Severe	Moderate	Mild	None	None	
N= 57	8 (14%)	22 (39%)	9 (16%)	8 (14%)	10 (18%)	
Right ventricle (mm)	9.3 ± 2.6	12.8 ± 3.9*	11.3 ± 4.7	8 ± 2*	10.2 ± 2	0.01
Left ventricle (mm)	6.5 ± 2.5*	13.7 ± 3.5*,**	11.8 ± 6.1	9.5 ± 2.8**	10.2 ± 2	0.01
Need for skin patch closure	2 (25%)	2 (8%)	1 (11%)	3 (38%)	10 (100%)	0.001
Preterm premature rupture of membranes	5/6 (83%)	5/20 (23%)	2/6 (33%)	0/7 (0%)	2/8 (25%)	0.02
Gestational age at delivery (weeks)	31.8 ± 2.3	35.9 ± 1.8	35.8 ± 2.7	33 ± 4	34.3 ± 1.7	0.004

Data presented as n(%), mean ± SD, *,**- differences in post-hoc analysis

806 Validation of the fetal lamb model of complex gastroschisis

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OBJECTIVE: Despite perceived favorable outcomes, complex Gastroschisis (cGS) has a significant morbidity such as sepsis, necrotizing enterocolitis, short bowel syndrome and bowel obstruction. A realistic animal model is lacking to enable further investigation of the pathogenesis of bowel dysfunction and development of novel prenatal therapies. We aimed to develop and validate a fetal lamb model of cGS.

STUDY DESIGN: In fetal lambs at 75 days' gestation, a 1cm abdominal incision was made, a 1cm diameter rigid silicone constrictive ring was fixed to the abdominal wall and the small bowel was exteriorized through the standardized defect. At term (145d), lambs were delivered and compared to normal control lambs. Outcomes were small bowel gross examination, *in vivo* motility (primary) and structure on MRI, *ex vivo* contractility and permeability, and histological analysis.

RESULTS: 5 of the 11 (45%) fetal lambs who underwent cGS induction survived to term. Compared to normal lambs (n=6), all lambs displayed a macroscopic phenotype of cGS (n=5): the small bowel and most of the large bowel were eviscerated, distended, thick and inflamed; there was small bowel obstruction with stenosis, atresia, necrosis and/or perforation (Fig.1A). On MRI, cGS lambs showed significantly decreased small bowel motility (motility GI-Quant score) and increased proximal bowel obstruction (motility contrast score), intra-abdominal bowel dilation and wall thickness (Fig.1B). They also had a reduced bowel contractility with significant decrease in smooth muscle contractions (Fig.1C). There were trend toward increased bowel permeability and increased integrity (Fig.1D). Histological analysis confirmed the abnormal architecture including thickening of all layers especially of proximal jejunum smooth muscle, serosal vascular proliferation, inflammatory cellular infiltrates in the serosa and submucosa, and shorter mucosal villi and crypts (Fig.1E-G).

CONCLUSION: The fetal lamb model of cGS accurately replicates at term the structural and functional phenotype observed in human neonates with complex GS.

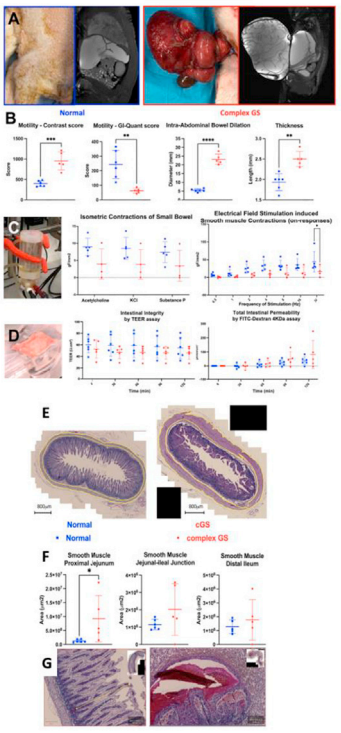

Figure 1 - Bowel structure and function in complex GS lambs (red, n=5) at term, compared to normal controls (blue, n=6).
(A) Gross examination: no eviscerated intestines in the control animals with representative MRI at term with normal large fluid filled stomach and smaller diameter intestines (blue). Thick matted intestines with evidence of bowel obstruction, atresia, necrosis and perforation consistent with complex GS and dilated bowel on term MRI.
(B) MRI examination: complex GS lambs have a significant increase in proximal bowel motility (contrast score 954 vs. 395, p<0.001), decrease in small bowel motility (GI-Quant score 63 vs. 243, p<0.01) and increase in intraabdominal bowel dilation (IABD; 23.3. vs. 5.4mm, p<0.001) and wall thickness (2.5 vs. 1.9mm, p<0.01).
(C) Ex vivo contractility assay: complex GS lambs have reduced smooth muscle contractions at a maximum intensity of 32 Hz (16.5±15.1 vs. 44.4±28.0 gF/mm², p=0.038) and trend toward lower isometric contractions.
(D) Ex vivo permeability assay: complex GS lambs demonstrate a trend toward decreased TransEpithelial Electrical Resistance (TEER) and increased total permeability of 4KDa Fluorescein IsoThioCyanate (FITC) Dextran.
(E-G) Histology: **(E)** All cGS lambs have an abnormal bowel architecture with loss of the normal crypt and villi architecture and **(F)** thickened smooth muscle especially in the proximal jejunum (9.26±8.30 vs. 1.27±0.54 x10⁶ um², p=0.041) compared to normal controls (blue, n=6). **(G)** all lambs display complex GS with stenosis, atresia, necrosis or perforation (right) compared to controls (left). The jejunal-ileal junction, proximal jejunum, and distal ileum exhibit abnormal architecture with serosal vascular proliferation, inflammatory cellular infiltrates.

807 Utility of reticulocyte hemoglobin equivalent in screening for iron deficiency in pregnancy

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OBJECTIVE: Reticulocyte hemoglobin equivalent (Ret-He) is the measure of functional iron available in hemoglobin of reticulocytes and may be an early indicator of iron deficiency (ID) prior to other red blood cell parameters. It has gained popularity in screening for ID in non-pregnant populations due to its convenience of testing, rapidity of results and cost-effectiveness. Unlike ferritin, Ret-He is not an acute phase reactant and not affected by inflammation. The objective of this study was to determine the accuracy of Ret-He in detecting ID in pregnancy compared to ferritin.

STUDY DESIGN: This was a prospective cohort study which included 200 pregnant patients. Participants were recruited in any trimester if a complete blood count (CBC) was drawn as part of routine prenatal care. For those who agreed to participate, Ret-He and ferritin were collected simultaneously with the CBC. Exclusion criteria included age < 18 , multifetal gestations, thalassemia or sickle cell disease and chronic kidney or liver disease. Ferritin level below 30 ng/mL was considered the gold standard for diagnosing ID. Spearman correlation was conducted to test the association between Ret-He and ferritin. Sensitivity and specificity were calculated for different Ret-He cutoff points. Receiver Operating Curve (ROC) analysis with area under the curve (AUC) was performed to assess the value of Ret-He in identifying ID.

RESULTS: Of 200 pregnant women recruited, 52, 72 and 76 were enrolled in the first, second and third trimesters, respectively. There was a weak but statistically significant correlation between ferritin and Ret-He (r_s=0.48, p< .0001). A Ret-He cutoff of 30.3, the lower threshold used by our laboratory for non-pregnant individuals, had a sensitivity of 30% and specificity of 90%. Alternatively, a Ret-He cutoff point of 34.0 had a sensitivity of 72% and specificity of 54%. The AUC for Ret-He was 0.65, predicting poor discrimination between patients with and without ID.

CONCLUSION: Ret-He is a poor predictor of ID in pregnancy. If it is used, a higher cutoff value may be more appropriate for diagnosing ID.

Table 1 – Reticulocyte hemoglobin equivalent cutoffs and their respective sensitivity and specificity

Cutoff point	Sensitivity	Specificity
30.3	0.298	0.897
31.9	0.441	0.769
32.9	0.522	0.641
33.5	0.652	0.590
34.0	0.721	0.539
35.0	0.795	0.282

808 Timing of aspirin discontinuation prior to delivery and risk of peripartum bleeding complications

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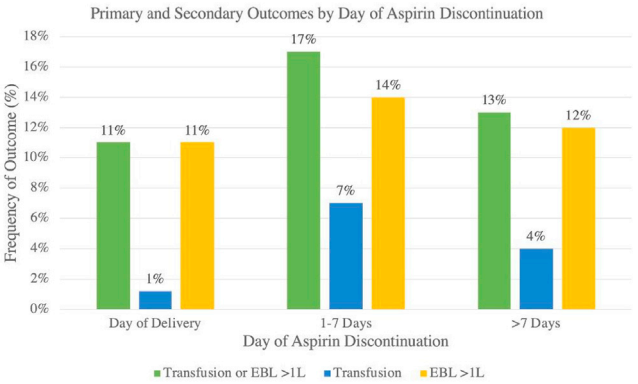
OBJECTIVE: There are limited data to guide timing of aspirin discontinuation prior to delivery. We assessed whether there was an association between timing of aspirin discontinuation and maternal and peripartum bleeding complications.

STUDY DESIGN: This was a secondary analysis of a large multicenter RCT of prophylactic tranexamic acid versus placebo in patients undergoing cesarean delivery. Participants taking daily oral aspirin during pregnancy whose discontinuation date was known were included. Participants were grouped by days of aspirin discontinuation in relation to their delivery date: on the day of delivery, 1-7 days prior to delivery, or >7 days prior to delivery. The primary outcome was a composite of transfusion of packed red blood cells or EBL >1L. Secondary outcomes were individual components of the primary outcome. Outcomes were compared across discontinuation timing groups. Adjusted ORs (95% CIs) were calculated using backwards elimination logistic regression (using characteristics associated with primary outcome) with >7 days prior to delivery as the reference group.

RESULTS: Of 10,993 patients in the parent trial, 1614 (15%) were on aspirin and 1571 with a known discontinuation date were included: 164 (10%) discontinued aspirin on day of delivery, 1064 (68%) from 1-7 days, and 343 (22%) >7 days prior to delivery. The primary outcome was observed in 244 (16%) of patients. After adjustments for differences in baseline characteristics (footnote), there were no significant differences in adjusted odds of outcomes by timing of aspirin discontinuation (Figure).

CONCLUSION: The timing of discontinuation (in days) of aspirin prior to cesarean delivery was not associated with postpartum hemorrhage or blood transfusion.



	Day of Delivery (n=164)	1-7 Days (n=1064)	>7 Days (n=343)
Transfusion or EBL >1L	0.92 (0.51, 1.66)	1.16 (0.81, 1.67)	Referent
Transfusion	0.34 (0.07, 1.57)	1.61 (0.86, 3.03)	Referent
EBL >1L	1.09 (0.59, 1.99)	1.10 (0.75, 1.62)	Referent

Odd ratios with 95% confidence intervals with adjustment for maternal age, body mass index, twin pregnancy, preoperative hemoglobin level, thrombocytopenia, cesarean for labor arrest, duration of oxytocin, reached second stage of labor, suspected accreta, and tranexamic acid study medication.

809 Vaginal misoprostol versus vaginal dinoprostone for labor induction: Individual participant data meta-analysis of randomized trials

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OBJECTIVE: To compare the effectiveness and maternal and perinatal safety with vaginal misoprostol versus vaginal dinoprostone for induction of labor (IOL).

STUDY DESIGN: In this individual participant data meta-analysis, we identified randomised controlled trials comparing vaginal misoprostol to vaginal dinoprostone for IOL in women with a live singleton gestation. Ovid MEDLINE, Ovid Embase, Ovid Emcare, CINAHL Plus, Scopus, Cochrane Library of registered trials, WHO ICTRP and clinicaltrials.gov were searched from inception to March 2023. We approached the authors of each study to share individual-level data. Primary outcomes were vaginal birth and composites for adverse perinatal and maternal outcomes. For the main analysis, data were analysed by the intention-to-treat principle. The primary meta-analysis used two-stage random-effects models, and the sensitivity analysis used one-stage mixed models. This meta-analysis is registered with PROSPERO (CRD42022321378).

RESULTS: Ten out of 52 eligible trials provided individual participant data, of which two were excluded after concerns about data integrity. The eight trials (4,180 participants) compared low-dose vaginal misoprostol (n= 2,077) and dinoprostone (n=2,103) (Table 1). Compared to vaginal dinoprostone, low-dose vaginal misoprostol had a comparable rate of vaginal birth (77.4% vs 77.6 %, adjusted odds ratio (aOR) 0.95, 95% CI 0.80 to 1.13, p=0.51, I^2=0%) and comparable composite adverse perinatal outcomes (11.8% vs 11.8%, aOR 0.96, 95% CI 0.74 to 1.25, p=0.74, I^2=36%). Composite adverse maternal outcomes were significantly lower with low-dose vaginal misoprostol (10.4% vs 8.96%, aOR 0.80, 95% CI 0.65:0.98, p=0.04, I^2=0.0%). Sensitivity analysis for the primary outcomes revealed similar findings.

CONCLUSION: Low-dose vaginal misoprostol and vaginal dinoprostone for IOL are comparable in terms of effectiveness and perinatal safety. However, low-dose vaginal misoprostol is likely to lead to a lower rate of composite adverse maternal outcomes than vaginal dinoprostone.

Table 1. Vaginal misoprostol compared to vaginal dinoprostone

Outcome	No. of trials	No. of women	Crude incidence (%) - Vaginal misoprostol versus vaginal dinoprostone¶	aOR (95% CI)	I^2 (95% CI)	Analysis method*	Certainty of the evidence (GRADE)
Primary outcomes							
Vaginal delivery	8	4,164	77.6 vs 77.4	0.95 (0.80;1.13)	0.0 (0;68)	two-stage	⊕⊕⊕⊕ High
Composite adverse perinatal outcome	8	4,180	11.8 vs 11.8	0.96 (0.74;1.25)	36 (0;72)	two-stage	⊕⊕⊕⊖† Moderate
Composite adverse maternal outcome	6	3,681	9.0 vs 10.4	0.80(0.65;0.98)	0 (0;75)	two-stage	⊕⊕⊖⊖ Low#,†
Secondary outcomes							
1. Delivery outcomes							
Cesarean delivery	8	4,164	22.4 vs 22.6	1.05 (0.88;1.25)	0 (0;68)	two-stage	⊕⊕⊕⊕ High
Cesarean delivery for failure to progress	7	3,524	9.1 vs 7.8	0.83 (0.48;1.44)	54 (0;80)	two-stage	⊕⊕⊕⊖† Moderate
Cesarean delivery for fetal distress	8	4,165	13.6 vs 10.4	1.32 (0.84;2.06)	63 (21;83)	two-stage	⊕⊕⊕⊖† Moderate
Unassisted vaginal birth	8	4,164	60.8 vs 60.2	1.03 (0.83;1.27)	26 (0;66)	two-stage	⊕⊕⊕⊕ High
Instrumental vaginal birth	8	4,164	16.8 vs 17.2	0.90 (0.72;1.12)	12 (0.0;72)	two-stage	⊕⊕⊕⊕ High
Instrumental vaginal birth for failure to progress in the second stage	5	2,821	8.6 vs 8.9	0.94 (0.58;1.52)	38 (0;77)	two-stage	⊕⊕⊖⊖†‡ Low
Instrumental vaginal birth for fetal distress	5	2,821	9.5 vs 11.2	0.85 (0.69;1.05)	0 (0;79)	two-stage	⊕⊕⊖⊖†‡ Low
Time to vaginal birth	8	4,097	16.2 vs 18.7¶	sHR 1.24 (0.84;1.83)	76 (51; 88)	two-stage	⊕⊕⊕⊖† Moderate
2. Labor progression outcomes							
Uterine tachysystole	5	3,005	11.4 vs 10.1	1.48 (0.48;4.56)	78 (49;91)	two-stage	⊕⊕⊖⊖†‡ Low
Uterine hyperstimulation	7	4,017	4.3 vs 4.0	1.00 (0.73;1.37)	-	one-stage	⊕⊕⊕⊖ Moderate#
Oxytocin augmentation	8	4,127	50.1 vs 54.1	0.69 (0.41;1.16)	84 (70;91)	two-stage	⊕⊕⊕⊖ Moderate#
Meconium-stained amniotic fluid	7	3,770	13.4 vs 11.2	1.25 (0.90;1.74)	26 (0;68)	two-stage	⊕⊕⊕⊖ Moderate#
3. Maternal safety outcomes							
Maternal infection	4	2,773	4.8 vs 5.7	0.79 (0.46;1.36)	0 (0;85)	two-stage	⊕⊕⊕⊖ Moderate‡
Severe postpartum hemorrhage	6	3,681	5.4 vs 5.6	0.94 (0.70;1.27)	0 (0;75)	two-stage	⊕⊕⊕⊖ Moderate‡
Maternal ICU admission	4	2,615	0.3 vs 0.6	0.54 (0.18;1.63)	-	one-stage	⊕⊕⊖⊖ Low#,†
4. Neonatal safety outcomes							
Apgar score < 7 at 5 mins	8	4,125	1.9 vs 1.7	1.06 (0.67;1.69)	-	one-stage	⊕⊕⊕⊕ High
Arterial umbilical cord pH < 7.10	8	3,350	5.6 vs 5.8	1.10 (0.86;1.39)	0 (0;68)	two-stage	⊕⊕⊕⊖ Moderate‡
NICU admission	7	3,988	7.1 vs 7.9	0.91 (0.58;1.43)	42 (0;76)	two-stage	⊕⊕⊕⊖ Moderate‡

aOR: adjusted odds ratio; 95% CI: 95% Confidence interval; sHR: sub-distribution hazard ratio; ICU: intensive care unit; NICU: neonatal intensive care unit.
*Two-stage as primary strategy, one-stage used when zero events are encountered in any arm of any included study. All analyses adjusted for maternal age and parity. ¶Time to vaginal birth in each group has been mentioned as the median hours.
Downgraded one level for imprecision
† Downgraded one level for inconsistency
‡ Downgraded one level for concerns on data completeness

810 Performance of four methods for urine-protein estimation compared to the standard 24-hours for proteinuria diagnosis

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OBJECTIVE: To assess the accuracy of a 6-h, 12-h urine collection, and protein/creatinine ratio (PCR) to diagnose proteinuria in women with gestational hypertension, and to determine if diurnal vs nocturnal collection affects the performance of the test.

STUDY DESIGN: A prospective observational study conducted at a University Teaching institution in Israel, between May 2013 and July 2023. Pregnant women >20 weeks hospitalized for preeclampsia workup were eligible. Three consecutive urine samples were collected for each woman; 06:00-12:00 h, 06:00-18:00 h, and 18:00-06:00 h. Protein levels were measured in each sample, as well as in a 24-h pooled sample. The diagnostic cut-off values for proteinuria were ≥75mg (6-h samples), ≥150 mg (12-h samples) and ≥300 mg (24-h sample). Moreover, PCR was also measured at the first urine sample and a ratio of ≥300 was diagnostic. The validity of each sample as opposed to 24-h sample, was evaluated by determination of sensitivity, specificity, positive predictive value, negative predictive value, and accuracy.

RESULTS: Overall, 258 women were included, and proteinuria was confirmed in 80 (31%) according to 24-h sample. The reliability and validity of the 6-h, diurnal and nocturnal 12-h and PCR versus the 24-h sample for a diagnosis of proteinuria are shown in Table 1. Cohen's kappa indicated a moderate agreement for the 6-h and the PCR diagnostic tests while a substantial agreement in both 12-h samples was observed. Paired sample AUC test revealed no statistically significant difference in AUC between 12-h diurnal and nocturnal results. ROC curve analysis did not show improved in sensitivity and specificity of any of the diagnostic tests when the analysis was stratified according to maternal weight, gestational age, number of fetuses, parity, or the existence of severe features.

CONCLUSION: The 12-h test showed adequate accuracy for detecting proteinuria, regardless of the time of collection. The 12-h test perform better than the 6-h and PCR tests.

Table 1. Comparison of the Diagnostic tests

	Proteinuria, mg	Positive Proteinuria*	Cohen κ	P value	Sensitivity (95% CI), %	Specificity (95% CI), %	PPV (95% CI), %	NPV (95% CI), %	Accuracy (95% CI), %
Diurnal 6 hours (n=257)	59.4±70.3 (4.32-5060.1)	93 (36.2)	.609	<.001	80.0 (69.6-88.1)	83.6 (77.3-88.7)	68.8 (60.8-75.8)	90.2 (85.6-93.5)	82.5 (77.3-86.9)
24 hours (n=257)	205.2±235.0 (15.4-7727.4)	80 (31.1)	Moderate						
Diurnal 12 hours (n=256)	112.7±125.4 (6.56-5347.6)	88 (34.4)	.760	<.001	88.6 (79.5-94.7)	89.8 (84.0-93.9)	79.6 (71.4-85.8)	94.6 (90.5-97.0)	89.4 (85.0-92.9)
24 hours (n=256)	204.0±234.5 (15.4-7727.4)	79 (30.9)	substantial						
Nocturnal 12 hours (n=251)	95.0±95.3 (3.82-5260.7)	71 (28.3)	.770	<.001	80.5 (69.9-88.7)	94.8 (90.4-97.6)	87.3 (78.3-92.9)	91.7 (87.5-94.6)	90.4 (86.1-93.8)
24 hours (n=251)	205.2±233.7 (15.4-7727.4)	77 (30.7)	substantial						
Protein/creatinine/ ratio (n=239) 24 hours (n=239)	182.9±192.9 (9.9-8864.2)	64 (26.8) 75 (31.4)	.605	<.001	63.3 (51.7-77.1)	91.5 (86.1-95.2)	78.1 (67.8-85.8)	83.8 (79.4-87.4)	82.3 (76.9-86.9)

CI, confidence interval; NPV, negative predictive value; PPV, positive predictive value.
Values are given as mean±SD (range) or number (%), unless indicated otherwise.
Proteinuria is defined as a protein level of ≥75 mg/6 h, ≥150 mg/12 h, ≥300 mg/24 h, and protein/creatinine ratio ≥300.

811 Does risk of postpartum hemorrhage increase in twin pregnancies with birthweights greater than 4000g?

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OBJECTIVE: Twin pregnancy carries a unique increased risk of postpartum hemorrhage (PPH) when compared to singleton gestations. Increased fetal weight in twin pregnancy may exacerbate uterine distension and result in increased risk of PPH secondary to uterine atony. In singletons, macrosomia is defined as a birthweight of 4000 grams (g) and is associated with risk of PPH. While prior studies have concluded PPH increases linearly with increasing birthweight in

twins, our aim was to examine whether patients with a sum birthweight >4000g were at increased odds of PPH when compared to those with a sum birthweight < 4000g.

STUDY DESIGN: Retrospective review of patients who delivered dichorionic-diamniotic twins at a single academic institution from 2013-2021. The primary outcome was PPH, defined as quantitative blood loss ≥ 1000mL in either vaginal or cesarean delivery. Secondary outcomes included PPH due to atony and use of uterotonic medications. Outcomes were assessed using univariable and multivariable logistic regression.

RESULTS: Among 431 twin gestations, 94 (21.8%) had a sum of birthweights ≤ 4000g and 337 (78.2%) had a sum of birthweights > 4000g. PPH occurred in 24.8% of individuals overall. There was no significant difference in odds of PPH in the ≤4000g group compared to the >4000g group (20.2% vs. 26.1%, p=0.24). There also was no significant difference in PPH due to atony or use of uterotonics between the two groups. After adjusting for age, insurance type, BMI, IVF, multiparity, history of cesarean delivery or uterine surgery, fibroids, and placenta accreta spectrum, there was insufficient evidence to conclude an association between PPH and the allotted birthweight categories (p=0.11).

CONCLUSION: In this retrospective study, risk of PPH does not appear to increase in patients with combined birthweights of greater than 4000g when compared to those ≤ 4000g.

Table Outcomes based on sum of birthweight cutoff

Outcomes	ALL (n=431)	Sum of birthweights ≤4000grams (n=94)	Sum of birthweights >4000grams (n=337)	p-value†
GA at delivery—median (range)	36.3 (23.6, 40.2)	32.2 (23.6, 36.4)	37.0 (33.2, 40.2)	<.0001
Preterm delivery (Weeks) – no. (%)				
<37	259 (60.1)	94 (100.0)	165 (49.0)	<.0001
<34	85 (19.7)	71 (75.5)	14 (4.2)	<.0001
<32	43 (10.0)	42 (44.7)	1 (0.3)	<.0001
<28	12 (2.8)	11 (11.7)	1 (0.3)	<.0001
Preterm Delivery Reason—no. (%)				0.30
Medically-indicated/iatrogenic	103/254 (40.6)	42/94 (44.7)	61/160 (38.1)	
Spontaneous	151/254 (59.4)	52/94 (55.3)	99/160 (61.9)	
Gestational Diabetes—no. (%)	37 (8.6)	12 (12.9)	25 (7.4)	0.10
Hypertensive Disorders of Pregnancy (either GHTN or PEC) –no. (%)	131 (31.0)	38 (40.9)	93 (28.2)	0.02
Mode of delivery –no. (%)				0.003
Cesarean for both	319 (74.0)	82 (87.2)	237 (70.3)	
Vaginal for both	106 (24.6)	12 (12.8)	94 (27.9)	
Cesarean and vaginal	6 (1.4)	0 (0)	6 (1.8)	
*Scheduled cesarean section? –no. (%)**	139/323 (43.0)	10/82 (12.2)	129/241 (53.5)	<.0001
Did patient labor?	209 (48.7)	40 (42.6)	169 (50.4)	0.18
Post-partum hemorrhage >1000 cc at delivery —no. (%)	107 (24.8)	19 (20.2)	88 (26.1)	0.24
Among individuals who reported to have PPH (n=107)				
Etiology of PPH—no. (%)				
Atony	93 (86.9)	18 (94.7)	75 (85.2)	0.46
Vaginal/Perineal laceration	5 (4.7)	0 (0)	5 (5.7)	0.58
Cervical laceration	0 (0)	0 (0)	0 (0)	--
Uterine artery laceration	3 (2.8)	0 (0)	3 (3.4)	>0.99
Hysterotomy extension	6 (5.6)	0 (0)	6 (6.8)	0.59
Retained POCs (either this or variable retained POCs)	5 (4.7)	1 (5.3)	4 (4.6)	>0.99
Other	9 (8.4)	1 (5.3)	8 (9.1)	>0.99
Bakri –no. (%)	1 (1.0)	0 (0)	1 (1.2)	>0.99
Use of uterotonics –no. (%)	51 (48.6)	10 (55.6)	41 (47.1)	0.51
Pitocin	37/51 (72.6)	9/10 (90.0)	28/41 (68.3)	0.25
Methergine	29/51 (56.9)	5/10 (50.0)	24/41 (58.5)	0.72
Hemabate	19/51 (37.3)	5/10 (50.0)	14/41 (34.2)	0.47
Misoprostol	20/51 (39.2)	3/10 (30.0)	17/41 (41.5)	0.72
TXA –no. (%)	1/51 (1.96)	0/10 (0)	1/41 (2.4)	>0.99
B-Lynch suture –no. (%)	1/51 (1.96)	0/10 (0)	1/41 (2.4)	>0.99
O'Leary –no. (%)	1/51 (1.96)	1/10 (10.0)	0/41	0.20
Uterine rupture –no. (%)	0 (0)	0 (0)	0 (0)	--
Placenta Accreta –no. (%)	8 (1.9)	2 (2.1)	6 (1.8)	0.69
Need for D&C –no. (%)	5 (1.2)	2 (2.1%)	3 (0.9)	0.30
Hysterectomy –no. (%)	7 (1.6)	1 (1.1)	6 (1.8)	>0.99
Shoulder dystocia –no. (%)	0 (0)	0 (0)	0 (0)	--
Cord prolapse –no. (%)	4 (0.9)	0 (0)	4 (1.2)	0.58
ICU admission of mother –no. (%)	9 (2.1)	3 (3.2)	6 (1.8)	0.42
Maternal death–no. (%)	0 (0)	0 (0)	0 (0)	--
NICU Admission (at least one twin) – no. (%)	187 (43.4)	89 (94.7)	98 (29.1)	<.0001
APGARS < 5 both twins –no. (%)	1 (0.2)	1 (1.1)	0 (0)	0.22
APGARS < 5 one twin –no. (%)	7 (1.6)	4 (4.3)	3 (0.9)	0.04
Neonatal mortality at least one twin –no. (%)	3 (0.7)	2 (2.1)	1 (0.3)	0.12

† Chi-square test for association and Fishers Exact Test was used for categorical variables. Two sample t-test and Mann-Whitney U test was used for continuous variables

* Scheduled Cesarean section is among individuals who reported to have had at least one twin via cesarean delivery

812 Impact of an increase from class II to III BMI on pregnancy outcomes

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OBJECTIVE: Current ACOG guidelines regarding management of patients with obesity are based on pre-gravid body mass index (BMI). It is unclear if and how management recommendations should change when BMI class increases during pregnancy.

STUDY DESIGN: This is a retrospective cohort study from 2009—2022 of patients with singleton gestations and BMI ≥35kg/m^2. We included those who maintained or increased (≥3 BMI points) BMI class during pregnancy and excluded those that decreased BMI class. The primary outcome was a composite of growth abnormalities (FGR/LGA), cesarean delivery, oligohydramnios, polyhydramnios, and stillbirth. A superiority analysis was performed for the composite outcome between patients who increased BMI class IIàIII and class II using a repeated measures logistic regression model adjusting for a history of the primary outcome, race/ethnicity, marital status, insurance, nulliparity, chronic hypertension and pregestational diabetes. The adjusted odds ratio was reported with the respective 95% confidence interval and p-value. An equivalence test was performed for the composite outcome between patients who increased BMI class IIàIII and class III using two one-sided tests from a repeated measures model with an equivalence margin of 4%, and adjusting for same characteristics as in the superiority analysis. The adjusted 90% confidence interval and the higher p-value of the two one-sided tests were reported. A p-value < 0.05 was considered significant.

RESULTS: 9,117 pregnancies were included: 2,481 (class II), 4,154 (class III), 2,482 (class IIàIII). Patients who increased from BMI class IIàIII had more adverse outcomes than those who maintained class II BMI (aOR 1.60, CI 1.36-1.89) and were similar to those with class III BMI (adjusted 90% CI -0.013-0.022, adjusted equivalence p-value < 0.01).

CONCLUSION: For patients that increase BMI class from IIàIII, it is reasonable to manage their pregnancies (with regards to antenatal surveillance and delivery timing) according to ACOG and institutional guidelines for patients with pre-gravid BMI class III.

Table 1: Composite adverse outcomes

	Class II > III (N=2482)	Class II (N=2481)	Adjusted OR (95% CI)	Adjusted p-value[1]	Class III (N=4154)	Equivalence Margin	Adjusted 90% CI[2] Class II-III v. Class III	Adjusted Equivalence p-value[2]
Composite adverse outcomes	502 (20.2)	328 (13.2)	1.62 (1.37-1.91)	<0.01	820 (19.7)	+/- 4%	(-0.013-0.022)	<0.01

Results reported as n (%) unless otherwise specified. OR: Odds ratio, CI: Confidence Interval

Composite adverse outcome: fetal growth restriction, large for gestational age, cesarean delivery, oligohydramnios, polyhydramnios, and stillbirth.

[1]Repeated measures, logistic regression model adjusted for history of the primary outcome, race/ethnicity, marital status, insurance, nulliparity, chronic hypertension and pregestational diabetes

[2]Two one-sided tests were performed for equivalence using a repeated measures analysis and adjusting for the above characteristics. 90% confidence interval and the higher of the two p-values are reported. Repeated measures analysis was utilized.

813 Trends in Hypertensive Disorders in the United States Post Aspirin Recommendation Guidelines: A Nationwide Study

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OBJECTIVE: To determine if there were changes in the rates of hypertensive disorders of pregnancy (HDP) in the United States after the publication of aspirin recommendation guidelines by the United States Preventive Services Task Force (USPSTF) and the American College of Obstetricians and Gynecologists (ACOG).

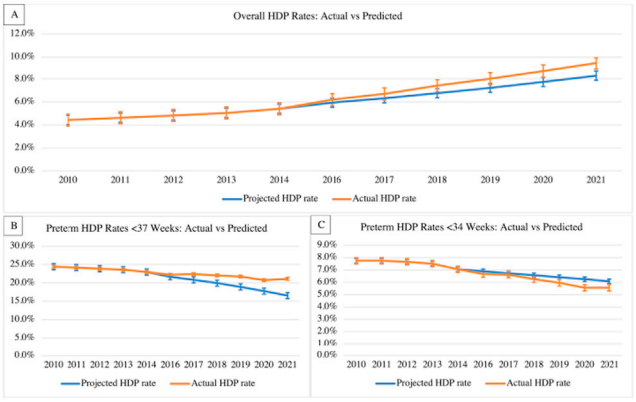
STUDY DESIGN: A population-based retrospective cohort study was performed using the US Natality database. The pre-aspirin recommendation guidelines (pre-ASA) group were births from 2010-2014. The post-aspirin recommendation guidelines (post-ASA) group - including both the USPSTF and ACOG guidelines - were births from 2016-2021. Births that occurred in 2015 were excluded. Outcomes were rates of HDP. Univariable and multivariable analyses were

performed. A logistic regression was used to project the HDP rate over time based on the pre-ASA group rate and was compared, per year, using Wald confidence intervals.

RESULTS: There were 12,127,659 births in the pre-ASA group and 17,665,217 births in the post-ASA group. After adjusting for baseline clinical differences, the post-ASA group had a higher rate of overall HDP than the pre-ASA group (7.7% vs 4.9%; aOR 1.58 [1.57-1.59]). However, the post-ASA group had a lower rate of preterm birth complicated with HDP prior to 37 weeks (21.6% vs 23.7%; aOR 0.90 [0.89-0.91]) and prior to 34 weeks (6.0% vs 7.5%; aOR 0.79 [0.78-0.81]) than the pre-ASA group. The observed HDP rate post-ASA implementation was higher than projected for overall HDP and preterm birth with HDP < 37 weeks, but not different for the preterm birth with HDP < 34 weeks. Both preterm periods showed a downtrending pattern.

CONCLUSION: While HDP remains on the rise overall, the rates are downtrending among preterm births. This observed trend, however, remains either higher or no different compared to the projected trend post-ASA implementation guidelines. While aspirin may provide some efficacy for HDP prophylaxis, it is worthwhile to continue focusing on public health efforts to address known modifiable risk factors for preeclampsia such as obesity, chronic hypertension, and diabetes.

Figure 1. Trends in Hypertensive disorders in the pre-ASA and post-ASA groups



814 Impact of quality improvement efforts at a population level: evidence from cesarean birth trends

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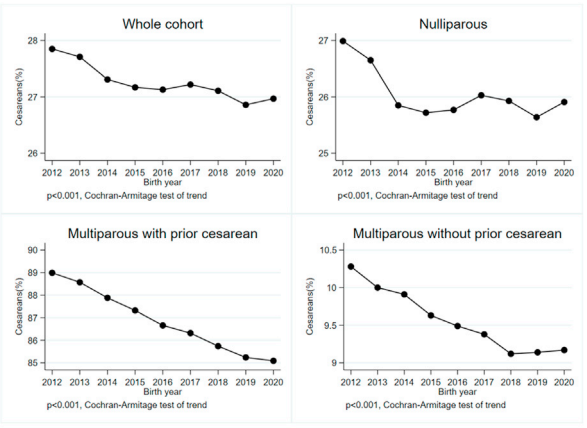
OBJECTIVE: In response to rising cesarean birth rates, the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine published guidance for prevention of the primary cesarean in 2014. Our objective was to evaluate trends in cesarean birth rates in the United States from 2012-2020.

STUDY DESIGN: Retrospective observational study of delivery data from National Vital Statistics System. Inclusion criteria were singleton, non-anomalous, term (37w0d-42w0d) gestation, vertex deliveries. We examined trends in rates of cesarean birth from 2012-2020 in nulliparas, multiparas without prior cesarean, and multiparas with prior cesarean utilizing Cochrane-Armitage test of trend. Risk ratios (95% Confidence interval) comparing cesarean rates for 2020 with 2012 were estimated.

RESULTS: In total, 27,221,575 cesarean births were included. Overall, the rate of cesarean birth decreased from 27.8% (95% confidence interval 27.7%, 27.9%) in 2012 to 26.9% (95% confidence interval 26.9%, 27.0%) in 2020 with a risk ratio (RR) of 0.97 (95% confidence interval 0.97, 0.98). Cesareans were decreased in nulliparous (26.9% (26.9%, 27.1%) in 2012 to 25.9% (25.8%, 25.9%) in 2020 with a RR of 0.96 (0.95, 0.96)), multiparous with prior cesarean (88.9% (88.8%, 89.1%) in 2012 to 85.1% (84.9%, 85.2%); RR (0.97 (0.97, 0.97)) and multiparous without prior cesarean (10.3% (10.2%, 10.3%) in 2012 to 9.16% (9.12%, 9.21%) in 2012; RR=0.97 (0.97, 0.97). Cesarean birth rates declined across subgroups stratified by parity: in nulliparas as well as multiparas both with and without prior cesarean (p< 0.001, Cochran Armitage test of trend) (Figure 1).

CONCLUSION: Quality improvement bundles aimed at safe prevention of primary cesarean birth may be associated with a reduction in overall cesarean birth including in multiparas with and without prior cesarean birth.

Figure 1. Trends in cesarean birth in the United States, 2012-2020



815 Treatment effect heterogeneity of antenatal steroids among late preterm births

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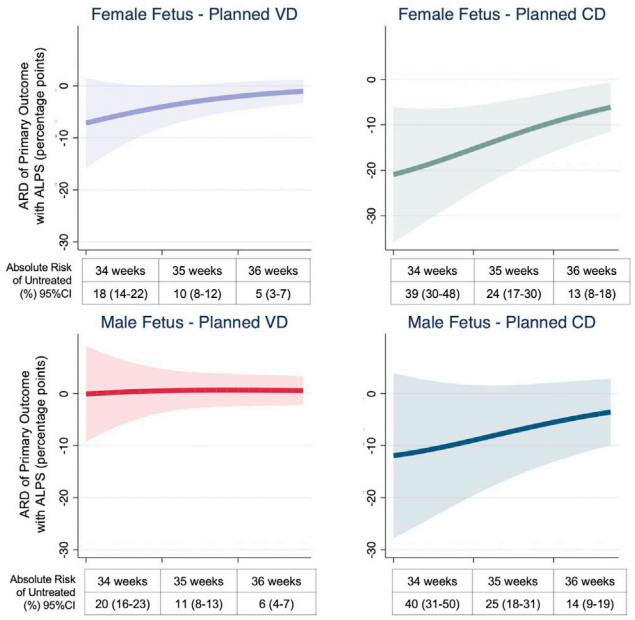
OBJECTIVE: To determine if there is treatment effect heterogeneity for late preterm steroids among factors previously reported to be associated with a neonate's risk of respiratory morbidity.

STUDY DESIGN: This is an exploratory secondary analysis of the Antenatal Late Preterm Steroid (ALPS) Trial. The primary outcome was the same composite of respiratory morbidity used in the trial. The primary exposure was antenatal steroid exposure vs. placebo. Treatment heterogeneity of antenatal steroids was assessed across 3 factors: gestational age at trial enrollment, fetal sex, planned cesarean delivery. A logistic regression model with interaction terms between the exposure and each factor was fit. Predicted probabilities of the primary outcome were compared across all potential possible combinations, and the absolute risk difference (ARD) between ALPS vs. placebo was plotted across days of gestation, stratified by sex and mode of delivery.

RESULTS: There were 2,825 participants included. The distribution of gestational age, fetal sex, and planned mode of delivery was not different between the groups. The Figure shows the ARD for respiratory morbidity over the late preterm period by fetal sex and planned mode of delivery. The absolute risk of the outcome in the untreated group is shown below the x-axis for each week of gestation. Patients with a planned cesarean delivery and presenting at 34+0 weeks had the highest baseline risk of respiratory morbidity (49.6% (95% CI 39.1, 59.9%)) and demonstrated the greatest ARD with ALPS. In comparison, the absolute risk for patients presenting at 36+5 weeks and having planned vaginal delivery was 5.9% (95% CI 4.1, 7.6%) with no observed ARD with steroid exposure, though the analysis was limited by small sample sizes.

CONCLUSION: These findings suggest there is treatment heterogeneity for ALPS depending on fetal sex, gestational age, and mode of delivery, with the largest benefit for patients with presenting at 34 weeks having a planned CD. Studies with larger sample sizes are needed to better inform shared decision-making around the practice of late preterm steroids.



ARD, absolute risk difference. CD, cesarean delivery. VD, vaginal delivery.
Note: The x-axis displays the gestational age at time of randomization into the ALPS trial.

816 Gut microbiome impacts iron deficiency and responsiveness to iron supplementation in a prospective, interventional trial

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OBJECTIVE: Oral iron absorption in the gut is regulated to optimize bioavailability & overcome iron losses. However, response to iron supplementation (IS) is unpredictable. We hypothesized that variation in the composition of the gut microbiome would vary between responders vs non-responders following IS.

STUDY DESIGN: People who menstruate without a known history of anemia or iron deficiency were included in our open label, prospective, interventional trial (n=26). Participants received 14 days of 65mg elemental iron. Blood (Days (D) 0 & 14) & stool (8 samples including D0 & D14) were collected for iron & anemia indices and microbiome analyses. Stool sample DNA underwent 16S amplicon sequencing and bioinformatic analysis of microbial ASVs (DADA2). To characterize the gut microbiome composition, taxonomic comparisons, & unsupervised clustering with Dirichlet multinomial mixtures (DMM) were performed. Participants who were iron deficient on D0 (n=17) were later subdivided into iron supplement responders (ferritin $\geq$ 30 ng/mL, n=4) and non-responders (ferritin $<$ 30 ng/mL, n=12), based on their D14 ferritin.

RESULTS: Three taxa were associated with D0 iron deficiency (ferritin $<$ 30 ug/L): *Bacteroides, Streptococcus* and *Tyzzerella* (p=0.021, 9.3e-05, 0.0024; Fig1A). Unlike *Streptococcus* and *Tyzzerella*, *Bacteroides* was inversely associated with baseline ferritin levels. In the D0 iron deficient group, IS response was associated with six keystone taxa: *Ruminococcus, Bacteroides, Gordonibacter, Lachnoclostridium, Lactobacillus*, and *Lactococcus* (p=0.013, 0.006, 0.008, 0.003, 0.004, 0.005; Fig1B). Increases in *Ruminococcus, Gordanibacter*, and *Lactobacillus* were associated with responders. *Bacteroides* remained more abundant in non-responders throughout the IS period.

CONCLUSION: Significant gut microbiome taxonomic differences were observed when comparing iron deficient and sufficient participants, and between IS therapy responders and non-responders. Thus, there is evidence for an impact of gut microbiome composition on iron deficiency and responsiveness to IS.

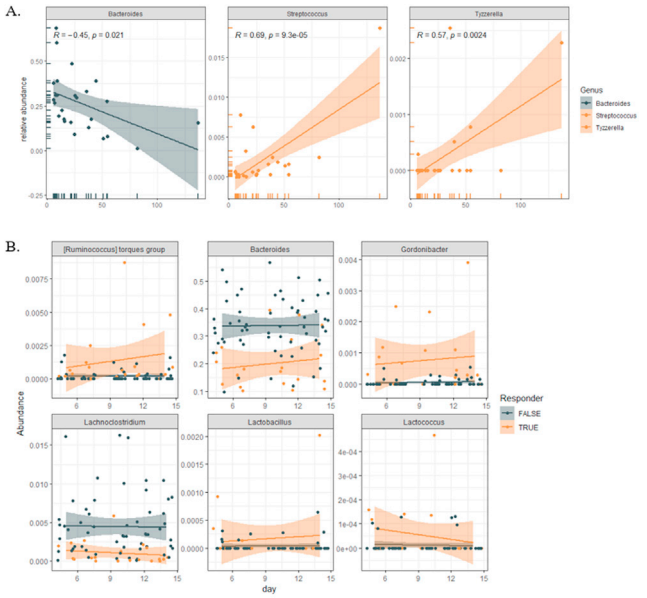

Figure 1. (A) Relative abundance scatterplots for keystone taxa associated with baseline iron deficiency where the x axis represents serum ferritin levels at Day 0, the y axis represents the relative abundance for each keystone and the color represents the associated with iron deficiency at Day 0. **(B)** Relative abundance scatterplots for keystone taxa associated with response to iron therapy post treatment where the x axis represents time in days, the y axis represents the relative abundance for each keystone and the color represents either non-responder (blue) or responder (gold) status for subjects that were originally iron deficient.

817 Trans-placental transport of a novel fluorescent lipid nanoparticle in a pre-clinical fetal therapy murine model

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OBJECTIVE: *In utero* therapies allow for prevention of irreversible fetal morbidity. While preferential transplacental delivery for fetal treatment is challenging, lipid nanoparticles (LNPs) offer an established safety profile, and lipoprotein-rich fetal blood provides a compatible environment. Since modifications in LNP composition allow for fetal tissue target specificity, we hypothesized that a specialized LNP delivery vehicle with near infrared (NIR) fluorescence detection would enable targeted fetal delivery which could be readily visualized *in vivo* after peripheral administration to a gravid mouse.

STUDY DESIGN: DiR, a NIR fluorescent dye, and other lipids dissolved in EtOH were rapidly mixed with buffer and sonicated to form DiR LNPs at 6 mM lipid concentration. 1.7 mg/uL DiR LNPs were injected into the tail veins of e14.5 gravid mice (n=2). Images were obtained at 4 timepoints before removing the maternal uterus, liver, kidneys, and viscera for imaging. The fetuses and placentae were subsequently imaged as well.

RESULTS: As anticipated, maternal *in vivo* images demonstrated strong fluorescent LNP signal in the liver at all timepoints (Fig1A). Initial faint LNP signal in the maternal uterus became concentrated in the distribution of the L uterine horn (Fig1B). Excitingly, the fluorescent LNP signal was observed in every placenta and fetus (Fig1C), and honed to the fetal liver. At high resolution, revealing there was preferential LNP signal in the fetal live over the other abdominal viscera (Fig1D).

CONCLUSION: These data show, for the first time, successful *in vivo* trans-placental LNP delivery to fetal mice via intravenous injection of a gravid mouse, with preferential uptake in the fetal liver. These findings are an exciting next step in the development of a novel, maternal peripherally delivered yet transplacental LNP delivery of cargo to the fetal liver for *in utero* fetal therapies.

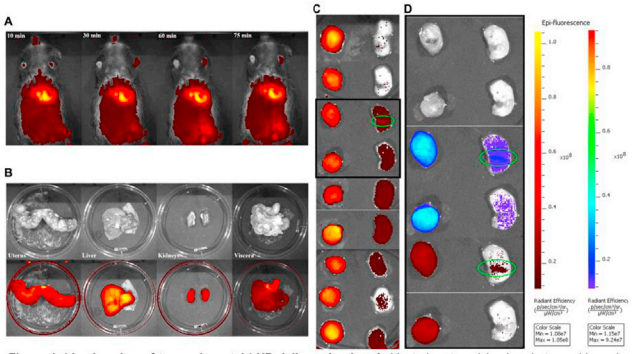

Figure 1. Live-imaging of trans-placental LNP delivery *in vivo*. A, Ventral maternal *in vivo* photographic and fluorescent overlay images at 4 timepoints (10, 30, 60, and 75 minutes) post-DiR LNP injection. **B,** Maternal uterus, liver, kidneys, and viscera 90 minutes post-DiR LNP injection. **C,** Photographic and fluorescent overlay of individual placenta and fetus pairs from Litter 1. **D,** High resolution photographic and fluorescent overlay images of placenta and fetus pairs 3 and 4 from Litter 1 to show detailed fluorescence distribution in the fetus. All images obtained with IVIS Lumina X5; 700/790 nm ex/em. C57Bl/6 mice used for all studies; Mice were euthanized by IACUC standards via cervical dislocation under inhaled isoflurane anesthesia.

818 MRI Markers of PAS in Individuals Without PAS

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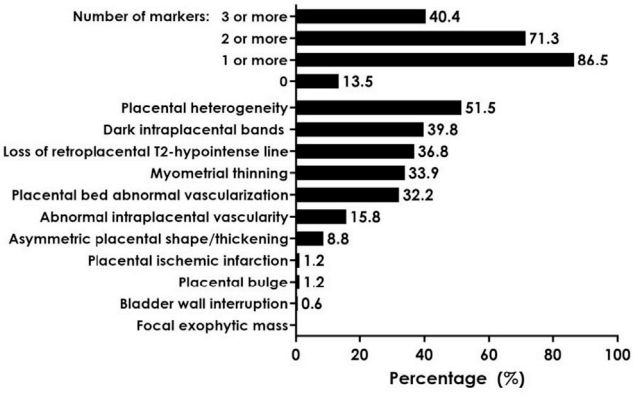
OBJECTIVE: The imaging diagnosis of placenta accreta spectrum (PAS) is challenging. Ultrasound markers of PAS are often seen in unaffected individuals but the prevalence of MRI markers in unaffected pregnancies is unknown. We evaluated the prevalence of MRI PAS markers in patients without PAS.

STUDY DESIGN: Retrospective analysis of MRIs performed at greater than 20 weeks gestation for non-PAS indications at a single institution from Jan 2019 to June 2022. Our institution obtains placental evaluation sequences for all MRIs obtained during pregnancy. Individuals with clinical or pathologic PAS or missing delivery data were excluded. Three experienced radiologists blinded to patient history, independently assessed for 11 markers of PAS as defined by the Society of Abdominal Radiology and the European Society of Urogenital Radiology guidelines. The prevalence of markers was compared between patients with and without a prior cesarean. Ten percent of cases were examined by all radiologists for consistency.

RESULTS: 171 MRIs performed at a median GA of 29 weeks (IQR 6.3 weeks) were included. 3.5% of fetuses were confirmed genetically abnormal and 66% had normal aneuploidy testing. At least one marker of PAS was seen in 86.5% of MRIs. The most prevalent markers were placental heterogeneity (51.5%), dark intraplacental bands on T2 weighted images (39.8%), loss of the retroplacental T2-hypointense line (36.8%), myometrial thinning (33.9%), and abnormal vascularization of the placental bed (32.2%). Three markers were uncommon: placental bulge (1.2%), placental ischemic infarction (1.2%), and focal exophytic mass (0%). Myometrial thinning was significantly more likely to be seen in those with a prior cesarean section than those without (55.2% vs 29.6%, p=0.008).

CONCLUSION: Similar to ultrasound, MRI markers of PAS are frequently seen in patients without PAS. Overreliance upon these markers in isolation is likely to lead to overdiagnosis of PAS.

Figure 1. Prevalence of MRI Markers of PAS in Individuals Without PAS



819 Trends and outcomes in deliveries affected by maternal fatty acid oxidation defects

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OBJECTIVE: Improved detection and management of fatty acid oxidation defects (FAOD) over time has led to increased survival to reproductive age. National data is needed on the prevalence and obstetric outcomes for this group of patients, given the potential increased risk of complications such as hypoglycemia or rhabdomyolysis related to the metabolic stress of labor and delivery.

STUDY DESIGN: Deliveries of patients with FAOD were identified using ICD-10CM codes from the 2016-2020 abstracts of the Nationwide Inpatient Sample. Trends in the rates of maternal FAOD delivery hospitalizations were assessed using Joinpoint regression with measured association expressed as annual average percent change (AAPC). Baseline patient demographics, obstetric outcomes, and health care resource utilization were compared using Chi-square or Wilcoxon rank sum where appropriate. Unadjusted logistic regression models were fit comparing risks of obstetric complications in patients with and without FAOD, expressed as odds ratios (OR) and 95% confidence intervals (CI).

RESULTS: 492 births affected by maternal FAOD were identified, with an increasing incidence over time from 20 to 45 cases per million birth hospitalizations (AAPC 24.8%, 95% CI: 11.6%, 42.7%). Deliveries with FAOD were associated with statistically significant higher mean length of stay (LOS) (3.6 versus 2.7 days) and delivery costs ($8,248 vs. $6,642). Births with FAOD were at higher odds of postpartum hemorrhage (PPH) (OR 1.76, 95% CI: 1.05, 2.95) but were not at higher likelihood of transfusion, non-transfusion severe maternal morbidity, preterm delivery, chorioamnionitis, hypertensive disorders of pregnancy, placental abruption, or cesarean delivery.

CONCLUSION: The prevalence of deliveries affected by a known maternal FAOD is increasing and associated with increased LOS, costs, and likelihood of PPH, although with no observed increased odds of other birth complications. These outcomes are helpful when counseling patients with FAOD considering pregnancy. Further research is needed to understand drivers of PPH and increased costs among these patients beyond LOS.

Table 1: Trends and outcomes in maternal fatty acid oxidation defect delivery hospitalizations

	FAOD deliveries		non-FAOD deliveries		
Year	N		N		Rate per million
2016	74		3781749		19.7
2017	72		3709236		19.5
2018	84		3649350		23.0
2019	107		3596164		29.7
2020	155		3478042		44.7
	FAOD		non-FAOD		
Mode of Delivery	N	%	N	%	
Spontaneous vaginal delivery	314	63.8%	11,648,367	64.0%	
Operative vaginal delivery	18	3.8%	728,179	4.0%	
Primary Cesarean delivery	89	18.1%	3,056,815	16.8%	
Repeat Cesearean delivery	71	14.3%	2,780,688	15.3%	
Outcomes	N	%	N	%	OR 95% CI
Transfusion	DS*	1%	210,504	1.2%	0.59 0.14- 2.36
Non-transfusion SMM	DS*	0%	143,669	0.8%	0.30 0.04- 2.15
Preterm delivery	67	13.9%	1,760,813	9.9%	1.48 0.97-2.25
Postpartum hemorrhage	32	6.6%	706,651	3.9%	1.76 1.05- 2.95
Chorioamnionitis/endometritis	17	3.5%	552,231	3.0%	1.17 0.62-2.21
Hypertensive disorders of pregnancy	66	13.3%	2,175,699	12.0%	1.14 0.76- 1.72
Placental abruption	13	2.6%	282,359	1.6%	1.69 0.72- 3.94
Cesarean delivery	160	32.5%	5,837,503	32.0%	1.00 0.75- 1.33
Mean Delivery LOS	Days	95% CI	Days	95%CI	
	3.6	2.8- 4.3	2.7	2.6- 2.7	
Mean Delivery Costs		95% CI		95%CI	
	$8,248	$7,316- $9,144	$6,536	$6,643- $6,610	

*DS= data suppressed in accordance with use agreement

820 High-Risk Pregnancy in North Carolina: Predictors of High Efficacy Postpartum Contraception Use

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OBJECTIVE: Postpartum high efficacy contraception use is particularly recommended for patients with a history of high-risk pregnancy. Several studies on high-risk pregnancy and high efficacy contraceptive use have shown inconsistent results. This study examined factors that influence the use of high efficacy contraception postpartum in respondents with reported high-risk pregnancy at a state population level.

STUDY DESIGN: North Carolina Pregnancy Risk Assessment Monitoring System data for 2012-2020 was analyzed. High efficacy contraceptive (IUD, implant, tubal ligation, vasectomy) use postpartum was the outcome of interest. The predictors and covariates included: demographics, high-risk pregnancy history, parity, pregnancy intention, infant mortality, interpersonal violence during pregnancy, and prenatal and postpartum counseling. High-risk pregnancy was defined as a history of preterm birth, low birth weight infant, obesity, diabetes, hypertension, depression, or no prenatal care. A multivariable logistic regression analysis was conducted with adjusted odds ratios (aORs) determined.

RESULTS: Significant predictors of high efficacy contraception use: history of high-risk pregnancy, multiparity, trying to get pregnant with their most recent pregnancy, living infant, postpartum contraception counseling, postpartum visit inquiry about depression, Black and Asian races, attainment of a bachelor's or master's degree, and age groups 30-34 and 35-39 years-old. (See Table 1 for aORs, p-values, and Confidence Intervals.)

CONCLUSION: At a state population level, high-risk pregnancy history is associated with high efficacy contraception use postpartum. Patients who use high efficacy contraception are more likely to plan their pregnancies and have multiple children. Postpartum contraception counseling is a predictor of high efficacy contraception use. Thus, based on the study findings, patients who are younger, have lower education levels, and have a history of unplanned pregnancy should be identified and provided comprehensive postpartum contraception counseling.

Variable	aOR	p-value	95% CI
History of high-risk pregnancy	1.182	.046	[1.003 to 1.394]
Multiparity	2.005	< .001	[1.703 to 2.362]
Trying to get pregnant with recent pregnancy	0.723	< .001	[0.619 to 0.845]
Living infant	2.846	.003	[1.416 to 5.720]
Postpartum contraception counseling	0.355	< .001	[0.282 to 0.446]
Postpartum visit inquiry about depression	1.404	.023	[1.049 to 1.880]
Black race	0.780	.014	[0.641 to 0.951]
Asian race	0.364	< .001	[0.226 to 0.586]
Bachelor's degree	0.642	< .001	[0.502 to 0.821]
Master's degree	0.655	.007	[0.482 to 0.892]
30-34 years-old	1.307	.007	[1.075 to 1.590]
35-39 years-old	1.504	< .001	[1.194 to 1.893]

Table 1. Significant predictors of high efficacy contraception use postpartum.

821 Impact of fetal sex on neonatal outcomes in gestational diabetes mellitus

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OBJECTIVE: A growing body of evidence suggest that maternal adaptation to pregnancy complications differs based on fetal sex chromosomes, indicating sexual dimorphisms in maternal pregnancy complications. This study aimed to investigate the disparities

in outcomes between pregnancies with female and male fetuses in patients with gestational diabetes mellitus (GDM).

STUDY DESIGN: The medical files of all diagnosed GDM patients delivered between 2018-2020, were reviewed. GDM was diagnosed based on oral glucose tolerance test. Women with GDMA1 achieved sufficient glycemic control without medical treatment, and GDMA2 required medical treatment to control their blood glucose levels. Maternal characteristics, pharmacological treatment, delivery and neonatal outcome were compared between the "male GDM group" and the "female GDM group" (patients with male or female fetuses respectively). Composite averse neonatal outcome included at least one of the following: hypoglycemia, sepsis, respiratory distress, anemia/blood transfusion, cerebral hemorrhage, HIE, or convulsions.

RESULTS: A total of 1587 GDM patients were included. As compared to the female GDM group (n=763) the male GDM group (n=824) was characterized by higher maternal age (p=0.046), a higher rate of cesarean deliveries (CD) (p=0.027), vacuum extractions (p=0.001), increased neonatal birthweight (p=0.001), macrosomia (birthweight >4000 gr) (p=0.001) and a higher rate of adverse composite neonatal outcome (0.004). Multivariable logistic regression analysis revealed that having a male fetus was independently associated with composite adverse neonatal outcome, with an odds ratio of **1.68**, 95% CI 1.16-2.42, p=0.006. Among GDMA2 cases there were no differences regarding the total dose of insulins or oral hypoglycemic medications between pregnancies with female and male fetuses.

CONCLUSION: The higher rate of adverse neonatal outcome observed in pregnancies with male fetuses among GDM patients corresponds with sex-specific differences in maternal pathophysiological adaptation during complicated pregnancies.

Table 2- Logistic regression model for composite adverse neonatal outcome

	Adjusted Odds Ratio	95% CI	P value
Maternal age (every added year)	0.98	0.95-1.02	0.260
Nulliparity	1.08	0.74-1.57	0.681
Obesity (BMI>30)	0.98	0.58-1.64	0.935
GDMA2	1.21	0.82-1.79	0.338
Hypertensive disorders	1.56	0.79-3.06	0.201
Male fetus	**1.68**	**1.16-2.42**	**0.006**
Fetal macrosomia	1.02	0.45-2.31	0.971
Fetal weight (every added gram)	1.00	1.00-1.00	0.990

OR: odds ratio, CI: confidence interval

822 Implications of intravenous paracetamol prior labor induction by catheter balloon insertion: a randomized controlled trial

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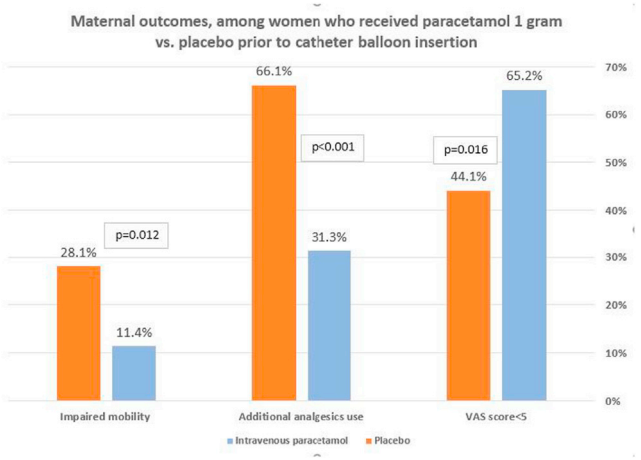
OBJECTIVE: For women with an unfavorable cervix, mechanical ripening by catheter balloon is common, but studies of pain relief during balloon insertion are lacking. This study aimed to assess maternal pain and satisfaction following paracetamol vs. placebo, prior to catheter balloon insertion.

STUDY DESIGN: Primiparous women at term who were admitted for medically indicated labor induction were randomized to receive intravenous paracetamol 1 gram in 100 cc normal saline or placebo (100 cc normal saline) prior to catheter balloon insertion. The primary outcomes were visual analog scale (VAS) scores and maternal satisfaction, as assessed in a questionnaire.

RESULTS: Overall, 141 women were included: 71 received paracetamol 1 g and 70 received placebo prior catheter balloon insertion. Background characteristics and pre-induction maternal pain did not differ between the groups. The median VAS scores at 2, 30 and 60 minutes after catheter insertion were comparable between the paracetamol and placebo groups, 6.46±2.77 vs. 6.66±2.78, p=0.68; 5.53±3.2 vs. 5.93±3.01, p=0.46; and 5.83±3.25 vs. 6.49±2.88, p=0.26, respectively. For the paracetamol vs. placebo group, the proportion with a mean VAS score < 5 was higher (65.2% vs. 44.1%, p=0.016) and the mean sum of the VAS scores was lower (4.39 vs. 5.37, p=0.045). After the balloon insertion, women in the paracetamol vs. placebo group showed greater maternal mobility (p=0.012), and a smaller proportion needed analgesics (31.3% vs. 66.1%, p(0.001) (figure). The maternal satisfaction score was similar between the groups (P=0.877). In multivariate analysis, advanced maternal age (p=0.034) independently decreased the VAS score. Cervical ripening, the duration from catheter insertion to delivery, and labor and neonatal outcomes did not differ significantly between the groups.

CONCLUSION: Paracetamol use prior to catheter balloon insertion was associated with reduced VAS score and reduced analgesic use after catheter balloon insertion, and improved maternal mobility compared with placebo



823 Virtual care in maternal fetal medicine: A patient and provider perspective

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OBJECTIVE: The purpose of this study is to evaluate provider and patient perspectives on virtual maternal-fetal medicine (MFM) consultation visits.

STUDY DESIGN: Patient satisfaction surveys were collected between 2020 and 2023 for patients who received MFM consultation care at a tertiary health system. A satisfaction survey was also distributed to MFM specialists across the country to evaluate providers' perspective on virtual care. Univariate analysis of data included means and standard deviation, and percentages. Comparison of continuous variables was performed using a two tailed t-test.

RESULTS: Patients reported no changes (on a scale of 0-3) in how their providers explained their diagnosis (1.86+/-0.34 virtual vs 1.93 +/-0.29 in-person; p=0.149), the respect they felt the providers showed (1.92+/-0.28 vs 1.91+/-0.37; p=0.900), or the likelihood they would recommend the office (1.75+/- 0.46 vs 1.81+/-0.53; p=0.42). From the providers standpoint, 46.6% either strongly disagreed or disagreed that they were motivated to incorporate telehealth into their practice prior to the COVID-19 pandemic when virtual care was not a popular option. However, the pandemic changed this mindset as most providers (86.7%) were motivated to continue using telehealth with 66.2% liking or strongly liking telehealth. Providers also strongly felt that telehealth improves access to care (54.7%), provides adequate care (54.7%), and is convenient for patients (61.3%). The biggest concern providers had for telehealth was that it decreased rapport with their patients (34.7%).

CONCLUSION: Overall the results from this survey study showed that virtual care has been well received by patients and providers. Maternal fetal medicine as a consultation service lends itself nicely to the ability to provide patients with telehealth services without compromising patientcare. Such services are of particular benefit to patients facing barriers to social drivers of health such as transportation limitations and can be a solution to improving patient-provider communication.

824 MD vs. ML: Comparing clinician intuition to machine learning to predict mode of delivery

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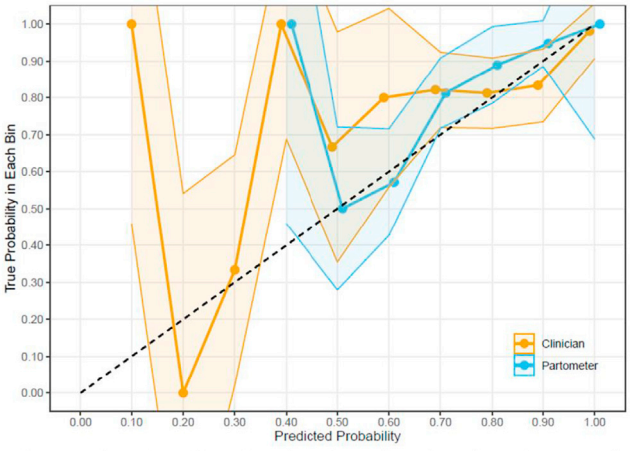
OBJECTIVE: Integration of machine learning (ML) models in healthcare remains rare. One reason is uncertainty regarding these models' predictive abilities compared to clinical intuition. We previously developed the Partometer, an ML model that passively collects both admission and intrapartum data to calculate accurate, q5 minute predictions of a patient's probability of vaginal delivery. The objective of this study is to assess if the Partometer is able to predict as well as a patient's obstetrician the probability of a vaginal delivery.

STUDY DESIGN: A prospective cohort study to evaluate calibration of the Partometer compared to clinician intuition. 42 clinicians agreed to participate. Patients admitted to these physicians, laboring and planning a vaginal delivery were the subjects for the prediction model. At 4 hours (a previously tested threshold time), we queried both the Partometer for a prediction of vaginal delivery likelihood (0 = likely cesarean to 1 = likely vaginal delivery) and concurrently asked the patient's physician (blinded to the Partometer's prediction). The calibration of each method's prediction was then compared to the final outcome by fitting a linear mixed model for the difference in the Brier scores between the two methods with random intercept to account for the predictions made by the same clinician. Calibration results were stratified for age, race and ethnicity, parity, and BMI.

RESULTS: 159 deliveries were included. Approximately half of subjects were nulliparous (55.3%), ≥35 years old (44%), and a third had BMI ≥30 (32.7%). The Partometer's predictions (mean Brier score = 0.11) were as well calibrated as clinicians' (mean Brier score = 0.12) in determining if the patient would have a vaginal delivery (estimated intercept = 0.01, p=0.343 from the mixed model). The demonstrated equivalence did not differ when stratifying by other predictive variables.

CONCLUSION: Our ML model, the Partometer, was able to predict as well as the patient's clinician the likelihood of a vaginal delivery, laying foundational work for integration of ML into obstetric decision making.



Predicted Probability	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
Clinician	0	1	1	3	3	3	5	28	32	30	53
Partometer	0	0	0	0	1	6	14	32	27	76	3

Figure 1: Calibration curves comparing clinician estimation of probability of vaginal delivery (orange line, shaded 95% confidence interval) to Partometer predictions (blue, shaded 95% confidence interval). The table describes the number of predictions made in each bin.

825 What are patient perspectives on research participation during labor and delivery

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OBJECTIVE: Pregnant people are underrepresented in clinical trials. Black patients only represent 5% of clinical trial participants in the US due to historic injustices that have led to research mistrust. Our objective was to assess the barriers, facilitators, and race-specific perspectives of research participation on labor and delivery (L&D).

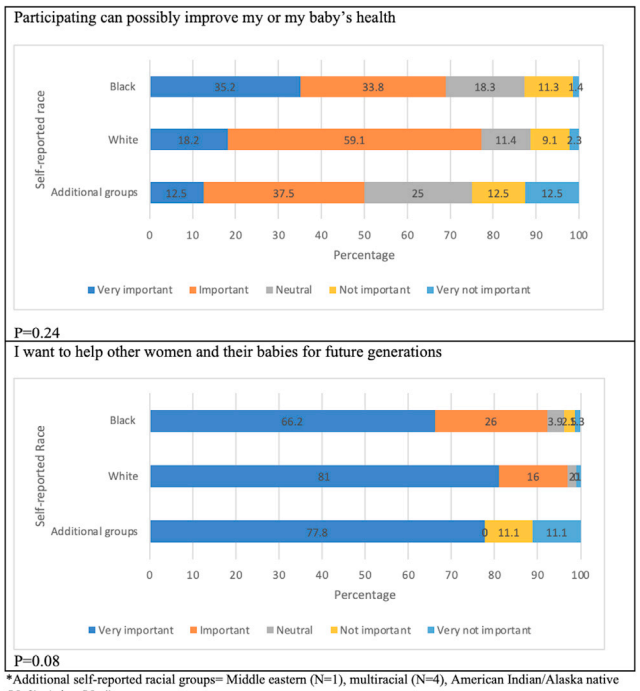
STUDY DESIGN: A prospective cross-sectional survey study of pregnant patients admitted for delivery at a single academic hospital with a high volume of L&D research studies. Inclusion criteria were all patients approached for research participation. An electronic survey was administered via tablet to patients who consented or declined L&D research participation. Descriptive and univariate analyses were used to compare characteristics of patients who consented vs declined research participation and compare motivators/barriers by self-reported race: Black/Afro-Caribbean, White, and additional groups [Middle Eastern, multi-racial, Asian, or American Indian].

RESULTS: We surveyed 221 patients (91%) who consented to research participation and 81 patients (52%) who declined. Self-identified race did not differ between consent and decline groups: 43.6% of

those who consented identified as Black, 50% White, and 6.4% as an additional group, while those who declined identified as Black (58.4%), White (33.8%), and members of an additional group (7.8%)(P=0.10). The most common reasons for declining research participation were concerns regarding health risks and confidentiality and these reasons for declining were similar across all races. Among patients who consented, the most common motivator for participation was a desire to help other pregnant people followed by the possibility of improving one's own health. These motivators were similar across all races.

CONCLUSION: Black patients are just as likely to participate in L&D research and share similar concerns regarding research participation as other racial groups. Researchers should address safety and confidentiality to maximize patient engagement, while simultaneously emphasizing how research can help other pregnant people.

Figure: Most common motivators for research participation among those who consented to research studies stratified by race



*Additional self-reported racial groups= Middle eastern (N=1), multiracial (N=4), American Indian/Alaska native (N=2), Asian (N=4)

826 Integrating maternal genotypes to improve birth weight prediction in low-risk pregnancies

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OBJECTIVE: Fetal growth potential is thought to be genetically driven, yet growth assessment tools do not utilize genetic data. Our aim was to determine whether integration of a maternal genetic risk score for birth weight (GRS-BW) would improve BW prediction in low-risk pregnancies.

STUDY DESIGN: This was a secondary analysis of a prospective observational cohort of 10,038 nulliparas who underwent detailed clinical characterization. To predict "ideal" BW, we included births without risk factors for abnormal fetal growth: preterm birth, pregestational diabetes, chronic hypertension, chromosomal abnormalities, and stillbirth. We randomly selected 60% of participants as a training set and utilized log linear regression to derive a new model for ideal BW prediction using established variables (gestational age (GA), sex) and assessing new variables with evidence for effects on growth beyond transmitted alleles: GRS-BW, prepregnancy nutrition (Healthy Eating Index-2010), exercise during pregnancy (weekly metabolic equivalents), maternal weight, and gestational weight gain. Maternal SNP arrays were used to compute GRS-BW from 84 published BW-associated loci. We compared the performance of models with and without GRS-BW in the validation set.

RESULTS: We analyzed N=7,816 births. In the training set, the "base model" (GA and sex only) had modest prediction of BW (R^2=0.598). GRS-BW, early pregnancy weight, and final pregnancy weight were independently associated with BW ($p< 0.001$ for all), and their addition to the model increased the R^2 to 0.644. Prepregnancy nutrition and pregnancy exercise were not independently associated with BW. In the validation set, the model with GA, sex, GRS-BW, and early pregnancy weight decreased the mean absolute error from 10.2% to 9.9% over the base model, while the model with all significant variables did not yield further improvement.

CONCLUSION: Integrating a maternal genetic risk score for BW marginally improved BW prediction in low-risk pregnancies. Further work is needed to determine whether genetic personalization of fetal growth potential can offer any clinical benefit.

Table 1. Validation of BW prediction models

Validation data	RMSE	RRSE	MAE
1. Base model (GA, sex)			
Ln(BW) = -1.654 + 0.443*GA -0.005*GA^2	0.133	0.622	0.102
2. Early pregnancy model: adds GRS + early pregnancy maternal weight			
Ln(BW) = -1.921 + 0.448*GA -0.005*GA^2 +0.05*GRS + 0.001*V1Wt	0.129	0.597	0.0987
3. Full model: adds final pregnancy weight			
Ln(BW) = -1.860 + 0.445*GA -0.005*GA^2 +0.045*GRS + 0.002*V1Wt - 0.001*V4wt	0.128	0.591	0.0979

The inclusion of GRS and early pregnancy maternal weight improved the prediction of BW compared to the base model as calculated by the root mean square error (RMSE), the root residual standard error (RRSE), and Mean Absolute Error (MAE), where lower error scores reflect better performance. The full model which also included final pregnancy weight did not yield further improvement.

827 Outcomes of Adolescent Pregnancies with Diabetes

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OBJECTIVE: National trends in obesity and metabolic syndrome have resulted in increasing rates of diabetes (DM) in pregnancy. These trends in pregestational comorbidities also affect the teenage populations. However, the potential additive effect of DM and adolescent status on pregnancy risks remains poorly elucidated. We sought to evaluate rates of adverse outcomes from adolescent pregnancies (AP) with DM.

STUDY DESIGN: We performed a retrospective cohort study using the Kids' Inpatient Database (KID) to identify pediatric admissions (≤20 years old) with ICD codes pertaining to Labor and Delivery and diabetes during five periods in the past decade (2006, 2009, 2012, 2016, 2019) in the United States. We used appropriate bivariate (e.g., chi-square) and multivariate (e.g., logistic regression) statistics to evaluate differences in obstetrics outcomes by diabetes status.

RESULTS: We identified 1,823,854 AP without DM, 3327 AP with type 1 (T1) DM, 3050 AP with type 2 (T2) DM, and 12,909 with gestational DM (GDM). Table 1 shows rates of outcomes by DM type. Compared to AP without diabetes, preterm delivery (T1: OR 4.53, 95% CI 4.09-50.2; T2: OR 3.35, 95% CI 2.96-3.78: GDM: 1.18,

95% CI 1.08-1.28), hypertensive disorders of pregnancy (T1: OR 4.32, 95% CI 3.95-4.74; T2: OR 4.18, 95% CI 3.79-4.61; GDM: OR 1.99, 95% CI 1.89-2.10), and cesarean delivery increased for all types of DM ($p< 0.001$ for all). Length of stay and cost of admission were also increased for any DM diagnosis ($p< 0.001$). Fetal anomaly rates remained unchanged for GDM, but increased for T1 and T2 DM ($p< 0.001$).

CONCLUSION: Diabetes in pregnancy potentiates the risks associated with adolescent pregnancies. This data highlights the need for targeted public health interventions to counteract both the rates of teen pregnancies and the epidemic of metabolic dysfunction in adolescent populations with rising rates of both T2DM and GDM. Public health and nutrition programs are needed to address the intersection of these epidemics.

Table 1: Adverse Pregnancy Outcomes in Adolescent Pregnancies with Diabetes

N (%)	No DM	T1DM	T2DM	GDM	p
Total N	1,823,854 (99.0%)	3,327 (0.2%)	3,050 (0.2%)	12,909 (0.7%)	--
Obesity	68,462 (3.8%)	303 (9.1%)	701 (23%)	2,582 (20%)	<0.001
Preterm Birth	104,246 (5.7%)	717 (21.5%)	513 (16.8%)	875 (6.8%)	<0.001
Hypertension	179,982 (9.9%)	1,177 (35.4%)	1,152 (37.8%)	3,214 (24.9%)	<0.001
Fetal Anomaly	22,085 (1.2%)	144 (4.3%)	95 (3.1%)	154 (1.2%)	<0.001
Cesarean delivery	343,866 (18.9%)	1,685 (50.6%)	1,302 (42.7%)	3,526 (27.3%)	<0.001
Severity of illness					<0.001
No Class	274 (0%)	1 (0%)	1 (0%)	1 (0%)	
Minor	1,101,877 (60.4%)	41 (1.2%)	36 (1.2%)	2,894 (22.4%)	
Moderate	614,776 (33.7%)	1,303 (39.2%)	1,155 (37.9%)	8,044 (62.3%)	
Major	102,977 (5.7%)	1,873 (56.3%)	1,794 (58.8%)	1,911 (14.8%)	
Extreme	3,950 (0.2%)	109 (3.3%)	64 (2.1%)	58 (0.4%)	
Mortality	75 (0%)	0 (0%)	2 (0.1%)	2 (0%)	0.43
Length of stay (d)	2.59	4.81	4.23	3.3	<0.001
Cost of Admission*	$15,517	$29,279	$25,237	$24,160	<0.001

* 2019

829 Cost-effectiveness of exome and genome sequencing for low-risk pregnancies

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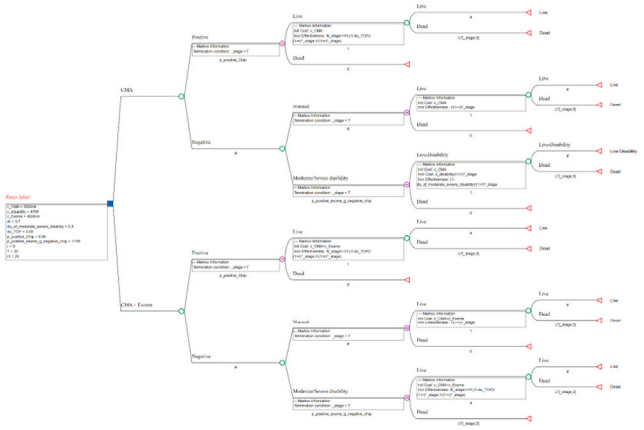
OBJECTIVE: Chromosomal microarray (CMA) is positive in about 1% of fetuses without a specific indication, even with apparent normal anatomy scans. Hence, CMA has become a widely accepted practice upon "parental request". However, it is evident that normal CMA analysis cannot exclude a single nucleotide variant (SNV) that is below the detection limit of CMA. Among low risk pregnancies with normal CMA 1/160 will have pathogenic variant for a severe disorder in exome sequencing (ES). We assessed the cost-effectiveness of ES in low-risk pregnancies

STUDY DESIGN: Costs, utility and quality adjusted life years (QALY) were modelled for prenatal testing with CMA or CMA+ES. Two strategies were compared using Markovian decision analysis model: (1) CMA only- abnormal result culminating in termination of pregnancy and normal test has a 1/160 chance for severe disorder. (2) ES after a negative CMA, for positive result a termination of pregnancy is conducted. Outcome measures included the QALYs after abortion, cost of CMA and ES test and the health expenses of a critically ill infant. The time horizon of the model was 20 years

RESULTS: Testing costs were $1,479 and $3,108 for CMA and CMA+ES strategies respectively. The QALY with time horizon of 20 years were 18.768 and 18.819 QALY for CMA and CMA+ES strategies respectively with incremental cost-effectiveness ratio (ICER) of 32,368$/QALY. The commonly accepted threshold for cost-effectiveness in many healthcare systems is an ICER of less than $50,000/QALY. Sensitivity analysis revealed that the time horizon and the dis-utility of moderate/sever disability of the genetic disorder has an impact on the ICER. For example, with a relatively small disutility of moderate/sever disability, the ICER is 58,822$/QALY and for a shorter time horizon of 10 years, the ICER is 80,024$/QALY

CONCLUSION: ES has the potential to be cost-effective compared with CMA alone. Our research provides data regarding the cost-effectiveness of ES in low-risk pregnancies that will become increasingly important in the near future as whole genome sequencing becomes the first-tier test in prenatal diagnosis



830 How does social vulnerability influence substance use patterns in pregnant persons with substance use disorder?

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OBJECTIVE: This study was undertaken to evaluate the impact of extremes of social vulnerability on substance use patterns in pregnant persons with substance use disorder (SUD).

STUDY DESIGN: We conducted a retrospective cohort analysis of mother-neonate dyads who received prenatal care through a specialized perinatal SUD program at a tertiary academic center from December 2019 to March 2023. Overall as well as subcomponent Social Vulnerability Index (SVI) scores were assigned based on zip code, as defined by the CDC. Information pertaining to demographic characteristics, prenatal care utilization and substance use patterns during pregnancy, were abstracted from electronic records and compared across 2 subgroups − the lowest and highest overall SVI quartiles. Student's t test and chi2 / Fisher's exact tests were used to compare continuous and categorical data, respectively. Statistical significance was set at $p\leq.05$.

RESULTS: Of 491 pregnant persons, 124 (25%) were in the lowest SVI and 106 (22%) in the highest SVI quartile. Mean SVI scores were 0.131 ± 0.099 vs 0.849 ± 0.012 (mean $\pm$ SD) in the lowest and highest quartile categories, respectively. Patients in the high SVI category had higher parity ($p< .01$), were more likely to be non-hispanic Black ($p< .01$) and have lower median income ($p< .01$).

The high social vulnerability subgroup also notably had higher rates of any current substance use (p=< .01), specifically opioid (p=.03) and cocaine (p< .01) use as well as DSM-V defined cocaine use disorder (p=.03). Patients in the high SVI group had limited prenatal care utilization as evidenced by - later presentation to prenatal care (p=.02), with fewer prenatal care visits (p=.04) which translated into higher rates of positive urine drug screens (UDS) for illicit substances upon admission to L&D (p=.05).

CONCLUSION: Pregnant persons with SUD exposed to high SVI environments are at increased risk for continued use, relapse and limited healthcare utilization. Addressing determinants of social vulnerability is a critical need for achieving perinatal health equity and addressing disparities in care.

Table 1. Substance use patterns and healthcare utilization by Social Vulnerability Index (SVI) among pregnant persons with Substance Use Disorder (SUD).

	Total (N=230) Mean ± SD/N (%)	Low SVI (N=124) Mean ± SD/N (%)	High SVI (N=106) Mean ± SD/N (%)	p-value
Any Current Substance Use	189 (82.2)	94 (75.8)	95 (89.6)	*0.009
Opioids	161 (70.0)	79 (63.7)	82 (77.4)	*0.030
Cannabis	67 (29.1)	39 (31.5)	28 (26.4)	0.402
Benzos	44 (19.1)	22 (17.7)	22 (20.8)	0.563
Cocaine	36 (15.7)	8 (6.5)	28 (26.4)	*<.001
Amphetamines	71 (30.9)	45 (36.3)	26 (24.5)	0.063
Alcohol	10 (4.3)	4 (3.2)	6 (5.7)	0.367
Other	2 (0.9)	1 (0.8)	1 (0.9)	0.911
DSM-V Use Disorders				
OUD	203 (88.3)	111 (89.5)	92 (86.8)	0.522
Cannabis	9 (3.9)	4 (3.2)	5 (4.7)	0.561
Benzos	19 (8.3)	12 (9.7)	7 (6.6)	0.399
Cocaine	18 (7.8)	5 (4.0)	13 (12.3)	*0.026
Amphetamines	50 (21.7)	34 (27.4)	16 (15.1)	*0.026
Alcohol	10 (4.3)	5 (4.0)	5 (4.7)	0.800
GA at Initial Visit (weeks)	16.61 ± 7.76	15.52 ± 7.34	17.89 ± 8.06	*0.021
# of PNV	8.68 ± 5.06	9.34 ± 5.21	7.94 ± 4.80	*0.045
UDS Positive on L&D Admission	101 (43.9)	46 (37.1)	55 (51.9)	0.059

*Represents statistical significance at p ≤.05

831 Neonatal Hypoglycemia at Term: Unraveling the Impact of Maternal Glycemic Status and Fetal Growth Patterns

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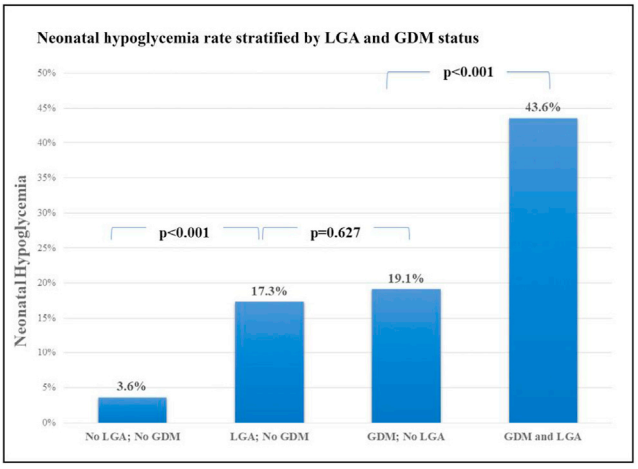
OBJECTIVE: Neonatal hypoglycemia is closely linked to abnormal maternal glycemic control and aberrant fetal growth. To delve deeper into this relationship, our study aims to evaluate the influence of two significant factors - gestational diabetes (GDM) and large-for-gestational-age (LGA) status - on the risk of neonatal hypoglycemia at term.

STUDY DESIGN: This retrospective cohort study enrolled liveborn singleton pregnancies born at term (≥37 weeks) in a tertiary center (2011-2022). Exclusion criteria included pre-gestational diabetes mellitus, neonatal birthweight < 10th centile, and known fetal genetic/structural abnormalities. The study population was categorized into four distinct groups: (1) Pregnancies without GDM or LGA (birthweight > 90th centile) – reference group; (2) pregnancies without GDM, but with LGA neonate; (3) pregnancies complicated with GDM, without LGA neonate; and (4) pregnancies with GDM and LGA neonate. The primary outcome of interest was the occurrence of neonatal hypoglycemia. Multivariable logistic regressions were performed.

RESULTS: A total of 22,836 patients were included in the study, with 18,889 (82.7%) pregnancies without GDM or LGA (group 1 – reference group), 1,640 (7.2%) with LGA (group 2), 1,947 (8.5%) with GDM (group 3), and 360 (1.6%) with both GDM and LGA. Notably, the groups exhibited variations in sociodemographic and obstetrical characteristics. The rates of neonatal hypoglycemia were 3.6%, 17.3%, 19.1%, and 43.6%, without significant differences between groups 2 and 3. The multivariate analysis, which controlled for hypertensive disorders of pregnancy, gestational age at delivery, mode of delivery, and birth injury, found that both LGA and GDM were significantly and independently associated with neonatal hypoglycemia. Interestingly, when presented together, LGA and GDM exhibited a synergistic effect.

CONCLUSION: The findings underscore the importance of considering maternal glycemic control and fetal growth patterns in assessing neonatal hypoglycemia risk and highlight the need for targeted interventions and monitoring strategies to optimize neonatal health outcomes.



832 Trial of labor outcomes after knotless-barbed vs. conventional suture for closure of cesarean uterine incision

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OBJECTIVE: To assess the effect of knotless barbed suture use for uterine incision closure at cesarean delivery on maternal and neonatal outcomes during the subsequent trial of labor.

STUDY DESIGN: We analyzed data from women with singleton pregnancies who underwent their first trial of labor after cesarean delivery between 2005 and 2021 at two large obstetrical centers. Trial of labor outcomes were compared between those with knotless barbed

sutures vs. conventional sutures for uterine incision closure in their primary cesarean. The primary outcome was trial of labor failure, with secondary outcomes including adverse maternal and neonatal outcomes. Univariate analysis was performed, followed by multivariable logistic regression while adjusting for relevant covariates.

RESULTS: During the study period, 5,087 patients met inclusion and exclusion criteria. Among them, 174 (3.4%) had prior use of knotless barbed sutures, while 4913 (96.6%) had conventional sutures. Maternal demographic characteristics did not differ between the groups. Univariate analysis revealed no significant differences in trial of labor failure between women with previous knotless barbed sutures and conventional sutures use (16.7% vs. 19.9%, p=0.30), the composite adverse maternal outcome, uterine scar disruption (rupture or dehiscence), and adverse neonatal outcome rates (TABLE). Multivariable analyses confirmed no association between knotless suture use and trial of labor failure (adjusted Odds Ratio (aOR) 0.79, 95% CI 0.41-1.52, p=0.48) or the composite adverse maternal outcome (aOR 0.80, 95% CI 0.52-1.23, p=0.31).

CONCLUSION: Knotless barbed suture use for uterine incision closure at cesarean delivery is associated with comparable vaginal birth rates and maternal and neonatal outcomes during the subsequent trial of labor. Further larger studies are needed to assess the incidence of more rare outcomes and to provide more robust evidence regarding the safety and efficacy of knotless sutures in this context.

Table: Obstetric maternal outcomes among the study groups

	Conventional suture use N=4913	Barbed suture use delivery N=174	p value
Primary outcomes			
TOLAC failure (intrapartum cesarean delivery)	976 (19.9%)	29 (16.7%)	0.30
Secondary outcomes			
Composite adverse maternal outcomes*	984 (20.0%)	32 (18.4%)	0.60
Uterine rupture	33 (0.7%)	0 (0%)	0.28
Dehiscence of uterine scar	25 (0.5%)	0 (0%)	0.35
Chorioamnionitis	140 (2.8%)	10 (5.7%)	0.03
Puerperal fever	133 (2.7%)	7 (4%)	0.30
Maternal ICU admissions	4 (0.1%)	0 (0%)	0.71
Postpartum hemorrhage	754 (15.3%)	21 (12.1%)	0.24
Blood products transfusion	123 (2.5%)	4 (2.3%)	0.86
Hysterectomy	4 (0.1%)	0 (0%)	0.71
Laparotomy	4 (0.1%)	0 (0%)	0.71
Hospitalization length, days	2.8±1.6	2.6±1.2	0.06
Prolonged hospital stays**	93 (1.9%)	2 (1.1%)	0.48
Perinatal fetal death	35 (0.7%)	1 (0.6%)	0.83
5-Minute Apgar score ≤ 7	107 (2.2%)	3 (1.7%)	0.68
NICU admission	257 (5.2%)	9 (5.2%)	0.98
Meconium aspiration syndrome	8 (0.2%)	0 (0%)	0.59
Jaundice	315 (6.4%)	15 (8.6%)	0.25
TTN	90 (1.8%)	3 (1.7%)	0.92
Mechanical ventilation	82 (1.7%)	1 (0.6%)	0.26
Seizures	58 (1.2%)	1 (0.6%)	0.46
Hypoglycemia	238 (4.8%)	8 (4.6%)	0.88
Sepsis	31 (0.6%)	1 (0.6%)	0.93
Encephalopathy	10 (0.2%)	0 (0%)	0.55
Intracranial hemorrhage	26 (0.5%)	0 (0%)	0.34
Birth asphyxia	35 (0.7%)	1 (0.6%)	0.83

Data are mean ± standard deviation; number (%); ICU Intensive Care Unit. TOLAC Trial of labor after cesarean. NICU Neonatal intensive-care unit, TTN Transient tachypnea of the newborn.
* Composite of adverse maternal outcome was defined as involving one or more of the following: uterine rupture or uterine scar dehiscence, postpartum hemorrhage, blood products transfusion, maternal ICU admissions, prolonged hospitalization (≥ 7 days after cesarean >5 days after vaginal delivery), chorioamnionitis, puerperal fever, laparotomy, and hysterectomy. ** Hospitalization > 7 days after cesarean >5 days after vaginal delivery

833 Outpatient versus inpatient management of premature prelabour rupture of membranes: A systematic review and meta-analysis

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OBJECTIVE: We aimed to compare the neonatal, obstetric, and maternal outcomes associated with outpatient management of pregnancies complicated by premature prelabour rupture of membranes (PPROM) against inpatient management.

STUDY DESIGN: We conducted a systematic review and meta-analysis of randomized controlled trials (RCTs) and cohort studies. We searched MEDLINE, EMBASE, Cochrane Database and Central Register, and PubMed from 1990 until July 2023 with no language restrictions for eligible studies. Random effects model was used for meta-analysis. The GRADE approach was used to assess quality of evidence.

RESULTS: Of 2,825 records identified, 14 publications (two RCTs, twelve cohort studies) were included, representing 6,010 patients. Management protocols were varied, generally including brief initial hospitalization, strict outpatient eligibility criteria, and surveillance with lab and ultrasound investigations. The RCTs were judged to have very low certainty of evidence due to small sample sizes and limited details available regarding their protocols. Based on data from cohort studies, outpatient management may be associated with lower rates of respiratory distress syndrome (RDS) (RR = 0.63 [0.52 to 0.77, very low certainty of evidence]), longer latency (MD 8.78 days, [2.29 to 15.26 days, low certainty of evidence]), higher gestational age (GA) at delivery (MD = 7.70 days [2.02 to 13.38 days, low certainty of evidence]), and lower rates of histologic chorioamnionitis (RR 0.74 [0.62 to 0.89, low certainty of evidence]) without meaningfully increased risks of other adverse neonatal, obstetric, or maternal outcomes.

CONCLUSION: Outpatient management may be a viable option for select patients affected by PPROM. The meta-analyzed data indicated that outpatient care may be at least as safe as inpatient management, with no demonstrated difference in risk of severe maternal, obstetric, or neonatal outcomes, and with potential benefits in reduced rates of RDS, longer latency, higher GA at delivery, and lower rates of histologic chorioamnionitis. This opportunity should be explored further in RCTs.

834 Vacuum delivery for "Maternal Exhaustion" has distinctive characteristics

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OBJECTIVE: Prolonged labor can be physically and emotionally exhausting and is associated with an increased risk of vacuum extraction (VE). Effective pushing and cooperation throughout the VE procedure are crucial for a favorable outcome. We aimed to characterize women at risk for VE indicated for "Maternal Exhaustion."

STUDY DESIGN: A retrospective cohort study of all singletons, term VEs in a tertiary center between 2011 and 2022. Patients were allocated into two groups based on the indication for VD, exhaustion (group 1) versus non-exhaustion (group 2). Exhaustion was based on the operator's discretion. The primary outcome was to investigate potential risk factors for exhaustion before VE.

RESULTS: We analyzed 2,950 VEs; 819 (27.8%) were indicated for exhaustion and 2,131 (72.2%) for non-exhaustion (Table 1). The features of the VE procedure, such as the number of pulls or detachments and the duration of the procedure, were not different between the groups. In univariate analysis, exhausted mothers were more likely to be nulliparous (75% vs. 71%, p=0.028), have diabetes in pregnancy (7.7% vs. 5.4%, p=0.047), use regional anesthesia (92.4% vs. 89.1%, p=0.006), have a longer duration of premature rupture of membranes [9.8 h (5.5-19.6) vs. 8.3 h (4.12-15.7), p< 0.001], longer second-stage duration (2.86 h ± 1.2 vs. 2.54 h ± 1.3, p< 0.001), and spend an extended time in the labor-ward [15.8 h (11.0-22.2) vs. 13.4 h (9.4-19.4), p< 0.001]. Using multivariable logistic regression, the duration of the second stage was the most statistically significant variable to predict "Maternal Exhaustion." as an indication for VE, an increment of 27.4% with every hour in the second stage (OR 1.274 [95% CI 1.146-1.416]).

CONCLUSION: Longer second-stage duration and extended time in the delivery room increase the risk of VE for the indication of maternal exhaustion. Better identification and support for prone gravidas may decrease VE rates and improves the birth experience.

Table 1. Characteristics of the groups based on Exhaustion vs. Non-Exhaustion in women undergoing Vacuum delivery.

Variable	Exhausted (n=819)	Non-Exhausted (n=2131)	P-value*	Odds Ratio	95% CI Lower	95% CI Upper
Maternal age, mean +/- SD	28.9 ± 4.9	29.3 ± 4.9	0.082	0.984	0.956	1.012
Body Mass Index, kg/m, mean +/- SD	28.9 ± 4.7	28.5 ± 4.6	0.10	1	1	1
Nulliparous, n (%)	616 (75%)	1515 (71%)	**0.028**	1.493	0.903	2.470
Previous one cesarean delivery, n (%)	99 (12.1)	262 (12.3)	0.38			
Hx of Anxiety/depression, n (%)	11 (1.3)	16 (0.8)	0.13	2.957	0.886	9.871
Diabetes in pregnancy, n (%)	63 (7.7)	115 (5.4)	**0.047**	1.567	0.989	2.481
Hypertension in pregnancy, n (%)	41 (5)	109 (5.1)	1			
Regional anesthesia, n (%)	757 (92.4)	1898 (89.1)	**0.006**	1.439	0.809	2.559
Duration of PROM, h, median (range)	9.8 (5.5-19.6)	8.3 (4.12-15.7)	**<0.001**	1.003	0.996	1.011
Second-stage, h, mean +/- SD	2.86 ± 1.2	2.54 ± 1.3	**<0.001**	1.274	1.146	1.416

835 Optimizing the 4th Trimester: Factors That Drive Attendance to a Comprehensive Postpartum Cardiometabolic Clinic

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OBJECTIVE: Gestational adverse metabolic outcomes (AMO), including hypertension (HTN) & diabetes (DM), impact maternal cardiometabolic (CM) health. The current practice of a ~6-week (wk) postpartum (PP) visit is insufficient to address all necessary long-term issues. We initiated a 12-wk Postpartum Cardiometabolic Clinic (PPMC) for patients with a gestational AMO to provide comprehensive/individualized guidance & noted that attendance increases follow-up with primary/specialty care. We therefore investigated what factors impact attendance to PPMC.

STUDY DESIGN: This retrospective cohort study included those with a gestational AMO referred to PPMC between 8/22-7/23. We compared demographic/CM factors between attendees/non-attendees of PPMC. Continuous variables were compared using Wilcoxon Rank Sum Tests. Categorical variables were compared using Chi-Square/Fisher's exact tests. Log binomial regressions calculating adjusted risk ratios (ARR) were performed.

RESULTS: 150 patients were referred to PPMC. Attendees were more likely to be referred > 2wks PP; non-attendees were more likely to be referred from L&D *(Table 1)*. Attendees were more likely to have a PP readmission *(26.9% vs. 10.5%, p< 0.05)* & routine PP visit *(90.3% vs. 70.2%, p< 0.01)* compared to non-attendees. Those with preeclampsia (PRE) w/ severe features (SF) were more likely to attend vs. no-show PPMC *(75.5% vs. 25.5%, p< 0.05)* whereas those with gestational HTN or PRE w/o SF were less likely to attend *(33.3% vs 66.6%, p< 0.01)*. After controlling for confounders (age, race, education, insurance & parity), those w/ a routine PP visit or readmission had a 1-2-fold higher likelihood of attending PPMC *(**ARR 1.9**, 95% CI 1.1-3.3, p=0.02; **ARR 1.3**, 95% CI 1.0-1.8, p=0.04)*.

CONCLUSION: Understanding factors impacting attendance to PP care is imperative. Here we demonstrate that referral timing & routine PP visit attendance significantly affect PPMC attendance. Our innovative data underscore the need to investigate factors driving these differences in PP clinic attendance as the 4th trimester is a critical gateway in the continuum of long-term maternal health.

Table 1: Characteristics of persons who attended vs. did not attend a comprehensive Postpartum Cardiometabolic Clinic.

	Overall (n=150)	Attended PPMC (n=93)	Did not attend PPMC (n=57)	p-value
Demographic information				
Age (years); mean (SD)	33.2 (5.7)	33.6 (5.4)	32.4 (6.1)	0.243
Race				
African American	110 (73.3)	64 (68.8)	46 (81)	
Caucasian	25 (16.7)	19 (20.4)	6 (11)	0.263
Asian	9 (6.0)	7 (7.5)	2 (3)	
Unknown	6 (4.0)	3 (3.2)	3 (5)	
Ethnicity				
Hispanic	10 (6.7)	7 (7.5)	3 (5.3)	0.916
Non-Hispanic	134 (89.3)	82 (88.2)	52 (91.2)	
Unknown	6 (4.0)	4 (4.3)	2 (3.5)	
Insurance				
Public	40 (26.7)	21 (22.6)	19 (33.3)	0.104
Private	109 (72.7)	72 (77.4)	37 (64.9)	
Uninsured/self-pay	1 (0.7)	0 (-)	1 (1.8)	
Education				
High school	9 (6.0)	7 (7.5)	2 (3.5)	
College	39 (26.0)	26 (28.0)	13 (22.8)	0.149
Post-graduate school	43 (28.7)	30 (32.3)	13 (22.8)	
Unknown	59 (39.3)	30 (32.3)	29 (50.9)	
Gravidity; mean (SD)	2.8 (2.0)	2.5 (1.6)	3.3 (2.4)	0.072
Parity; mean (SD)	2.0 (1.6)	1.8 (1.0)	2.4 (2.2)	0.182
Past medical history				
HTN in prior pregnancy	30 (20.0)	14 (15.1)	16 (28.1)	**0.053**
DM in prior pregnancy	17 (11.3)	9 (9.7)	8 (14.0)	0.414
Preterm delivery in prior pregnancy	23 (15.3)	10 (10.8)	13 (22.8)	**0.047**
Delivery Information				
Gestational age at delivery (weeks); mean (SD)	36.8 (3.3)	37.1 (3.3)	36.4 (3.4)	0.164
Delivered for cardiometabolic indication	108 (72.0)	65 (69.9)	43 (75.4)	0.463
Attended routine postpartum visit	124 (82.7	84 (90.3)	40 (70.2)	**0.002**
Had postpartum hospital readmission [due to cardiometabolic indication]	31 [20.7) [27 (87.1)]	25 (26.9) [23 (92.0)]	6 (10.5) [4 (66.7)]	**0.016** 0.159
Cardiometabolic history				
PPMC referral time				
Antenatal care	12 (8.1)	8 (8.7)	4 (7.0)	
L&D admission	34 (22.8)	12 (13.0)	22 (38.6)	**0.002**
< 1 week postpartum	25 (16.8)	14 (15.2)	11 (19.3)	
1-2 weeks postpartum	24 (16.1)	20 (21.7)	4 (7.0)	
> 2 weeks postpartum	54 (36.2)	38 (41.3)	16 (28.1)	
Reason for PPMC referral				
T1DM	4 (2.7)	4 (4.3)	0 (-)	0.298
T2DM	9 (6.0)	4 (4.3)	5 (8.8)	0.301
A1GDM	6 (4.0)	5 (5.4)	1 (1.8)	0.408
A2GDM	25 (16.7)	16 (17.2)	9 (15.8)	0.821
Chronic HTN	19 (12.7)	12 (12.9)	7 (12.3)	0.911
Gestational HTN & PRE w/o SF	18 (12.0)	6 (6.5)	12 (21.1)	**0.008**
PRE w/ SF (term and postpartum)	47 (31.3)	35 (37.6)	12 (21.1)	**0.034**
Preterm PRE w/ SF	27 (18.0)	16 (17.2)	11 (19.3)	0.746
Chronic HTN with superimposed PRE w/ SF	23 (15.3)	15 (16.1)	8 (14.0)	0.730
Preterm eclampsia	3 (2.0)	1 (1.1)	2 (3.5)	0.558
Maternal cardiac disease	4 (2.7)	1 (1.1)	3 (5.3)	0.154

PPMC, Postpartum Cardiometabolic Clinic; SD, standard deviation; L&D, Labor and Delivery; T1DM, type 1 diabetes mellitus, T2DM, type 2 diabetes mellitus; GDM, gestational diabetes mellitus; HTN, hypertension; PRE, preeclampsia; w/, with; w/o, without; SF, severe features. Data are reported as n (%) unless otherwise specified.

836 Ultrasonographic fetal lung texture analysis in twin and singleton gestations

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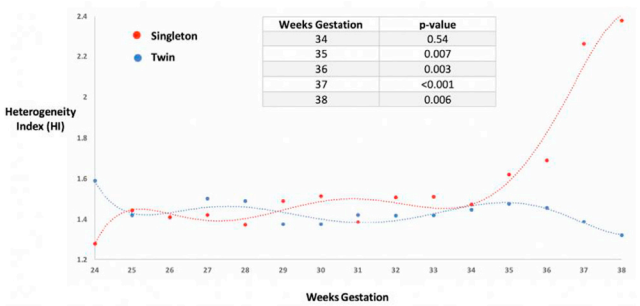
OBJECTIVE: The objective of this study was to determine whether fetal lung ultrasound heterogeneity index (HI) differs between twin and singleton gestations during the late second and third trimesters.

STUDY DESIGN: This prospective cohort study included women with singleton and twin gestations who had scheduled medically indicated ultrasound examinations at 24 weeks gestation or later in a large healthcare system from 2017 through June 2023. Grayscale fetal lung images were acquired with Voluson E8 and E10 ultrasound machines (GE Healthcare, Milwaukee, WI) using convex array transducers with a frequency range of 3-7.5 MHz. A region of interest was selected in each fetal lung image with a transverse view at the level of the 4-chamber heart excluding areas with shadow. HI was determined with MATLAB software (The Math Works, Inc, Natick, MA). This program converts the intensity of each pixel to a binary 1 (white) and 0 (black), and then calculates the percentage of white pixels with respect of the total number of pixels. Ineligible patients included those with fetal malformations and screening tests suggestive of aneuploidy. Exclusion criteria included low image quality.
RESULTS: During the study period, lung images were analyzed from 240 twin fetuses and 425 singleton fetuses. In total 2,151 images were analyzed. The fetal lung HI was determined for each collected image. The mean HI at each gestational week was compared between singleton and twin fetuses with two sample t-tests. Fetal lung HI throughout gestation for both groups are shown in Figure 1. There is a statistically significant divergence in mean HI beginning at 35 weeks gestational age between singleton and twin fetuses such that HI sharply increases in singleton fetuses.
CONCLUSION: A significant divergence in HI was observed between twin and singleton fetuses at and beyond 35 weeks of gestation. This finding may reflect previously reported differences in fetal lung maturity between twins and singletons during these gestational ages.

Figure 1 - Average fetal lung HI for twins and singletons from 24 to 38 weeks gestation



837 NT-ProBNP in preeclampsia with severe features as a predictor of adverse maternal cardiac outcomes

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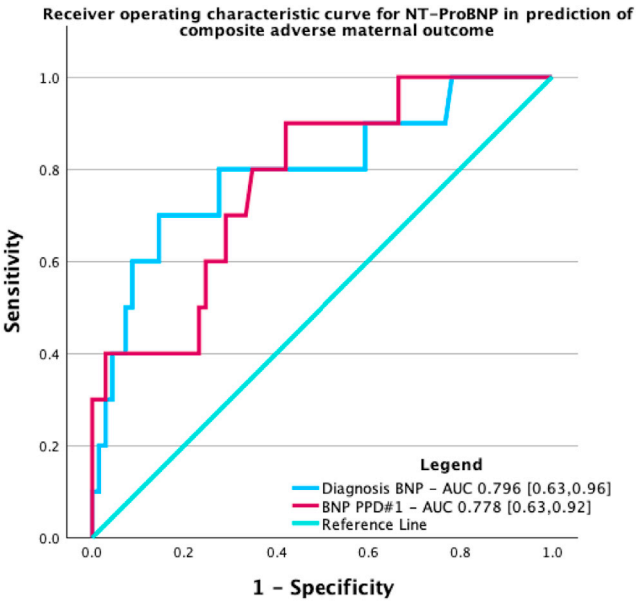
OBJECTIVE: N-terminal brain natriuretic peptide (NT-ProBNP) is secreted by cardiac myocytes when exposed to excess myocardial stretching or ischemia and is predictive of heart failure in non-pregnant adults. We aimed to evaluate the predictive value of NT-ProBNP for adverse maternal cardiac outcomes among patients with preeclampsia with severe features (PreESF).
STUDY DESIGN: This was a prospective cohort study of singleton pregnant patients diagnosed with PreESF from 1/2022 to 7/2023. Patients with pre-existing cardiac diseases were excluded. NT-ProBNP was drawn at diagnosis and postpartum day one (PPD#1). The primary outcome was a composite of peripartum cardiomyopathy (PPC) or postpartum readmission (PPR) within 6 weeks for a preeclampsia-related complication. Diagnosis and PPD#1 NT-ProBNP levels were analyzed using multivariable logistic regression with backwards selection and receiver operating characteristic curves to evaluate the association and predictive value. Maximum Youden indices were calculated to identify optimal NT-ProBNP cutoffs.
RESULTS: 80 patients were included. Mean maternal age was 31.8±7.1 years and mean gestational age at preeclampsia diagnosis was 34.7±3.2 weeks. Sixty percent identified as Black (n=48) and 15% (n=12) as Hispanic. Ten patients (12.5%) experienced the composite outcome: PPC n=6 and PPR n=4. Multivariable logistic regression identified diagnosis NT-ProBNP (p=0.02) and PPD#1 NT-ProBNP (p=0.04) as associated with the composite outcome. Diagnosis NT-ProBNP and PPD#1 NT-ProBNP were similarly predictive of outcome with an area under the curve (AUC) of 0.796 (p=0.0001, 95% CI [0.63,0.96]) and 0.778 (p=0.0001, 95% CI [0.63,0.92]) respectively. Youden index for diagnosis NT-ProBNP was 274.5 pg/mL (sensitivity 70%, specificity 81.2%, PPV 41.1%, NPV 95.2%) and for PPD#1 NT-ProBNP was 102 pg/mL (sensitivity 90%, specificity 58%, PPV 23.7%, NPV 97.6%).
CONCLUSION: Elevated NT-ProBNP at diagnosis or after delivery of PreESF is predictive of adverse maternal cardiac outcomes and may be a useful marker to identify patients in need of additional cardiac evaluation and follow-up.



838 Transvaginal/Transvesical Ultrasound (TVUS) to Diagnose Placenta Accreta Spectrum (PAS), its Severity & to Predict Blood Loss

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OBJECTIVE: Diagnosing PAS disorders and their severity using imaging technology remains a challenge. TVUS (full bladder) offers a unique opportunity to evaluate the anatomy, including cervical region involvement and vascular flow. Our study developed and evaluated semi-quantitative score, based on TVUS, to accurately diagnose PAS and predict blood loss during surgery in pregnant women with clinical and ultrasound evidence of PAS.

STUDY DESIGN: A prospective cohort study was performed from 2018 -2023 of patients referred to a quaternary center with suspected PAS on 2D ultrasound and clinical suspicion. A pre-determined scoring system was applied based on uterine wall, arterial vascularity, and cervical involvement. Each of three categories was scored 0-3, yielding a cumulative score of 0-9. Patients with score of 0 were recommended c-section with placenta removal. Scores from 1-9 were managed on multidisciplinary discussion and patient preference among the following options: c-section with placenta removal, c-section with placenta in-situ (conservative) with or without interval hysterectomy, or c-hysterectomy. Multivariate linear regression analysis was performed to predict blood loss using evaluated risk factors and PAS scoring.

RESULTS: 73 patients were evaluated and categorized by score (Table1). These categories differed significantly in terms of management type, estimated blood loss, ICU admission and hospital length of stay. All patients in Category 0 (score 0) were successfully managed as c-section with placenta removal. On multivariate analysis, Category 3 (score 7-9) and c-hysterectomy were associated with significantly higher blood loss; prior history of c-section deliveries was not associated with estimated blood loss (EBL). Excluding the conservative management group, EBL was directly correlated with the scoring category.

CONCLUSION: Our TVUS-based scoring accurately diagnosed PAS. Cases with a score of 0 had a successful c-section with placenta removal. The complexity of management, blood loss and morbidity increased with higher scores.

Table 1. Comparison of demographics and outcomes based on PAS Categories.

Variables	Category 0 (PAS 0) (n =11)	Category 1 (PAS 1-3) (n=17)	Category 2 (PAS 4-6) (n=27)	Category 3 (PAS 7-9) (n=18)	P value
GA at delivery (weeks)	37.2 (34-40)	35 (26-39)	34.3 (25-38)	32.5 (26-35)	<0.001
C-section with removal of placenta	11 (100%)	10 (58.8%)	5 (18.5%)	0 (0%)	<0.001
C-section with conservative management	0 (0%)	4 (23.5%)	6 (22.2%)	9 (50%)	
C-Hysterectomy	0 (0%)	3 (17.6%)	16 (59.2%)	9 (50%)	
Interval Hysterectomy	0 (0%)	4 (23.5%)	4 (14.8%)	8 (44.4%)	0.02
cEBL (mL) all methods	635 ± 352	634 ± 599	1549 ± 1284	1895 ± 2106	<0.001
Birth weight (grams)	3088 ± 284	2534 ± 691	2251 ± 470	2039 ± 515	0.001
ICU Admission (days)	1 (8.3%)	3 (17.6%)	10 (37%)	8 (44.5%)	0.03
Duration of stay in hospital (days)	3 (2-4)	4 (2-11)	4 (2-14)	5 (3-10)	0.001

Data are presented as n (%), median (range), mean ± SD. GA, gestational age; PAS, placenta accreta spectrum; cEBL, corrected estimated blood loss using established methods.

839 Unexpected UDS: Impact on Neonatal and Maternal Outcomes in Opioid Use Disorder

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OBJECTIVE: Evaluate the effects of unexpected Urine Drug Screens (UDS) on neonatal and maternal outcomes in pregnant patients on Medications for Opioid Use Disorder (MOUD).

STUDY DESIGN: Prospective cohort of pregnant patients on MOUD enrolled in a multidisciplinary treatment program between 2015 and May 2023. Patients had at least 2 prenatal visits with at least two UDS. Experimental group contained at least 2 unexpected UDS outcomes, while the control group had at least 2 expected UDS outcomes. Primary outcomes assessed were Neonatal Opioid Withdrawal Syndrome (NOWS). Secondary outcomes included prenatal care compliance, maternal obstetric outcomes, and birth weight. Categorical outcomes are compared between groups using Fisher's exact tests. Quantitative data were analyzed using Poisson regression or two-sample t-tests with transformations included as appropriate.

RESULTS: 266 patients met the inclusion criteria. 51 of 266 (19%) were on Buprenorphine prior to pregnancy vs 215 of 266 (81%) were started during pregnancy. 68 of 266 (26%) had at least 2 unexpected UDS outcomes vs 198 of 266 (74%) had expected UDS. The median buprenorphine dose at delivery was 12 mg [IQR: 8 to 16] vs 12 mg [8 to 16], P=.654. Demographic data was similar including overdose history.

Hypertensive disorders were higher in the unexpected UDS group at 26.5% vs 15.2%, P=.044. NOWS treatment was similar in unexpected UDS at 56.7% vs 46.7%, P=.161, although the Finnegan score was higher in unexpected UDS 13.3 +/- 3.9 vs 12.1 +/- 3.9, P=.034. Prenatal and postpartum visits were lower in unexpected UDS group 14.6+/-7.9 v 18.9+/-7.1, P<.0001. Patients with unexpected UDS were less likely to be on buprenorphine at the time of delivery 77.9% v 94.4%, P=.0005. Rooming in and breastfeeding rates at discharge were lower in unexpected UDS at 45.3% v 64%, P=.012 and 7.4% vs 22.8%, P=.004 respectively, Table.

CONCLUSION: Unexpected UDS results in pregnant patients with OUD were associated with higher rates of hypertensive disorders, lower prenatal and postpartum visit attendance, fewer on MOUD at delivery, and lower rates of mother-infant bonding.

Table 1. Maternal and Neonatal delivery data with P value calculated by Fisher's exact test or two-sample t-test.

	Unexpected (n=68)	Expected (n=198)	P value
Prenatal (PN) & Postpartum (PP) Outcomes			
PN visits attended	11.1 +/- 6.9	14.2 +/- 5.5	0.001
Total number of PP visits	4 [2 to 5]	4 [3 to 6]	0.002
Number of PN and PP visits	14.6 +/- 7.9	18.9 +/- 7.1	0.0001
Percent lost to prenatal care	12 (17.6%)	5 (2.5%)	0.0001
Maternal Outcomes			
Mode of delivery • Vaginal Delivery • Operative Vaginal Delivery • Cesarean Section	 35 (51.5%) 5 (7.4%) 28 (41.2%)	 111 (56.6%) 8 (4.1%) 77 (39.3%)	 0.460
Complications • Preterm Labor • PPROM • Hypertensive disorders • Diabetes	 6 (9%) 6 (8.8%) 18 (26.5%) 2 (2.9%)	 19 (9.6%) 10 (5.1%) 30 (15.2%) 12 (6.1%)	 1 0.251 0.044 0.529
MAT Formulation at Delivery • Buprenorphine products • No MAT	 53 (77.9%) 9 (13.2%)	 187 (94.4%) 6 (3%)	 0.0005
Buprenorphine dose at delivery (mg)	12 [8 to 16]	12 [8 to 16]	0.654
Naloxone dose at delivery (mg)	2 [0 to 3]	2 [0 to 4]	0.561
SUD	66 (97.1%)	169 (85.4%)	0.008
Mother roomed in with infant	29 (45.3%)	121 (64%)	0.012
Neonatal Outcomes			
GA at delivery	38.1 +/- 1.3	38.1 +/- 2.0	1
Preterm birth rate	6 (8.8%)	23 (11.6%)	0.654
Birth weight (Grams)	2965 +/- 464	2955 +/- 540	0.888
Small for GA	7 (10.3%)	28 (14.2%)	0.534
APGARs • 1 min • 5 min • 10 min	 8.0 +/- 1.5 8.6 +/- 0.9 8.2 +/- 0.8	 7.9 +/- 1.6 8.6 +/- 1.0 8.0 +/- 0.9	 0.867 0.987 0.523
Admitted to NICU/NACU	59 (88.1%)	163 (82.7%)	0.341
Length of hospital stay (days)	13 [7 to 19.5]	11 [6 to 20.0]	0.505
Treated for NOWS	38 (56.7%)	92 (46.4%)	0.161
Highest Finnigan score	13.3 +/- 3.9	12.1 +/- 3.9	0.034
Length of NOWS treatment (days)	17.2 +/ 11.0	18.4 +/ 11.2	0.566
Breastfeeding before NOWS	3 (7.9%)	34 (37.4%)	0.001
Breastfeeding after NOWS	2 (5.3%)	32 (35.6%)	0.001
Breastfeeding at discharge	5 (7.4%)	44 (22.8%)	0.004
Infant Discharged to mother	20 (29.4%)	133 (67.2%)	<0.0001

840 How Much Oxytocin Do We Give? Cumulative Doses for Labour Acceleration

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OBJECTIVE: Recent publications call for more detailed data regarding the cumulative doses of oxytocin (CDOs) given over the course of labour, to increase our understanding of the drug. We aimed to evaluate the CDOs given for labour acceleration with a high dose regimen (HDR), to compare these to CDOs possible within low dose regimens (LDRs), and to evaluate if HDRs translate to high CDOs.

STUDY DESIGN: We conducted a retrospective cohort study of all Robson Group 1 patients over a one-year period who had been commenced on oxytocin for labour acceleration (augmentation) in the first stage (n=414). Labours were accelerated if progress was < 1cm/hour over a two-hour period. A HDR of oxytocin was given, commencing at 5mU/min and increasing by 5mU every 15 minutes to a maximum of 30mU/min. CDOs were manually calculated to account for all dose titrations, duration of each titration and labour duration. The CDOs given with our HDR were then compared to those permissible within a LDR, commencing at 2mU/min and increasing by 2mU every 30 mins to a maximum of 15mU/min.

RESULTS: CDOs spanned a wide, right skewed range (75 - 17,325mU) when recorded as a continuous variable. The mean (SD) CDO for our study cohort was 3006mU (±2992mU). 0.9% (4/414) of the population reached the maximum CDO permitted by the HDR. 57.2% (237/414) of the CDOs given were within the range permitted by LDRs. At 8-hours of oxytocin acceleration the mean (SD) CDO was 4468mU (±2729mU), less than 1/3 of the maximum permitted dose of 13,280mU over that duration.

CONCLUSION: Previous studies of CDOs comment on maximum permitted doses of oxytocin within HDR and LDRs, rather than true doses given. Our study shows that using a HDR, the true CDO given falls within the range of doses permitted by LDRs for the majority of cases. We report a mean CDO of 3006mU, which is lower than previous studies of with LDRs which quote 3437mU as the mean CDO for Group 1 labour acceleration. We conclude that CDOs reflect an institutions readiness to downward titrate, and safe, judicious use of oxytocin. Without knowledge of CDOs, debate regarding HDR and LDR is trivial.

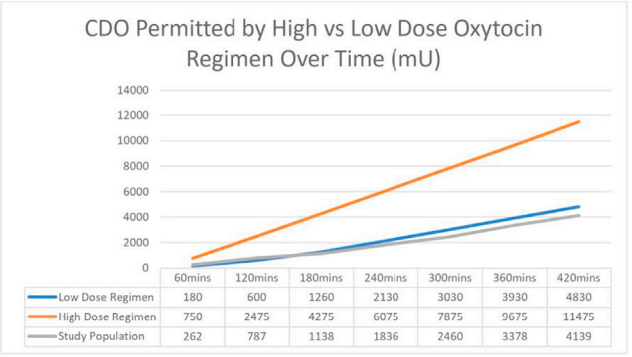

Figure 1. Maximum permitted CDO in a high vs a low dose oxytocin regimen, and CDO given in a high dose regimen (i.e. study population).

841 To Push or Not to Push: Passive Descent and the Second Stage

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OBJECTIVE: Guidelines vary widely regarding management of the second stage (SS), with recommendations focusing on duration of active pushing (DOAP) and passive descent (PD). We evaluated the impact of oxytocin on DOAP and mode of delivery. We aimed to evaluate if management in the SS should vary depending on first stage (FS) progress/oxytocin use.

STUDY DESIGN: This was a retrospective cohort study of 300 SS Robson Group 1 patients in an Irish tertiary referral centre. The study had three arms, 100 consecutive patients were recruited to each arm: oxytocin acceleration in the FS, oxytocin de novo in the SS, and no oxytocin. Patients were grouped according to PD or active pushing. DOAP and mode of delivery were recorded.

RESULTS: Operative intervention rates were higher, and DOAP was longer for those with PD, p=.00, with an increase of 16.8 ± 2.7 minutes (95% C.I. = 11.5 − 22.1). When analyzed in terms of oxytocin use, the findings remained significant only for those with oxytocin acceleration in the FS.

Those with PD had higher rates of malposition (OP/OT) (22.3%) than those immediately pushing (18.7%). This did not reach statistical significance (p=.46). Station was higher for those with PD (p= .00). Adjusting for these confounding factors, both oxytocin use in the FS (p=.04) and PD (p=.00) predicted the duration of AP, explaining for 14% of the variance in DOAP (r2 = .14).

CONCLUSION: Our findings agree with previous studies demonstrating a longer duration of the second stage has a significant impact on the

mode of delivery. Our findings are novel in their differentiation by oxytocin use. The impact of PD on mode of delivery only retains significance for those with oxytocin in the FS, suggesting that for this cohort, limiting the duration of the SS is more important. PD may therefore be less beneficial for those with a dystocic FS and should the position and station of the vertex be suitable, AP should be encouraged. This may also limit pelvic floor damage secondary to both a prolonged FS and SS.

842 Maternal Morbidity and Health Services Outcomes Following Combined Vaginal-Cesarean Twin Births

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OBJECTIVE: Maternal complications and healthcare costs of combined twin deliveries are not well defined. We sought to assess national trends and costs of combined deliveries and to analyze their association with adverse maternal outcomes.

STUDY DESIGN: Monochorionic (MCDA) and dichorionic (DCDA) diamniotic twin births were abstracted from the 2016-2020 Nationwide Readmissions Database. Mode of delivery (MOD) was defined using procedure codes and combined deliveries (CoD) as having both vaginal (VD) and cesarean delivery (CD) codes in the same hospitalization. CoD trends analyses by twin type were conducted using joinpoint regression to estimate the average annual percent change (AAPC) with 95% confidence intervals (CI). Adjusted logistic regression models were performed to evaluate associations between MOD and non-transfusion severe maternal morbidity (ntSMM) and other clinical outcomes adjusting for demographic, clinical, and hospital factors. Mean hospitalization costs and postpartum length of stay (ppLOS) were stratified by MOD.

RESULTS: Of 277,172 twin births, 72,536 (26.2%) resulted in VD, 8,845 (3.2%) in CoD, and 195,791 (70.6%) in CD. From 2016 to 2020, CoD prevalence for MCDA twins remained stable at 2.3% (AAPC 0.2%, 95% CI -2.6%, 3.0%) while decreasing significantly for DCDA twins from 3.6% to 3.2% (AAPC -2.4%, 95% CI -2.9%, -2.0%). CoD conferred higher odds of ntSMM (aOR 1.88, 95% CI 1.51- 2.34), transfusion, reoperation, wound infection, critical care interventions and intrauterine infection compared to VD (Table). Compared to CD, CoD were at higher odds of transfusion (aOR 1.63, 95% CI 1.44, 1.84), postpartum hemorrhage (aOR 1.50, 95% CI 1.34, 1.68), intrauterine infection (aOR 2.38, 95% CI 2.03, 2.79) and dilation and curettage (aOR 1.61, 95% CI 1.02, 2.53). Among the three modes of delivery, mean total costs adjusted for inflation were highest for CoD at $13,838 ($8,016 VD, $11,589 CD) with no difference in CoD versus CD ppLOS (3.3 days).

CONCLUSION: Combined vaginal-cesarean twin births are associated with higher odds of severe maternal complications and lead to higher hospitalization costs.

Table: Maternal morbidity of twin births in the United States stratified by mode of delivery

	Combined Delivery				Cesarean Delivery			
	Unadjusted		Adjusted		Unadjusted		Adjusted	
Outcomes	OR	95% CI	aOR	95% CI	OR	95% CI	aOR	95% CI
Non-transfusion SMM	2.00	1.60, 2.50	1.88	1.51, 2.34	1.95	1.77, 2.16	1.75	1.58, 1.94
Transfusion	3.05	2.66, 3.50	2.76	2.40, 3.17	1.79	1.66, 1.94	1.68	1.55, 1.82
Postpartum hemorrhage	0.86	0.77, 0.96	0.84	0.75, 0.94	0.59	0.57, 0.62	0.55	0.53, 0.58
Reoperation	13.49	4.51, 40.31	11.54	3.82, 34.82	11.71	4.84, 28.33	9.64	3.91, 23.72
DVT/PE	0.34	0.08, 1.42	0.33	0.08, 1.37	1.90	1.32, 2.74	1.85	1.27, 2.68
Wound infection	11.14	6.63, 18.70	10.39	6.20, 17.44	9.07	6.14, 13.40	7.87	5.31, 11.67
Critical care interventions	4.85	1.95, 12.02	4.09	1.73, 9.68	3.52	2.41, 5.15	3.15	2.14, 4.63
Intraoperative complication	3.24	2.19, 4.81	3.12	2.13, 4.56	3.06	2.52, 3.72	2.86	2.35, 3.48
Chorioamnionitis/endometritis	1.30	1.10, 1.52	1.19	1.01, 1.39	0.46	0.43, 0.50	0.49	0.46, 0.53
Dilation and curettage	0.16	0.10, 0.25	0.15	0.09, 0.23	0.11	0.09, 0.13	0.10	0.08, 0.12

*Reference group = vaginal twin deliveries. Adjusted for maternal age, payer, median income quartile, twin type, gestational age, hospital location and teaching status, hospital size, year of delivery, and clinical factors (hypertension, gestational and pre-gestational diabetes, obesity, history of cesarean delivery, placental abruption). SMM = severe maternal morbidity, DVT = deep vein thrombosis, PE = pulmonary embolism.

843 Patient Perception of Gestational Diabetes Mellitus And Its Influence on Adherence to Postpartum Diabetes Screening

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OBJECTIVE: Patients with Gestational Diabetes Mellitus (GDM) are at increased risk for developing Type II Diabetes Mellitus (T2DM). Postpartum screening for T2DM is lacking and presents challenges, with less than 50% of patients undergoing recommended follow up. We aim to understand risk perception and knowledge surrounding screening adherence to T2DM.

STUDY DESIGN: An IRB-approved, prospective study between August 1, 2022 to July 31, 2023 surveying patients diagnosed with GDM in a single hospital system. Data was collected at three timepoints - twice at antenatal diabetes education appointments and once postpartum prior to discharge from hospital. The survey was adapted from the Risk Perception Survey for Developing Diabetes (RPS-DD).

RESULTS: A total of 136 individuals participated in the study at least one time point. Twenty-two of these participants completed the survey at two time points. A total of 158 surveys were collected. Prior to study participation, 51.3% of patients had formal diabetes education. Patients believed that factors associated with T2DM development include previous GDM (66.9%), family history of T2DM (56.3%), and lifestyle factors (25.2%). Knowledge on racial discrepancies and diabetes diagnosis was limited, with only one third of respondents stating that non-white races (including Asian American, Black, Hispanic, and American Indian) are associated with increased risk of developing T2DM. Additionally, in comparison to women in their age group, 74.7% of GDM patients believe they are more likely to develop T2DM. Interestingly, only 50.7% believe they have increased immediate risk of developing T2DM over the next 10 years.

CONCLUSION: Understanding patient's perception and ensuring that we continue to educate and raise awareness surrounding their immediate and long-term risks related to development of T2DM is paramount. Education should highlight the increased risk of T2DM development in the 3-10 years post delivery. Further research is needed to understand how risk perception influences screening adherence.

844 Timeliness of diagnosis and treatment of postpartum hypertensive disorders in the Emergency Department

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OBJECTIVE: This study aims to assess the time to diagnosis and treatment of hypertensive disorders during the postpartum period in the Emergency Department, particularly focusing on potential disparities in care and identify areas for quality improvement.

STUDY DESIGN: The study was conducted at a multi-centered large medical institution in the metro-Detroit area, analyzing postpartum ED visits from November 2015 to December 2022. The primary analysis focused on the time elapsed between severe range blood pressure readings and the administration of antihypertensives. Secondary analyses included the presence of essential laboratory work up such as complete blood count, complete metabolic panel, urine protein and creatinine.

RESULTS: Among the 430 women who presented to the ED during the postpartum period with hypertension, 72.6% had preeclampsia with severe features, and 13% had chronic hypertension with superimposed severe preeclampsia. Of the patients with severe hypertension, only 72% received a complete blood count, 66% underwent evaluation of creatinine and liver profile, and 4% had a urine protein ordered. The average time from severe range blood pressure to antihypertensive administration was 189 minutes for Black patients and 370 minutes for White patients. There were no statistically significant differences in the time of first blood pressure reading, laboratory evaluation, or treatment of severe range blood pressure between racial groups.

CONCLUSION: This study identified the most significant area for improvement in the timely administration of antihypertensive medication following severe range blood pressure readings. Additional areas for improvement were observed in ordering essential laboratory tests to assess the severity of preeclampsia. Surprisingly, our institution demonstrated equal expeditious care for both white and black patients, contrary to existing literature indicating potential disparities. Based on these findings, a targeted quality improvement plan will be implemented to enhance the identified areas of concern.

845 Mode of delivery and postpartum depressive symptoms among nulliparous people with antenatal depression

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OBJECTIVE: Antenatal depression (AD) and cesarean delivery (CD) are both independent risk factors for postpartum depression (PPD); however, it is unknown whether mode of delivery impacts progression from AD to PPD.

STUDY DESIGN: The 2016-2019 Multistate Pregnancy Risk Assessment Monitoring System (PRAMS) data was used to identify first-time parturients with AD (reported depression in the 3 months prior to or at any point during pregnancy). Mode of delivery was obtained through the birth record. The primary outcome was self-reported PPD symptoms (positive response on the PHQ-2) and was compared between those undergoing a spontaneous vaginal delivery (SVD) to those who underwent operative birth (CD plus operative vaginal delivery). Maternal demographics, pregnancy characteristics and delivery characteristics were compared between groups. Population-weighted multivariable regression was performed, adjusting for a priori confounders.

RESULTS: Of the 15,317 people who met the inclusion criteria, 9,405 (63.6%) had a SVD and 5,912 (36.4%) had an operative birth. Parturients who underwent operative birth were older, had higher levels of education, were more likely to be married, had higher BMIs, more medical comorbidities (hypertension and diabetes), and higher rates of preterm birth than those who had a SVD (Table). After adjustment for confounders, there was no difference in the odds of PPD symptoms between those with AD who had a vaginal delivery compared with operative birth (aOR 1.08, 95% CI 0.95-1.24).

CONCLUSION: In this large, population-based, nationally representative study of first-time parturients with AD, there was no association between mode of delivery and risk of PPD symptoms. This is important for counseling those with AD, who are often concerned about the risk for development or progression of PPD.

Table 1: Pregnancy and delivery characteristics among recently-delivered parturients with antenatal depression, PRAMS 2016-20.

Demographic characteristic	Spontaneous Vaginal Delivery	Operative Delivery[f]	P-Value
Population	9,405 (63.6)	5,912 (36.4)	
Maternal age			<0.01
<20	1,802 (18.0)	680 (10.4)	
20-34	6,969 (76.2)	4,441 (76.5)	
≥35	633 (5.8)	791 (13.1)	
Maternal race/ethnicity			0.10
Hispanic	1,391 (13.8)	757 (11.7)	
Non-Hispanic white	4,791 (66.1)	3,176 (66.5)	
Non-Hispanic black	1,460 (12.9)	989 (14.1)	
Other	1,466 (7.2)	837 (7.7)	
Maternal education			
Less than high school	1,438 (14.6)	692 (11.0)	<0.01
High school diploma	2,838 (31.4)	1,637 (27.5)	
Some college	2,841 (29.1)	1,897 (32.4)	
College degree	2,223 (24.9)	1,648 (29.1)	
Married	3,541 (39.6)	2,552 (44.3)	<0.01
Insurance			<0.01
Public	5,033 (51.9)	2,956 (47.8)	
Private	4,021 (46.4)	2,767 (51.0)	
No insurance	168 (1.7)	76 (1.2)	
WIC Use in Pregnancy	4,404 (44.8)	2,625 (42.7)	0.14
Tobacco use in pregnancy	1,300 (12.1)	847 (13.3)	0.17
Hypertension			<0.01
Pre-gestational	1,174 (12.6)	977 (15.8)	
Gestational	1,574 (17.1)	1,566 (22.0)	
Diabetes			<0.01
Pre-gestational	839 (9.6)	716 (12.7)	
Gestational	781 (7.9)	672 (11.3)	
Body Mass Index			<0.01
<25	5,139 (56.6)	2,533 (45.6)	
25-29	1,224 (13.9)	726 (12.2)	
≥30	2,758 (29.4)	2,449 (42.2)	
Preterm birth	1,597 (8.2)	1,735 (15.0)	<0.01
Small for gestational age	1,704 (13.4)	1,238 (14.6)	0.17

* Columns are n,%, unless otherwise indicated
[f] Operative delivery includes cesarean delivery and operative vaginal delivery (vacuum, forceps)

846 Obstetric and neonatal outcomes in clinically diagnosed placental abruption with and without placental histopathological confirmation

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OBJECTIVE: Placental abruption (PA) is a severe obstetric complication. The diagnosis of PA is a clinical one, while placental histopathology (PH) is used to support the diagnosis. It is not yet clear whether PH findings consistent with PA are a marker of severity of abruption, and whether it correlates with maternal and neonatal

outcomes. Our aim was to compare obstetric and neonatal outcomes in clinically diagnosed PA cases with and without PH confirmation
STUDY DESIGN: All clinically diagnosed PA cases between 2008-2020 were reviewed. Obstetrics and neonatal outcomes, and PH were compared between patients with a clinically diagnosed PA with and without PH of retroplacental hematoma. Placental lesions were classified according to the current "Amsterdam" criteria. Composite of neonatal morbidity included one or more of the following complications: seizures, IVH, HIE, PVL, blood transfusion, NEC, or neonatal death
RESULTS: A total of 305 clinically diagnosed PA cases were included for analysis, of them 95 (31.3%) had PH lesions consistent with PA and 210 (68.8%) did not.

The group with PH lesions was characterized by higher rates of vaginal bleeding at presentation (51.6% vs. 36.2%, p=0.012), a higher rate of prematurity (61% vs. 34.2%, p< 0.001), and a higher incidence of the composite neonatal outcomes (27.3% vs. 13.4%, p=0.005). The group with PH retroplacental hematoma had substantially higher rates of concurrent maternal vascular malperfusion (MVM) lesions (31.6% vs. 11.9%, p< 0.001)
CONCLUSION: Approximately 1/3 of PA cases were confirmed by histopathology and were associated with worse obstetric and neonatal outcomes as well as placental MVM lesions

Table - Selected obstetric, neonatal, and placental outcomes

	Clinical PA & Histopathology confirmation (n=95)	Clinical PA (n=210)	P Value
Maternal age (years)	36.6 ± 6.01	35.3 ± 6.2	0.078
Nulliparity (%)	19 (20)	63 (30)	0.071
BMI (kg/m^2)	22.8 ± 8	23.5 ± 5.7	0.384
Preterm delivery <37 weeks (%)	58 (61)	72 (34.2)	**<0.001**
Gestational age at delivery (weeks)	34.8 ± 4.5	37.1 ± 3.7	**<0.001**
Presenting symptom vaginal bleeding (%)	49 (51.6)	76 (36.2)	**0.012**
Cesarean delivery (%)	64 (67.3)	164 (78.1)	0.064
Birthweight (gr)	2266.7 ± 827	2684.9 ± 785.7	**<0.001**
Small for gestational age (%)	14 (14.7)	29 (13.8)	0.859
Neonatal death (%)	4 (4.2)	3 (1.4)	0.209
Composite adverse neonatal outcome (%)	26 (27.3)	28 (13.4)	**0.005**
Placental weight <10th percentile (%)	19 (20)	48 (22.8)	0.655
Vascular lesions of maternal malperfusion (%)	30 (31.6)	25 (11.9)	**<0.001**
Villous lesions of maternal malperfusion (%)	26 (27.3)	70 (33.3)	0.352
Vascular lesions consistent with FTOD (%)	5 (5.2)	13 (6.2)	>0.999
Villous lesions consistent with FTOD (%)	2 (2.1)	14 (6.7)	0.162
MIR (stage 1-3) (%)	18 (18.9)	46 (21.9)	0.649
FIR (stage 1-3) (%)	6 (6.3)	15 (7.1)	>0.999

Continuous variables are presented as mean ± SD and categorical variables as n (%). p-values in bold are statistically significant. SGA- Birthweight < 10th centile; Composite adverse neonatal outcomes - One or more of the following severe complications: Neonatal seizures, intra-ventricular hemorrhage, hypoxic-ischemic encephalopathy, periventricular leukomalacia, the need for blood transfusion, necrotizing enterocolitis, or neonatal death; disease; MIR- maternal inflammatory response; FIR- fetal inflammatory response

847 One hour versus two hours postprandial glucose monitoring in gestational diabetes-mellitus: a prospective clinical trial

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OBJECTIVE: We aimed to compare perinatal outcomes and patient satisfaction in patients with gestational diabetes mellitus (GDM) monitored by 1-hour versus 2-hours postprandial glucose measurements (PPG1 vs PPG2).
STUDY DESIGN: A prospective control trial at a single tertiary center. The study population included patients with GDM, diagnosed by the two-step approach. Patients diagnosed with gestational diabetes who were referred to our ambulatory patient clinics were asked to participate in the trial. Patients were placed in one of two groups Group 1 —PPG1 group 2- PPG2 according to their preference. All patients otherwise were managed according to our GDM-clinic protocol: patients were placed on appropriate diet by a dietitian and were instructed to self-monitor and document their blood glucose measurements using a glucose meter 4 times a day (fasting + either PPG1 or PPG2 with the appropriate normal and abnormal cutoffs). As per our protocol patients were evaluated every 2 weeks from time of diagnosis to 32 weeks gestation and every one week afterward. Insulin or oral medications were administered as per clinic protocol as well as decisions regarding timing or mode of delivery. Patients were asked to fill in a detailed satisfaction and questionnaire in the last prenatal visit. The study was powered to detect a 25% difference in the primary outcome of composite of adverse neonatal outcomes.
RESULTS: Overall, 99 patients were recruited 50 in the PPG1 group and 49 in the PPG2 group. Baseline characteristics were comparable between the study groups. The rate of the primary outcome, as well as glycemic control, induction of labor, mode of delivery, and birth weights were comparable between the groups — (Table). All parameters of patient satisfaction were also comparable.
CONCLUSION: PPG1 and PPG2 postprandial glucose monitoring had comparable outcomes and patient satisfaction. Therefore, we recommend counseling patients to choose either strategy based on personal preference.

Table – Selected neonatal and pregnancy outcomes

	PPG1 group (n=50)	PPG2 group (n=49)	p-value
Composite neonatal complications (primary outcome)			0.27
Neonatal hypoglycemia	11 (22.0)	17 (34.7)	
Neonatal jaundice	0	1 (2.0)	
NICU admission	2 (4.0)	4 (8.2)	
Respiratory morbidity	5 (10.0)	2 (4.1)	
Balances glycemic control (<20% abnormal values)	41 (82.0)	39 (79.6)	0.76
Induction of labor	17 (34.0)	21 (42.9)	0.36
Mode of delivery			0.14
Normal vaginal delivery	22 (44.0)	30 (61.2)	
Cesarean delivery	26 (52.0)	16 (32.7)	
Assisted vaginal delivery	2 (4.0)	3 (6.1)	
Gestational age ate delivery (weeks)	38.2 ± 1.0	37.7 ± 1.5	0.09
Postpartum hemorrhage	0	1 (2.0)	0.49
Preeclampsia	1 (2.0)	3 (6.1)	0.36
Placental abruption	0	0	
Neonatal birthweight (grams)	3319 ± 355	3319 ± 520	0.99
Umbilical cord pH	7.31 ± 0.07	7.32 ± 0.06	0.80

Data are presented as mean ± standard deviation or n (%)

NICU – neonatal intensive care unit.

848 Outcomes in pregnancies complicated with preterm hypertensive disorders with and without late antenatal corticosteroids

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OBJECTIVE: To determine whether late preterm (34-36 weeks) course of antenatal corticosteroids (ACS) is associated with improved short-term neonatal outcomes among pregnancies complicated with hypertensive disorders of pregnancy (HDP) who delivered in the late preterm period.

STUDY DESIGN: A single tertiary center retrospective study (11/2011 to 05/2023), including all individuals with singleton, non-anomalous fetuses who delivered between 34.0-36.6 weeks of gestation following a diagnosis of HDP. Individuals with missing delivery data and those who received only a single dose of ACS were excluded. The primary outcome was a composite adverse neonatal outcome, including intensive care unit (NICU) admission, oxygen treatment, non-invasive positive pressure ventilation, mechanical ventilation, respiratory distress syndrome, or transient tachypnea of the newborn. Secondary neonatal outcomes included Apgar score, intraventricular hemorrhage, surfactant use, hypoglycemia, hyperbilirubinemia, and sepsis. Multivariable regression models were used to estimate adjusted odds ratio (aOR) and 95% confidence intervals (CI).

RESULTS: Of 7624 preterm deliveries during the study period, 262 (3.4%) individuals were diagnosed with HDP and delivered between 34+0 to 36+6 weeks. Of them, 73 (28%) received ACS in the late preterm period. Those treated with ACS were more likely to have a history of HDP (12.3% vs5.3%. , p=0.05), to be diagnosed with fetal growth restriction (19.2% vs7.4%. , p=0.006), delivered earlier (35.4 vs. 36.1 weeks, p=0.001), and to have a Cesarean delivery (67.1% vs48.9%. , p=0.008). After adjustments, the composite neonatal morbidity was similar between the two groups (aOR 0.87, 95% CI 0.44,1.72). Other secondary outcomes, including hypoglycemia requiring treatment, were also similar between the groups (Table).

CONCLUSION: Exposure to a late preterm ACS does not improve neonatal morbidity in newborns born in the late preterm period following HDP. Additional studies with larger cohorts in this specific population are required.

Table: Neonatal outcomes in relation to antenatal corticosteroids exposure

Outcome	No ACS (n=189)	Late Preterm ACS (n=73)	P-value	aOR (95% CI) #
Composite neonatal morbidity*	48 (25.4)	22 (30.1)	0.44	0.87 (0.44-1.72)
NICU admission	31 (16.8)	18 (24.7)	0.15	
Oxygen treatment	25 (13.5)	8 (11.0)	0.58	
NIPPV treatment	7 (3.8)	1 (1.4)	0.45	
Mechanical ventilation	5 (2.7)	1 (1.4)	1.00	
TTN	19 (10.3)	7 (9.6)	0.87	
RDS	7 (3.8)	4 (5.5)	0.51	
Apgar 1 minutes	8.6±1.5	8.73±1.0	0.56	
Apgar 5 minutes	9.6+1.5	9.90±0.3	0.37	
Birthweight	2499.9±437.1	2276.4±404.4	<0.001	
Surfactant use	1 (0.5)	1 (1.4)	0.48	
IVH	1 (0.5)	0 (0.0)	1.000	
Hypoglycemia**	56 (30.3)	30 (41.1)	0.097	
Hypoglycemia requiring treatment***	38 (20.5)	21 (28.8)	0.156	
Hyperbilirubinemia	87 (47.0)	39 (53.4)	0.35	
Neonatal sepsis	0 (0.0)	0 (0.0)	NC	

Dichotomous variables are presented as n(%), continuous variables are presented as mean (±standard deviation)

aOR: adjusted odds ratio, CI: confidence interval, IVH: intraventricular hemorrhage, NC: not calculated, NICU: neonatal intensive care unit, NIPPV: non-invasive positive pressure ventilation, RDS: respiratory distress syndrome, TTN: transient tachypnea of the newborn.
* Defined as any of the following: NICU admission, oxygen treatment, NIPPV, mechanical ventilation, RDS, or TTN
** Defined as serum glucose lower than 40 mg/dl at first 24 hours and lower than 50 mg/dl afterwards.
*** Defined as the need for oral or parenteral treatment.
# Adjusted to mode of delivery and gestational age at birth.

849 Macrosomia prediction via sonographic and obstetrical parameters using machine learning

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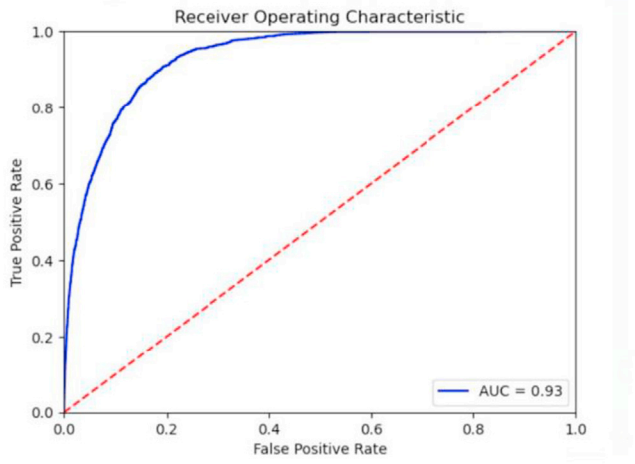
OBJECTIVE: Assessing the predictive capacity of machine learning (ML) algorithm, incorporating sonographic and obstetrical parameters, in predicting macrosomia

STUDY DESIGN: Retrospective cohort study including all parturients at a single tertiary university who had a singleton live birth at $\geq$ 36 gestational weeks between July 2012 and September 2020, in whom a sonographic estimated fetal weight (EFW) 14 days prior birth was available. The study employed a total of 39 features, comprising biometry sonographic measurements such as abdominal circumference (AC), femur length (FL), bi-parietal diameter (BPD), and head circumference (HC), along with maternal data encompassing demographic information, anthropometric measurements, obstetrical history, chronic and gestational morbidity, and glucose values for gestational diabetes screeaining and diagnosis. Gradient boosting-catboost was utilized to estimate birth weight $\geq$ 4000 grams. The predictive capacity of the algorithm was then compared to the Hadlock EFW formula accuracy

RESULTS: A total of 20,468 parturients met the inclusion criteria, and 9.29% of the neonates were classified as macrosomic, defined by a birth weight of $\geq$ 4000 grams. Notably, the algorithm's performance was influenced most significantly, in descending order, by AC, FL, BPD, fetal gender, HC, gestational age, and parity. The algorithm's predictive capacity for macrosomia exhibited an area under the curve (AUC) of 0.93 (95% CI 0.927-0.936), outperforming the AUC of 0.89 observed for the Hadlock's EFW formula (Figure 1). When employing Youden's index, the algorithm demonstrated a positive predictive value (PPV) of 0.32 and a negative predictive value (NPV) of 0.99.

CONCLUSION: The predictive algorithm demonstrated superior accuracy compared to the traditional EFW formula in predicting macrosomia, resulting in a remarkably high NPV. The incorporation ML algorithm into clinical care has the potential to greatly assist in patient counseling regarding the optimal timing and mode of delivery, thereby potentially reducing neonatal morbidity risks.



850 Timing of the diagnosis of fetal growth restriction: better early or better late?

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OBJECTIVE: SMFM defines early-onset fetal growth restriction(FGR) when diagnosed < 32 weeks(wks) of gestation. The implication of the gestational age(GA) at the time of diagnosis of FGR (based on estimated fetal weight(EFW) or abdominal circumference(AC)) in regards to neonatal outcomes is unclear. The objective of the study was to assess whether the severity of neonatal outcomes was associated with the GA at the time of diagnosis of FGR.

STUDY DESIGN: A retrospective cohort study, from 3/2018-12/2022, on singleton gestations, with FGR, delivered at term. Fetuses were stratified into groups based on GA at diagnosis: < 24 wks, 24-32 wks, and >32 wks. Groups were further stratified into FGR based on overall EFW< 10% and those that were diagnosed based on an isolated AC< 10th%. The primary outcome was a neonatal composite outcome: NICU Admission, APGAR < 5 at 5 minutes, neonatal hypoglycemia & small for GA.

RESULTS: Of 529 patients, 20 patients were diagnosed with FGR < 24 wks (17 by EFW, 3 by AC), 126 diagnosed 24-32 wks (78 by EFW, 48 by AC) & 382 diagnosed >32 wks (141 by EFW, 241 by AC). Individuals diagnosed at < 24 weeks had a higher likelihood of having an adverse event compared to individuals who were diagnosed at GA >32 wks (90% vs. 60.5%, p=0.0003). In regards to the 24-32 wks group, there was no statistically significant difference in the composite outcomes when compared to < 24 wks or >32 wks groups. Furthermore, regardless of the mode of diagnosis (EFW vs AC) there were more adverse composite neonatal outcomes when FGR was diagnosed < 24 wks compared to >32 wks (Table 1). There is a trend of improvement of outcomes in the 24-32 wks period, but it does not reach statistical significance.

CONCLUSION: Our data implies that the diagnosis of FGR, at any GA, regardless of the mode of diagnosis, is associated with neonatal morbidity of >50%. However, those infants diagnosed < 24 weeks GA, have a significantly higher risk of morbidity than any other GA. Therefore, it is our contention that the definition of early FGR should be expanded upon to reflect the severity of the disease at this periviable time.

Table 1. Primary Outcome – Composite Fetal/Neonatal Outcome by GA.

All Patients Diagnosed with FGR					
Variable	ALL (n=528)	<24 WEEKS (n=20)	24-32 WEEKS (n=126)	>32 WEEKS (n=382)	p-value
Composite Fetal/Neonatal Outcome –no. (%)	353 (66.9)	18 (90.0)	104 (82.5)	231 (60.5)	<.0001
Patients diagnosed with FGR by: AC < 10%, EFW >10%					
Variable	ALL (n=292)	<24 WEEKS (n=3)	24-32 WEEKS (n=48)	>32 WEEKS (n=241)	p-value
Composite Fetal/Neonatal Outcome –no. (%)	159 (54.5)	2 (66.7)	35 (72.9)	122 (50.6)	0.009
Patients diagnosed with FGR by: EFW <10%					
EFW Variable	ALL (n=236)	<24 WEEKS (n=17)	24-32 WEEKS (n=78)	>32 WEEKS (n=141)	p-value
Composite Fetal/Neonatal Outcome –no. (%)	194 (82.20)	16 (94.12)	69 (88.46)	109 (77.30)	0.049

851 Neonatal outcome in late preterm twin gestation: impact of antenatal corticosteroids before 34 weeks

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OBJECTIVE: This study aims to investigate the impact of antenatal corticosteroids (ACS) treatment before 34 weeks on neonatal outcome of dichorionic diamniotic (DCDA) twins born at late preterm (gestational age (GA) 34-36.6 weeks).

STUDY DESIGN: This retrospective study examined all DCDA twin gestations born during the late preterm period between 2014 to 2020. Maternal and neonatal outcomes were compared between twin gestations treated with ACS (before 34 weeks) (ACS group) and those who were not exposed to ACS (control group). Sub-analysis was performed to compare neonatal outcome between those treated with ACS during the 14 days prior to delivery and those treated more than 14 days before delivery. Composite adverse neonatal outcome included: hypoglycemia, sepsis, respiratory morbidity, blood transfusion, cerebral morbidity.

RESULTS: A total of 297 twin pregnancies were included, with 122 in the ACS group and 175 in the control group. Maternal age, BMI, hypertensive disorders, diabetes mellitus and mode of delivery did not differ between groups. GA at delivery was lower in the ACS group compared to the control group (35.06 ± 0.8 weeks vs. 35.49 ± 0.69 weeks, p< 0.001). The ACS group had higher rates of nulliparity (46.7% vs. 33.1%, p=0.018), induction of labor (13.1% vs. 5.1%, p=0.015), and neonatal NICU admission (p< 0.001). Composite adverse neonatal outcome did not differ between the groups. Within the ACS group, neonates delivered within 14 days from ACS

treatment had higher rates of NICU admission compared to those who were born >14 days from ACS treatment (p< 0.004), yet adverse composite neonatal outcome did not differ between the groups. By multivariable logistic regression analysis ACS treatment was not found to be independently associated with composite adverse neonatal outcome.

CONCLUSION: Twin pregnancies treated with ACS before 34 weeks but delivered in the late-preterm period, showed similar outcomes compared to those who were not treated with ACS. Clinical judgment for ACS treatment should consider the GA and its proximity to 34 weeks of gestation.

Table- Comparison of neonatal outcome of twin gestations according to ACS

	Control group (n=350)	ACS group (n=244)	P value
Birth weight (gram)	2317.3±329.5	2168.9±360.3	**0.0001**
5-min Apgar score < 7	3 (0.9)	3 (1.2)	0.69
Admission to NICU	58 (16.6)	88 (36.1)	**0.0001**
Hypoglycemia	3 (0.9)	3 (1.2)	0.69
Respiratory distress	5 (1.4)	0	0.082
Composite adverse neonatal outcome	15 (4.2)	10 (4.09)	0.9
	ACS ≤ 14 days (n= 46)	**ACS > 14 days (n= 198)**	**P value**
Birth weight (gram)	2175.8±362	2139.3±351.5	0.643
GA (weeks)	34.57±0.58	35.17±0.79	**<0.0001**
5-min Apgar score < 7	1 (0.5)	2 (4.3)	0.092
Admission to NICU	25 (54.3)	63 (31.8)	**0.004**
Hypoglycemia	3 (1.5)	0	1
Composite respiratory morbidity	0	0	
Composite adverse neonatal outcome	0	10 (5.05)	0.216

Data are mean± standard deviation, n (%). NICU- neonatal intensive care unit. Composite outcome included at least one of the following- hypoglycemia, sepsis, respiratory morbidity, anemia/blood transfusion, cerebral hemorrhage, HIE or convulsions, Intraventricular hemorrhage (IVH).

852 Utility of a standardized reporting system in prenatal ultrasound for placenta accreta spectrum disorder

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OBJECTIVE: Prenatal diagnosis of placenta accreta spectrum disorders (PASD) has become essential to allow for a well-conducted multidisciplinary management plan before the onset of labor to reduce maternal and fetal morbidity and mortality. In addition to risk-factor assessment, first-line modalities for predicting PASD are two-dimensional grayscale ultrasound (US) and color Doppler. Inconsistency and variability of reported US descriptors complicate multidisciplinary collaboration and research communication within and between institutions nationally and internationally.

STUDY DESIGN: We conducted a retrospective review of patients evaluated and delivered for PASD at the University Health System in San Antonio, Texas. In January 2023 our institution implemented a standardized reporting protocol for prenatal ultrasound descriptors of PASD. We compared the rate of reported standardized ultrasound descriptors and PASD type from January to July 2022 and the same period in 2023, before and after the implementation of this tool.

RESULTS: Of the 30 cases included, 17 (56.7%) pre-implementation and 13 (43.3) post-implementation. Pre-implementation, PASD was histologically confirmed as percreta in 69.2%, increta in 15.4%, and accreta in 15.4%. Post-implementation, PASD histological confirmation revealed of placenta percreta in all cases (100%). The type of placenta accreta based on prenatal ultrasound was reported only in 35% of cases in the pre-implementation period compared to post-implementation 85% (p=0.007). The rate of reported standardized ultrasound descriptors before and after implementation of our protocol is demonstrated in Table 1.

CONCLUSION: Implementation of standardized protocol into routine practice of prenatal maternal-fetal ultrasound for PASD improves reporting rate of ultrasound descriptors, and a priori risk and placenta accreta index (PAI) score, both of which facilitate multidisciplinary collaboration and surgical planning for patients with PASD.

Table 1. Reporting of standardized PAS descriptors before and after implementing an ultrasound protocol

	Pre-Implementation		Post-Implementation		P*
	N=17	%	N=13	%	
Placenta previa	13	76.5	12	92.3	0.39
Placenta location	15	88.2	13	100	0.20
Placenta structure	1	5.9	10	76.9	**0.0001**
Clear zone	5	29.4	12	92.3	**0.0006**
Placenta lacunae	11	64.7	13	100	0.34
Lacunae grade	4	23.5	7	53.8	0.087
Retroplacental hypervascularity	10	58.8	12	92.3	0.039
Bridging vessels	7	41.2	12	92.3	**0.0040**
Smallest myometrial thickness (SSMT)	6	35.3	12	92.3	**0.0016**
Placental bulge	6	35.3	10	76.9	**0.0235**
Exophytic mass	0		5	38.5	**0.0128**
A priori risk	2	11.8	10	76.9	**0.0003**
Placenta accreta index (PAI) score	4	23.5	11	84.6	**0.0009**

*chi-square

853 Outcomes of Stevens-Johnson syndrome and toxic epidermal necrolysis in pregnant women, 2009-2020

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OBJECTIVE: Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) are rarely described in the pregnant population, and little is known about their impact on the mother and developing fetus. We aim to describe SJS/TEN in pregnant women and to investigate the risk factors for developing SJS/TEN in pregnancy.

STUDY DESIGN: We utilized hospitalization data from the 2009-2020 National Inpatient Sample. Pregnancy hospitalizations and SJS/TEN involvement were identified by ICD-9/10 codes and analyzed by chi-square and logistic regression.

RESULTS: We identified 650 pregnancies complicated by SJS/TEN requiring hospitalization. The median age was 28 (IQR: 23-32) years, and the majority of patients were non-Hispanic white (55.2%). There were ≤10 cases of mortality in the cohort. Among cases with trimester data, 73.9% of SJS/TEN cases occurred during the third trimester. In the multivariable logistic regression model, HIV infection (OR=9.49; 95% CI=1.24-7.24; p=0.030), herpes simplex virus (HSV) infection (OR=2.49; 95% CI=1.15-5.41; p=0.021), genitourinary tract (GU) infections (OR=3.80; 95% CI=2.01-7.16; p< 0.001), malignant neoplasm (OR=8.67; 95% CI=1.22-61.39; p=0.031), and lupus (OR=41.94; 95% CI=20.78-84.66; p< 0.001) were associated with increased odds of developing SJS/TEN in pregnancy. Of 650 pregnant patients with SJS/TEN, 378 delivered during the hospitalization. The rates of preterm births were higher in the SJS/TEN cohort, 16.9% versus 8.2% (p< 0.001). There were no significant differences in frequency of pre-eclampsia, stillbirths, and post-term births compared to the non-SJS/TEN pregnancy cohort.

CONCLUSION: Although rare, SJS/TEN in pregnancy is associated with favorable perinatal outcomes aside from an increase in preterm birth. The high prevalence of SJS/TEN in the third trimester may reflect the inflammatory state of the late third trimester. Lupus, malignancy, HIV, and to lesser degrees, HSV and GU infection should be considered in the differential diagnosis.

Table 1: Logistic regression risk factors for association with developing Stevens-Johnson syndrome and toxic epidermal necrolysis in pregnancy (2009-2020).

Risk Factors		Crude Odds Ratio (95% CI)	Crude P-Value	Adjusted Odds Ratio (95% CI)	Adjusted P-Value
Demographics					
Age	≥30 (vs <30)	0.99 (0.70-1.41)	0.973	0.96 (0.65-1.28)	0.821
Race/Ethnicity	White (vs Other)	1.31 (0.92-1.88)	0.137	1.40 (0.97-2.01)	0.071
Metabolic Disorders					
Diabetes	Yes (vs No)	2.39 (0.88-6.47)	0.086	2.25 (0.82-6.16)	0.114
Obesity	Yes (vs No)	1.01 (4.94-2.06)	0.980	0.81 (0.37-1.78)	0.597
Infections					
Hepatitis B or C	Yes (vs No)	2.75 (0.68-11.11)	0.156	1.84 (0.41-8.24)	0.423
HIV Positive	Yes (vs No)	1.17 (1.64-8.40)	**0.014**	9.49 (1.24-7.24)	**0.030**
Herpes Simplex Virus Infection	Yes (vs No)	2.60 (1.21-5.57)	**0.014**	2.49 (1.15-5.41)	**0.021**
Genitourinary Tract Infection	Yes (vs No)	4.75 (2.68-8.43)	**<0.001**	3.80 (2.01-7.16)	**<0.001**
Other					
Malignant Neoplasm	Yes (vs No)	10.57 (1.48-75.62)	**0.019**	8.67 (1.22-61.39)	**0.031**
Lupus	Yes (vs No)	53.85 (2.90-99.99)	**<0.001**	41.94 (20.78-84.66)	**<0.001**
Intravenous Drug Use	Yes (vs No)	2.54 (0.81-7.97)	0.111	1.65 (0.48-5.69)	0.429
Pregnancy Complications					
Pre-Eclampsia	Yes (vs No)	1.33 (0.68-2.63)	0.405	1.27 (0.63-2.55)	0.502

854 Inositols pathway is altered in placental tissue of obese women

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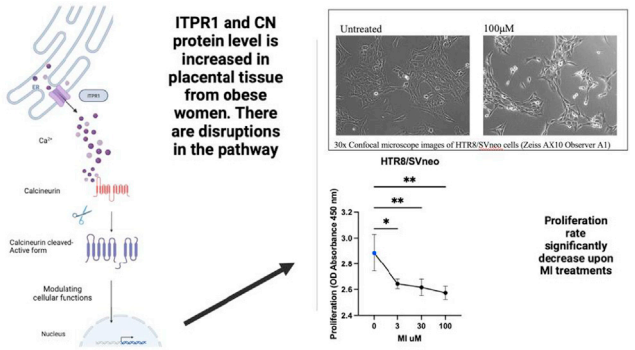
OBJECTIVE: Obesity in pregnancy has significant short- and long-term consequences for both women and their neonates as well for long-life metabolic disorders. Myo-Inositol (MI) has a pivotal role in Insulin/glucose metabolism interacting with Inositol 3 phosphate receptor 1 (ITPR1) in endoplasmic reticulum. This pathway influences also cellular functions. The objective was to investigate potential changes of MI pathway in placental tissue of obese women, investigating its role in cellular proliferation.

STUDY DESIGN: In a non-randomized experimental study, placental explants were collected from uncomplicated obese (OB) and normal weight (CTRL) women undergoing elective cesarean section, at term. Tissues were snap frozen in liquid nitrogen. Critical proteins involved in Ins regulation and pathway including SMIT1, SMIT2, ISYNA1, MIOX, ITPR1 and CN were analyzed. Total proteins were extracted with RIPA buffer, their concentrations measured with BCA assay and quantified by Western Blot (WB). To investigate the effect of MI treatment on placental cells, a trophoblast human cell line (HTR8/SVneo) was used for proliferation assay study (Immunological science). Student's t test was used for single comparison analysis and ANOVA for multiple comparisons. Data were significant if p< 0.05.

RESULTS: Thirty-four placenta samples (18 OB vs 16 CTRLs) were analyzed by WB. Data were normalized on GAPDH protein level. ITPR1 was upregulated in OB group (p=0.002) compared to CTRLs, as well as the active cleaved form of calcineurin (CN) (p=0.004). We did not observed alteration in SMITs, MIOX and ISYNA1 protein levels. "*In vitro*" MI treatment, in a dose-dependent way, decreased proliferation of trophoblast cells (Fig).

CONCLUSION: An alteration of the MI pathway within placenta tissue of OB women was demonstrated as revealed by significant increase in ITPR1 protein level and active CN. No changes instead occurred in MI cellular intake, synthesis and catabolism. MI inhibited trophoblast cell proliferation. In women with pre-pregnancy obesity up-regulation of placental MI activity could affect placenta development.



855 Incidence of Dysphoric Milk Ejection Reflex

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OBJECTIVE: Dysphoric Milk Ejection Reflex (DMER) is a condition described as brief, abrupt, negative emotions experienced by breastfeeding individuals prior to milk letdown. It may negatively impact the breastfeeding relationship. Our primary objective was to determine the incidence of DMER.

STUDY DESIGN: A prospective cohort study with English speakers who delivered a liveborn infant between December 2022-May 2023 at two hospitals within a large healthcare system in New York. Patients who elected to breastfeed were eligible for the study. Participants were emailed an initial survey at the time of consent. The following morning, they started receiving surveys three times daily for one week assessing for DMER symptoms, with symptom severity rated on a Likert scale. Medical records were reviewed to obtain patient demographics, antepartum course, and obstetrical and fetal outcomes. Descriptive statistics were performed to determine incidence and characterize the patient population.

RESULTS: 203 patients were approached for participation. 151 consented and 1 withdrew, leaving 150 participants in the study. Of those, 59 did not complete any surveys, and 73 were lost to follow up. The 18 remaining participants completed the initial survey and >50% of the surveys assessing for DMER symptoms, for a total of

321 surveys completed. 33.% (n=6) screened positive for DMER in more than 50% of breastfeeding episodes. Patients who screened positive were more likely to be <35 years old, non-Hispanic white, married, obese, privately insured, and delivered at term by cesarean section. Amongst those who screened positive for DMER, no one had a history of psychiatric disorders. DMER symptom severity was mostly very mild to moderate (Table 1). One patient reported severe symptoms.

CONCLUSION: More than 1 in 4 breastfeeding women screened positive for DMER. It is important to extend this research to better define, quantify, qualify, and publicize this condition in an effort to inform clinical practices to facilitate successful, healthy, breastfeeding relationships.

	% Patients Reporting DMER Symptom Severity (n=6)			
Symptoms	Very Mild	Mild	Moderate	Severe
Aggression	66.7	50.0	16.7	
Agitation	66.7	50.0	16.7	16.7
Anger	50.0	50.0	16.7	16.7
Annoyance	83.3	50.0	16.7	16.7
Anxiety	83.3	83.3	33.3	16.7
Confusion	33.3	33.3		16.7
Depression	50.0	33.3	33.3	16.7
Distress	33.3	16.7		16.7
Fear	33.3			
Frustration	83.3	50.0	16.7	
Guilt	66.7	16.7		
Impatience	100.0	50.0	33.3	16.7
Nausea/vomiting	33.3			16.7
Oversensitivity	50.0	16.7	16.7	16.7
Panic	66.7	16.7		16.7
Paranoia		16.7		
Pit in stomach	16.7	33.3	16.7	16.7
Restlessness	33.3	16.7	16.7	
Sadness	33.3	50.0	16.7	16.7
Tenseness	16.7	50.0		
Worthlessness		16.7		

856 Intrapartum Maternal Fever and Severe Maternal Morbidity

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OBJECTIVE: To determine the association between severity of intrapartum maternal fever and severe maternal morbidity (SMM).

STUDY DESIGN: Retrospective cohort of all deliveries that occurred at 7 hospitals within a large health care system in New York from 2019-2022. Pregnancies without intrapartum temperature data were excluded. Clinical and sociodemographic data were obtained from the electronic medical record system. The primary exposure was maximum temperature prior to delivery. The cohort was divided into three groups: afebrile (<38.0 °C), mild fever (≥ 38.0°C – 39.0°C), moderate-severe fever (≥ 39.0°C). The primary outcome was SMM, defined using the Centers for Disease Control and Prevention (CDC) criteria. Multivariable logistic regression was used to evaluate the association between maximum maternal temperature and SMM, adjusting for potential confounders.

RESULTS: A total of 65,246 deliveries were included for analysis: 96.4% (n=62,918) afebrile, 3.2% (n=2,092) mild fever, and 0.4% (n=236) moderate-severe fever. The overall rate of SMM was 4.3% (n=2,780), which occurred in 4.0%, 9.3%, and 22.9% of the afebrile, mild fever, and moderate-severe fever groups, respectively ($p < 0.001$). On multivariable logistic regression analysis, SMM was 2.41 and 7.55 times more likely in pregnancies complicated by mild or moderate-severe fever compared to afebrile patients (95% CI 2.03-2.86 and 5.36-10.47, respectively).

CONCLUSION: Maternal intrapartum fever is an independent predictor of SMM. Further investigation is warranted to determine the optimal timing of antibiotic administration to effectively reduce this risk.

Table 1. Multivariable logistic regression analysis.

Characteristic	aOR (95% CI)
Temperature	
<38 °C	REFERENCE
38 - 39°C	2.41 (2.03-2.86)
≥39°C	7.55 (5.36-10.47)
Maternal Age (≥ 35yo)	1.18 (1.07-1.30)
Race-Ethnicity other than Non-Hispanic White	1.42 (1.30-1.56)
Obesity	1.00 (0.92-1.10)
Multiparity	0.63 (0.57-0.70)
Public Insurance	1.15 (1.05-1.26)
Multiple Gestation	2.79 (2.30-3.37)
Pre-eclampsia with severe features	4.24 (3.77-4.77)
Other hypertensive disorders	1.75 (1.56-1.96)
Placental Abnormalities	5.00 (4.28-5.81)
Prior Uterine Surgery	2.19 (1.95-2.45)

* Logistic regression model included 56,500 deliveries and adjusted for all above variables.

857 Validation of the PROMIS© Medication Adherence Scale for Aspirin Among Pregnant Patients

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OBJECTIVE: Low-dose aspirin is an essential tool to prevent preeclampsia. A measure validated in the prenatal setting to evaluate adherence, which is essential to efficacy, is lacking. We investigated the validity and performance of an instrument validated outside a pregnant population to measure medication adherence among pregnant patients of low socioeconomic status who were recommended low-dose aspirin.

STUDY DESIGN: This was a cross-sectional analysis using the National Institutes of Health (NIH) Patient-Reported Outcomes Measurement Information Systems (PROMIS©) Medication Adherence Scale (PMAS), which contains two subscales, Medication Beliefs and Knowledge (MBK) and Medication Taking Behaviors (MTB). This was assessed among pregnant people who were recommended low-dose aspirin at an urban tertiary care center clinic between April and July 2023. We assessed internal consistency and reliability, and compared mean PMAS scores using Mann-Whitney U and Kruskal-Wallis tests by self-reported maternal race/ethnicity, history of adverse pregnancy outcome (APO), or history of pre or gestational diabetes.

RESULTS: Among 40 patients surveyed, the mean PMAS score was overall high at 41.18 (SD 3.90) and the internal consistency reliability was strong at 0.83. Item-to-total PMAS score correlations demonstrated a moderate to good fit (r range 0.39-0.80) for all items except two in the MTB subscale which focused on medication side effects (MedAd7) and cost (MedAd9) (Table 1). Self-reported race, ethnicity, history of APO, or history of diabetes were not associated

with a significant difference in PMAS score (p = 0.62, 0.40, 0.36, 0.70 respectively).

CONCLUSION: This study revealed that use of PMAS in this population is reliable, but that the MTB subscale may be weakened by inherent characteristics of low-dose aspirin (e.g., few side effects and low cost). It may be preferable to use MedAd5 as a stand-alone item along with the MBK subscale in future evaluations of this population. There was no statistically significant difference in PMAS score by any demographic or clinical characteristic.

Score Totals & Narratives		Mean Score (SD)	Max Score	Cronbach's Alpha
Medication Beliefs & Knowledge		17.53(2.10)	20	0.78
MedAd1	*"I know how to take this medication as recommended"*			
MedAd2	*"I understand why I need to take this medicine"*			
MedAd3	*"I believe it is important to take this medicine"*			
MedAd4	*"I believe this medicine is working"*			
Medication Taking Behaviors[1]		23.65(2.33)	25	0.74
MedAd5	*"I took this medicine as recommended"*			
MedAd6	*"I remembered to take this medication"*			
MedAd7	*"I did not take this medicine because it caused side effects that bothered me"*			
MedAd8	*"I stopped taking this medicine because I thought I did not need it"*			
MedAd9	*"I did not take this medicine because of the cost"*			
PMAS Total Score		41.18(3.90)	45	0.83

[1] Medication Taking Behaviors were assesed over the prior 7 days

858 Applying machine-learning models to successful Vaginal Birth after two Cesarean Deliveries

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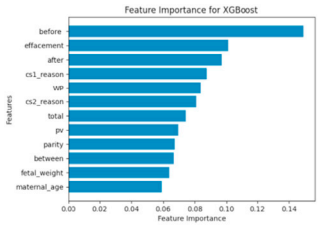
OBJECTIVE: Applying machine-learning models to clinical features of women attempting Trial of Labor after two Cesarean deliveries to predict success rate.

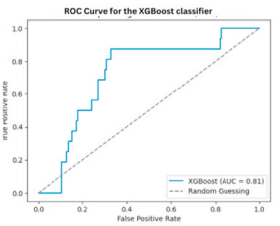
STUDY DESIGN: A Retrospective Cohort Study was conducted between the years 2009 -2021 at a University- affiliated Medical Center. Data was extracted from records and included maternal demographics and clinical features. The primary outcome was Vaginal Birth After Two Cesarean deliveries (VBAC2) without uterine rupture or dehiscence. Secondary outcomes were APGAR scores at 1 and 5 minutes, neonatal pH values below 7.1, Neonatal Intensive Care Unit admissions, maternal need for blood transfusion, and intrapartum, neonatal and maternal mortality. We used different machine-learning models and statistical regression to predict the outcome class.

RESULTS: Among a total of 91196 singleton deliveries, 2472 of women underwent two prior Cesarean sections. Of these, 475 deliveries were approved for and attempted trial of labor. Of them, 408 (86%) had successful VBAC2, 406 without uterine rupture or dehiscence. In total, 10 women had uterine rupture (2.1%) and 4 (0.8%) had dehiscence of uterine scar. There were no mortalities, neonatal or maternal. The most accurate classifier model was the XGBoost Classifier (ROC AUC 81%), followed by the Randon Forest Classifier (ROC AUC 80%) and then by the Logistic Regression Classifier (ROC AUC 72%). The sensitivity and specificity of the XGBoost were 25.0% and 96.4%, respectively, defining the prediction probability threshold as 0.25, with high specificity. The parameters with the highest importance for successful VBAC2 XGBoost Classifier are presented in figure 1.

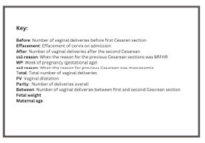
CONCLUSION: Machine-learning models trained with clinical data may be useful in predicting safety and success for vaginal delivery after two Cesarean sections with a relatively high degree of certainty. Using these models may aid in counseling women before delivery and help patients and physicians make more informed decisions regarding mode of delivery choices in the case of two previous Cesarean sections.



Graph 1



Graph 2



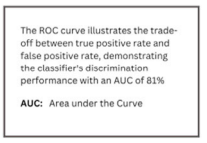


Figure 1

859 Neonatal and Maternal Outcomes Following Implementation of Expectant Management of Late Preterm PROM

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OBJECTIVE: Recent evidence suggests that both immediate delivery and expectant management until 37 weeks are reasonable options for stable preterm premature rupture of membranes (PPROM) in the late preterm period. We compared maternal and neonatal outcomes pre- and post-implementation of a January 2021 institutional guideline which introduced the option of expectant management after 34 weeks' gestation.

STUDY DESIGN: This was a retrospective cohort study of patients admitted with PPROM between 28 – 36 6/7 weeks' gestation from May 2019 to December 2020 (pre-implementation) and from April 2021 to December 2022 (post-implementation). Pregnancies with fetal anomalies and multiple fetuses were excluded. The primary outcome was neonatal intensive care unit (NICU) length of stay (LOS). Secondary outcomes included neonatal sepsis, maternal LOS, and chorioamnionitis.

RESULTS: Data were collected from 170 patients pre-implementation and 180 post-implementation. The median gestational age at the time of PPROM was the same between groups (34 weeks, IQR 32 – 35.3 vs. 34 weeks, IQR 32.1 – 35.1). NICU LOS was similar in both pre- and post-groups (14.7 days, IQR 4.4 - 29.7 vs. 12.7 days, IQR 4.0 - 23.4, p=0.35). When patients in active labor at the time of admission were excluded, results remained similar (13.5 days, IQR 4.0 - 27.7 vs. 11.0 days, IQR 4.0 - 22.9, p=0.35). The incidence of neonatal sepsis was similar between groups (1.8% vs. 3.9%, p=0.22), as was the incidence of chorioamnionitis (6.5% vs. 8.3%, p=0.51). There was a statistically significant increase in maternal LOS (3 days (IQR 3-5) vs. 4 days (IQR 3-7), p=0.02) in the post-implementation period. There were no significant differences in need for neonatal respiratory support, stillbirth or neonatal demise, maternal

postpartum antibiotics, postpartum hemorrhage, or blood transfusion (Table 1).

CONCLUSION: Offering expectant management of late PPROM at a tertiary care academic center led to similar maternal and perinatal outcomes with no change in neonatal NICU LOS and a modest increase in maternal LOS.

Table 1. Neonatal and Maternal Outcomes by Implementation Period.

	Pre-implementation (n=170)	Post-implementation (n=180)	p-value
Gestational age at PPROM	34.0 (32.0 – 35.3)	34.0 (32.1 – 35.1)	0.96
GBS status			0.26
Positive	39 (22.9)	34 (18.9)	
Negative	93 (54.7)	114 (63.3)	
Unknown	38 (22.4)	32 (17.8)	
Received antenatal corticosteroids			<0.001
Yes, complete course	49 (28.8)	73 (40.6)	
Yes, incomplete course	73 (42.9)	43 (23.9)	
No	48 (28.2)	63 (35.0)	
Received latency antibiotics			0.25
Yes, complete course	19 (11.2)	31 (17.2)	
Yes, incomplete course	43 (25.3)	39 (21.7)	
No	108 (63.5)	110 (61.1)	
Gestational age at delivery	34.1 (32.7 – 35.3)	34.4 (33.1 – 35.4)	0.33
Mode of delivery			0.07
Vaginal delivery	131 (77.1)	123 (68.3)	
Cesarean delivery	39 (22.9)	57 (31.7)	
NICU admission*	160 (94.1)	168 (93.3)	0.76
NICU length of stay (days)	14.7 (4.4 - 29.7)	12.7 (4.0 - 23.4)	0.35
Neonatal sepsis**	3 (1.8)	7 (3.9)	0.22
Stillbirth or neonatal demise	0 (0.0)	1 (0.6)	0.37
Any respiratory support***	73 (42.9)	89 (49.4)	0.30
Respiratory support ≥ 24h	50 (29.4)	58 (32.2)	0.35
Chorioamnionitis	11 (6.5)	15 (8.3)	0.51
Maternal length of stay (days)	3 (3 – 5)	4 (3 – 7)	0.02
Maternal postpartum antibiotics	17 (10.0)	16 (8.9)	0.72
Postpartum hemorrhage	9 (5.3)	9 (5.0)	0.58
Blood transfusion	2 (1.2)	1 (0.6)	0.53

Data presented as median (interquartile range) or n (%).

*Defined as a neonatal intensive care unit (NICU) stay for ≥ 4 hours.
**Defined as a positive blood culture and/or use of antibiotics for ≥ 7 days.
***Includes mechanical ventilation/intubation or continuous positive airway pressure (CPAP) use.

860 Increasing postpartum hemorrhage and blood product transfusion at delivery in the United States, 2016-2020

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OBJECTIVE: To evaluate temporal trends of postpartum hemorrhage (PPH) and blood product transfusion at delivery in the United States.

STUDY DESIGN: This cross-sectional study queried the Healthcare Cost and Utilization's National Inpatient Sample. The study population was 18,067,310 hospital deliveries from 1/2016-12/2020. The main outcome measures were incidence of PPH and performance of blood product transfusion at delivery according to the Center for Disease Control and Prevention (CDC) definition, including red blood cells, fibrinogen, plasma, platelets, cryoprecipitate, and whole blood. Temporal trends were assessed with the Cochran-Armitage test.

RESULTS: Annual delivery volume decreased from 3,754,681 to 3,427,085 from 2016-2020 (8.3% relative-decrease). The incidence of PPH was 400.0 per 10,000 deliveries. The diagnosis of PPH at delivery increased from 337.2 to 463.4 per 10,000 deliveries during the 5-year period (37.4% relative-increase, *P-trend*< 0.001). During the study period, 205,720 (113.9 per 10,000) patients received blood transfusion with any product type, including single product (n=180,415 [99.9 per 10,000]), two type products (n=15,270 [8.5 per 10,000]), and three or more type products (n=10,035 [5.6 per 10,000]). The number of patients receiving any blood product at delivery increased from 102.9 to 125.4 per 10,000 deliveries from 2016-2020 (21.9% relative-increase, *P-trend*< 0.001), including two product types from 7.7 to 9.6 per 10,000 deliveries (24.7% relative-increase, *P-trend*< 0.001) and three or more product types from 4.5 to 6.0 per 10,000 deliveries (33.3% relative-increase, *P-trend*< 0.001).

CONCLUSION: This nationwide analysis demonstrates an increasing trend of PPH diagnosis and utilization of blood transfusion at delivery, particularly with multiple products, despite an overall decrease in delivery volume in the recent years in the United States. In 2020, one in 80 patients received blood transfusion at delivery.

861 Timing of history-indicated cerclage placement and pregnancy outcomes

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OBJECTIVE: Patients with history of cervical insufficiency are offered a history (Hx)-indicated cerclage in a future pregnancy; however, data on timing of placement is limited. We compared the relationship between gestational age (GA) at cerclage placement to selected perinatal outcomes in patients undergoing a Hx-indicated vaginal cerclage.

STUDY DESIGN: Retrospective cohort study of patients with non-anomalous singleton gestations who underwent Hx-indicated vaginal cerclage (between 11-20 wks GA) and delivery at a single tertiary center 1/2013-4/2021. At our institution, Hx-indicated cerclages are typically placed at 12-14 wks, but can vary upon GA at entry to prenatal care. The primary exposure was GA at cerclage placement. Primary outcome was birth GA. Secondary outcomes included preterm birth (PTB), operative morbidities, and select pregnancy outcomes. Linear and logistic regression modeled the relationship between GA at cerclage placement and primary and secondary outcomes, and OR and β with 95% CI were calculated.

RESULTS: Of 542 cerclages performed in our study period, 175 cases were analyzed. The mean GA of Hx-indicated cerclage placement was 13 ± 1.4 wks. Our cohort were largely obese, publicly insured, non-married, non-Hispanic Black, and had high rates of intramuscular progesterone use. There was no significant association between GA at cerclage placement and birth GA (p=0.72, b 0.13 [-0.57, 0.82], Table). While there was a significant association between GA at placement and readmission within 7 days (p=0.048, OR 1.7 [1.01, 3.1]), there was no significant relationship between GA at placement and PTB (at any GA cut-off), intraoperative complications, or other studied maternal or neonatal outcomes (Table).

CONCLUSION: GA at time of Hx-indicated cerclage placement up to 20 wks was not associated with birth GA, PTB, or intraoperative complications. However, for each additional wk of GA at cerclage placement, there were increased odds of post-operative readmission. Future studies should evaluate if there an optimal GA for Hx-indicated cerclage placement.

Table. Pregnancy and operative outcomes among cases of non-emergent Hx-indicated vaginal cerclage 2013-2021 by timing of cerclage placement (weeks of gestation)

OUTCOMES	History-indicated cerclage (n=175)	OR or β (95% CI)
Cerclage procedure		
Intraoperative composite[1]	1.7	OR 0.97 (0.42, 2.2)[3]
Operative blood loss (mL)	15 (5, 25)	β -0.51 (-4.2, 3.2)[4]
Operative time (min)	23 (14)	β 0.24 (-1.3, 1.8)[4]
Maternal postoperative LOS (hrs)	4.0 (4.2)	β -0.003 (-0.44, 4.4)[4]
Readmission within 7 days	1.1	OR 1.8 (1.0, 3.1)[3]
Number of postoperative triage visits	1 (0, 2)	β 0.11 (-0.12, 0.34)[4]
Pregnancy Outcomes		
GA of rupture of membranes (wks)	34 (7.0)	β 0.94 (-0.64, 0.83)[4]
GA at cerclage removal (wks)	32 (6.3)	β 0.16 (-0.49, 0.82)[4]
Preterm birth <37 wks	49	OR 0.99 (0.80, 1.2)[3]
Preterm birth <35 wks	34	OR 1.1 (0.84, 1.3)[3]
Extremely preterm birth <28 wks	22[9]	OR 0.96 (0.74, 1.3)[3]
Previable preterm birth <24 wks	13[9]	OR 1.0 (0.73, 1.3)[3]
Cesarean birth	37	OR 0.97 (0.78, 1.2)[3]
Postpartum hemorrhage	9.1	OR 1.2 (0.85, 1.6)[3]
Perinatal Outcomes		
Fetal outcome		
Liveborn (referent)	90	N/A
Stillbirth/early loss	6.9	OR 0.80 (0.47, 1.4)[5]
Neonatal demise	2.9	OR 0.41 (0.11, 1.5)[5]
Neonatal composite morbidity[2]	49	OR 1.1 (0.85, 1.3)[3]
Birthweight (grams)	2429 (1169)	β -34 (-157, 88)[4]

Data presented as %, mean (SD) or median (interquartile limits) as appropriate.
[1]Intraoperative composite = PPROM, pregnancy loss, transfusion, conversion to open procedure, bowel, bladder, vascular, nerve or other injury, failure to complete planned procedure, or unanticipated admission
[2]Neonatal composite morbidity = 5-minute APGAR <4, base excess <-12, arterial pH <7.0, neonatal ICU admission, neonatal death (within 4 wks)[3]Logistic regression; [4]Linear regression; [5]Multinomial logistic regression

862 Virtual reality for pain reduction during episiotomy and perineal tear repair

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OBJECTIVE: Virtual Reality (VR) is being used as a non-pharmacological tool for pain relief and anxiety reduction. Our objective was to determine the impact of VR during episiotomy and perineal tear repair.

STUDY DESIGN: A prospective, randomized control trial was performed from September 2022 to February 2023. Delivered women were randomly allocated to undergo episiotomy or perineal tear repair with or without the use of VR. The primary outcome was pain evaluated by the Visual Analogue Scale (VAS) at the end of the repair. A validated questionnaire was used to evaluate anxiety which included 20 questions.

RESULTS: Eighty-eight women were included in this study, 44 were randomly included in each group., There was no statistically significant differences between the demographics and characteristics of the participants. VR was effective in significantly reducing the pain in the study group. There was no difference in the level of anxiety between groups.

CONCLUSION: VR was effective in reducing pain but not anxiety during episiotomy and perineal tear repair.

	VR Group (N=44)	Control (N=44)	P
Age	28.9 ± 3.9	29.4 ± 5.1	0.61
BMI	28.7 ± 5.0	28.7 ± 4.2	0.89
First delivery	21	17	0.52
Episiotomy	17	13	0.81
Perineal Tear	26	31	0.37
3rd degree Tear	1	0	1
Epidural	34	32	0.81
VAS	1.2 ± 1.8	2.7 ± 2.7	0.005
STAI anxiety score	34.2 ± 7.0	33.6 ± 6.0	0.67

863 Outcomes after fetoscopic laser photocoagulation for TTTS with or without concomitant selective fetal growth restriction

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OBJECTIVE: To compare outcomes after fetoscopic laser photocoagulation (FLP) for twin-twin transfusion (TTTS) with or without concomitant selective fetal growth restriction (SFGR) based on single or dual survival postlaser.

STUDY DESIGN: Retrospective cohort study of patients with TTTS treated by FLP in 1 institution between 11/2011 and 04/2023.SFGR was defined by a fetal weight < 10 percentile in 1 fetus and intertwin discordance of ≥25%. Outcomes were compared between TTTS with no SFGR and TTTS+SFGR.

RESULTS: 186/422(44.1%) patients presented TTTS+SFGR and 236/422(55.9%) presented with isolated TTTS.

Gestational age(GA) (20.1[15.9-29.0] vs 20.1[15.9-27.9] weeks, p=0.53), cervical length at the time of FLP (38[10-70] vs 37[11-57] mm, p=0.3) and rate of PPROM (16/226[7.1%] vs 17/183[9.4%], p=0.19) were similar between TTTS and TTTS+SFGR.

Postlaser dual survival was higher in cases of isolated TTTS (200/236[84.7%] vs TTTS+SFGR 142/186[76.3%], p=0.03).

There were some relevant differences when outcomes between single survivor after FLP with TTTS vs TTTS+SFGR where compared: Main difference before FLP was a higher proportion of stage 3 TTTS in the latter group (83.8% vs 34.6%, p< 0.01), as the proportion of anterior placentas, GA at laser and surgical time were similar. PPROM was more frequent in the TTTS+SFGR group (0 vs 16%, p=0.03), and they delivered at an earlier GA than compared to those with isolated TTTS (33.4 vs 30.0weeks, p=0.04). There were also differences in the proportion of surviving ex donor fetuses at birth (44% vs 12.5%, p< 0.01) and at 30 days of life (50% vs 11.1%, p< 0.01), with higher rates in the isolated TTTS group. In case of dual survival post laser, the proportion of surviving ex-donor were significantly higher at birth and at 30 days in the isolated TTTS group.

CONCLUSION: FLP for TTTS+SFGR was associated with a decreased rate in dual survival with an increased risk of donor demise. Outcomes in cases of TTTS+SFGR where there was a single survivor were worse than if isolated TTTS was the indication for FLP. Specific explanation of these adverse results need to be elucidated.

Table 1. Comparison between isolated TTTS and TTTS with concomitant sFGR according to the immediate post-laser survival

	Isolated TTTS (n=236)		TTTS with concomitant sFGR (n=186)		p*	P**
	Single survivor post laser (n=26)	Dual survivor post laser (n=200)	Single survivor post laser (n=37)	Dual survivor post laser (n=142)		
Quintero classification (stage III, %)	9/26(34.6)	81/200(40.5)	31/37(83.8)	82/142(57.7)	<0.01	<0.01
Cervical length before FLP (mm)	36[28-55]	38[10-70]	35[12-55]	37[11-57]	0.54	0.35
Anterior placenta (%)	13/26(50)	81/200(40.5)	21/37(56.8)	60/142(42.3)	0.60	0.75
GA at the time of FLP (weeks)	19.5[16-26]	20.3[15.9-27.9]	19.6[16.3-25.9]	20.1[15.9-28.1]	0.42	0.77
Duration of FLP (minutes)	54[36-74]	45[22-98]	18[17-94]	45[22-98]	0.69	0.08
Ex-Donor survival post laser (%)	10/26(38.5)	200/200(100)	4/37(10.8)	142/142(100)	0.01	1
PPROM (%)	0/26(0)	16/200(8)	6/37(16.2)	11/142(7.7)	0.03	0.81
Gestational age at delivery (weeks)	33.4[20-38.9]	30.9[18.4-40.1]	30.0[18.4-40.1]	31.1[19.6-39.6]	0.04	0.69
Single survival at birth (%)	25/26(89)	12/200(6)	32/37(83.8)	20/142(14.1)	0.18	0.06
Ex-donor survival at birth (%)	11/25(44)	179/191(93.7)	4/32(12.5)	119/142(90.2)	<0.01	<0.01
Single survival at 30 days of life (%)	22/23(95.6)	28/189(9.5)	27/35(77.1)	23/128(18)	0.04	0.02
Ex-donor survival at 30 days of life (%)	11/22(50)	165/175(94.3)	3/27(11.1)	98/113(86.7)	<0.01	<0.01

*represents the comparison between single survivor post laser for TTTS+sFGR versus single survivor post laser for TTTS with no SFGR

**represents the comparison between dual survivor post laser for TTTS+SFGR versus dual survivor post laser for TTTS with no SFGR

864 Maternal Rates of Alloimmunization at Initiation of Pregnancy Care: Insights from a National Cohort

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OBJECTIVE: Hemolytic disease of fetus and newborn (HDFN) is a life-threatening disease mediated by maternal alloimmunization. Published prevalence studies of maternal antibodies in the United States (US) include single center reports but no national data. This study describes contemporary prevalence and temporal trends in alloimmunization in early pregnancy in the US.

STUDY DESIGN: Red blood cell antibodies (RBC Abs) in obstetric panels during 2010-2021 were identified in a national commercial laboratory database. The Overall Cohort comprised pregnant patients screened for RBC antibodies in an initial obstetric panel; Continuity Cohort included those who had additional 3rd trimester oral glucose challenge. Data were normalized based on US Centers for Disease Control live births and weighted by year and census division to estimate the national prevalence of alloimmunization. Cochrane-Armitage tests were used to assess for alloimmunization temporal trends.

RESULTS: Of 9,876,196 pregnancies, 1.5% screened positive for RBC Abs; 0.9% (914/100,000 pregnancies) identified and 0.6% (604/100,000) unidentified. Of identified RBC Abs, anti-D comprised 64%, corresponding to an estimated national rate of 586/100,000 pregnancies. Prevalence of other high-risk RBC Abs for HDFN included anti-E (110/100,000), anti-K (68/100,000), and anti-c (29/100,000) (**Table**). Similar results were observed in the continuity cohort. There was an increasing temporal trend for all four high risk antibodies (all $P < .001$).

CONCLUSION: Among nearly 10 million pregnancies in the US from 2010 to 2021, 1.5% screened positive for RBC Abs. Over 50% (793/100,000) had RBC Abs known to be high risk for HDFN with an increasing temporal trend. Though overall prevalence of anti-D is difficult to interpret without ability to distinguish active from passive presence, it likely remains problematic in HDFN as demonstrated by ranking second only to anti-K in critical titers. Given the severity of HDFN, new initiatives may be required to reduce alloimmunization incidence in patients of reproductive potential.

Table 1: Estimates of national prevalence of alloimmunization in early pregnancy

	Rate per 100,000 pregnancies (95% Confidence Interval)			
	Overall Cohort (Number = 9,876,196)		Continuity Cohort (Number = 3,926,094)	
	RBC Antibody Detected	Critical Titer*	RBC Antibody Detected	Critical Titer
High risk of HDFN				
anti-D	586 (553 - 618)	21 (20 - 22)	516 (484 - 548)	12 (11 - 14)
anti-K	68 (64 - 71)	46 (44 - 48)	49 (45 - 52)	32 (30 - 35)
anti-c	29 (26 - 31)	1.9 (1.5 - 2.2)	23 (21 - 25)	1 (0.7 - 1.4)
anti-E	110 (105 - 116)	8 (7 - 9)	90 (85 - 96)	4.5 (3.7 - 5.2)
Moderate risk of HDFN				
anti-C	30 (26 - 33)	2.6 (2.2 – 3.0)	21 (18 - 24)	1.5 (1.1 - 1.9)
anti-e	4 (3 - 5)	0.06 (0.01 - 0.12)	3 (2 - 4)	0.06 (0 - 0.15)
anti-k	0.01 (0 - 0.03)	0.01 (0 - 0.03)	0	0
anti-Fya	13 (12 - 14)	3.1 (2.7 - 3.6)	9 (8 - 10)	2 (1.4 - 2.5)
anti-U	0.03 (0 - 0.07)	0	0	0
Low risk of HDFN *Any***	112 (103 - 121)	Not applicable	101 (92 - 111)	Not applicable

* ≥4 for anti-K and ≥16 for all other high-risk and moderate-risk antibodies

** Includes: anti-Cw, anti-f, anti-Jka, anti-Jkb, anti-M, anti-S, anti-s, anti-Fyb, anti-Lua, anti-Lub, anti-Kpa, anti-Kpb, anti-Yta, anti-Coa, anti-Cob, anti-Ge2,3

865 Toll-like Receptor 9 (TLR9) suppression restores endothelial function in the maternal placental microvasculature in preeclampsia

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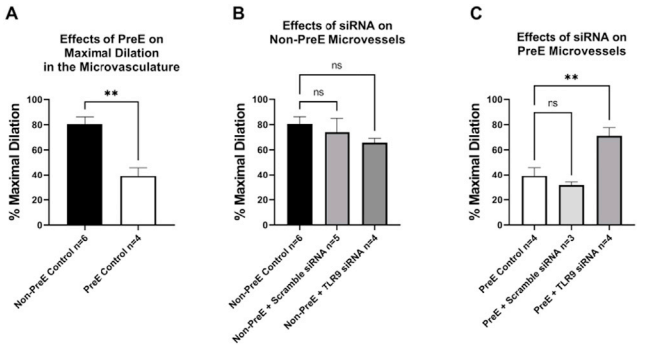
OBJECTIVE: We have previously shown that endothelial function in the human placental microcirculation is impacted by excessive oxidative stress and TLR9 may be part of this mechanism. Therefore, to evaluate whether TLR9 knockdown restores vascular function in preeclamptic microvessels.

STUDY DESIGN: Placental microvessels (< 150μM diameter) were dissected from the maternal side of control or preeclamptic placentas and then incubated with media and scrambled siRNA or TLR9-specific siRNA (50nM) for 12-16 hours. Vessels were cannulated on glass micropipettes, pressurized to 60mmHg, and then pre-constricted with 0.1-2.0 nM endothelin-1. A pressure gradient was applied to induce flow and vessel inner diameters were measured by videomicroscopy. Flow-mediated dilation (FMD) was calculated as a % of maximum diameter and expressed as mean ± SEM. Results were analyzed by two-way ANOVA with Dunnett's multiple comparisons. The maximum dilation values were evaluated by a Kruskal-Wallis test with Dunn's multiple comparative test or t-test as appropriate.

RESULTS: Preeclamptic microvessels demonstrated impaired endothelium-dependent vasodilation compared to healthy controls (Fig. A, p=0.0018). Vasodilator capacity in healthy controls was not significantly impacted by siRNA treatment (Fig. B, p=0.4429). TLR9 siRNA restored impaired endothelium-dependent vasodilation to flow compared to both untreated and scrambled siRNA-transfected vessels from patients with preeclampsia (Fig. C, p=0.0082).

CONCLUSION: Suppression of TLR9 expression restores endothelium-dependent vasodilation to flow in preeclamptic vessels and merits further evaluation.



866 Zygosity-based Twin Pregnancy Outcomes: Insights from SNP-Based cfDNA Screening

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OBJECTIVE: To evaluate outcomes in twin pregnancies stratified by zygosity based on SNP-based cell-free DNA screening (cfDNA).

STUDY DESIGN: Prospective study of twin pregnancies undergoing SNP-based cfDNA following prenatal ultrasound (< 20 weeks' gestation) at 13 US sites (Oct 2021-March 2023). Pregnancies with twin-to-twin transfusion syndrome (TTTS) prior to enrollment or a contraindication to cfDNA screening were excluded. cfDNA results, ultrasound findings, placental pathology, and maternal and newborn outcomes were collected. Dizygotic twins (DZ) on cfDNA were classified as dichorionic (DC). Monozygotic (MZ) twins on cfDNA were classified as monochorionic (MC) or DC based on placental pathology. Odds ratios (95% confidence intervals) were calculated to compare the pregnancy outcomes for MZ MC and MZ DC twins with those of DZ twins.

RESULTS: 137 patients enrolled in the study. After exclusions for undetermined cfDNA (1), incomplete follow-up (11), and MZ twins with no placental pathology (2), 123 patients remained in the cohort: 76 DZ, 31 MZ MC, and 16 MZ DC. Placental pathology was available for 63/76 (82.9%) DZ twins and was DC in all. Median gestation at cfDNA was 12^{+5} weeks. Pregnancy outcomes by zygosity and chorionicity are shown in Table 1. TTTS occurred in 3.2%, selective intrauterine growth restriction (SIUGR) in 22.6%, and twin-anemia-polycythemia sequence (TAPS) in 9.7% of MC twins. MZ MC twins had the highest incidence of pregnancy complications including preterm birth and NICU admission. The incidence of small-for-gestational age (SGA) (birth weight < 10th percentile) was higher in the MZ DC group compared to the DZ group (OR=2.51; 95% CI 1.08,5.87).

CONCLUSION: SNP-based cfDNA in twin pregnancies can be used to determine the rate of complications by zygosity. This may help establish the actual rates of specific complications of MC twins, such as TTTS, SIUGR, and TAPS. The finding of a high incidence of SGA in MZ DC vs DZ DC twins may have important research and clinical implications, particularly on the frequency of growth surveillance.

Table 1. Newborn outcomes Comparison of pregnancy outcomes in MZ MC and MZ DC twins with those in the referent group, DZ twins.

cfDNA	Dizygotic	Monozygotic			
		Dichorionic		Monochorionic	
	n (%)	n (%)	OR, [95%CI]	n (%)	OR, [95%CI]
Delivery Outcome	N=152	N=32		N=62	
Termination	0 (0%)	0 (0%)	N/A	1 (1.6%)	N/A
IUFD/Stillbirth	2 (1.3%)	0 (0%)	N/A	2 (3.2%)	2.5, [0.34,18.16]
Live birth	150 (99%)	32 (100%)	N/A	59 (95%)	0.26, [0.04,1.61]
Route of delivery	N=152	N=32		N=61	
Emergency Cesarean	38 (25%)	4 (12%)	0.43, [0.14,1.3]	8 (13%)	0.45, [0.2,1.04]
Planned Cesarean	71 (47%)	20 (62%)	1.9, [0.87,4.16]	42 (69%)	2.52, [1.34,4.73]
Vaginal	43 (28%)	8 (25%)	0.84, [0.35,2.03]	11 (18%)	0.56, [0.27,1.17]
Gestation at Birth	N=152	N=32		N=62	
< 20 weeks	0 (0%)	0 (0%)	N/A	1 (1.6%)	N/A
Early preterm birth (<34 weeks)	28 (18%)	6 (19%)	1.02, [0.38,2.72]	19 (31%)	1.96, [0.99,3.85]
Late preterm (34^{+0} - 36^{+6} weeks)	48 (32%)	10 (31%)	0.98, [0.43,2.24]	35 (56%)	2.81, [1.53,5.16]
Term (≥37 weeks)	76 (50%)	16 (50%)	1, [0.47,2.14]	8 (13%)	0.15, [0.07,0.33]
Birth weight	N=145	N=32		N=61	
Birthweight <10th %	25 (15%)	11 (34%)	2.51, [1.08,5.87]	11 (18%)	1.06, [0.48,2.31]
Birthweight <5th %	11 (7.6%)	7 (22%)	3.41, [1.21,9.64]	6 (9.8%)	1.33, [0.47,3.77]
Neonatal Outcomes	N=146	N=32		N=57	
NICU admission	55 (38%)	13 (41%)	1.13, [0.52,2.47]	34 (60%)	2.45, [1.31,4.57]
Neonatal death	1 (0.7%)	0 (0%)	N/A	0 (0%)	N/A
Fetal anomaly	N=148	N=32		N=59	
Birth defect	4 (2.7%)	0 (0%)	N/A	2 (3.4%)	1.26, [0.23,7.09]

867 Impact of BMI and Mode of Delivery on Neonatal and Maternal Outcomes of Nulliparas

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OBJECTIVE: To compare neonatal and maternal outcomes based on the attempted mode of delivery stratified by body mass index (BMI kg/m^2).

STUDY DESIGN: This was a repeated cross-sectional analysis of US vital statistics Live Birth/Infant Death linked data from 2011 to 2020. We limited analyses to nulliparas with singleton pregnancies and cephalic presentation who delivered at 20 weeks or greater. Our primary outcome was a composite neonatal outcome defined as any neonatal death, neonatal intensive care unit (ICU), surfactant use, ventilation use, or seizure. Our secondary outcome was severe maternal morbidity (SMM) defined as any maternal ICU, transfusion, uterine rupture, and hysterectomy. Outcomes were compared according to BMI category (< 18.5, 18.5-24.9, 25-29.9, 30-39.9, 40-49.9, and 50-59.9) between individuals who attempted labor and individuals who opted for non-labor cesarean delivery. Adjusted relative risks (aRR) with 99% confidence intervals were calculated using modified Poisson regression.

RESULTS: Of 9,711,230 individuals, 462,201 had BMI < 18.5, 4,882,537 had BMI 18.5-24.9, 2,342,705 had BMI 25-29.9, 1,663,303 had BMI 30-39.9, 317,913 had BMI 40-49.9, and 42,571 had BMI 50-59.9. Table 1 shows the aRRs for each BMI class, with individuals who attempted labor being the referent group. Compared to attempting labor, non-labor cesarean was associated with an increased risk of the composite neonatal outcome in all BMI classes-BMI < 18.5, 18.5-24.5, 25-29.9, 30-39.9, 40-49.9, and 50-59.9 (range of aRRs 1.12-1.44). Compared to attempting labor, non-labor cesarean was associated with an increased risk of SMM in BMI < 18.5, 18.5-24.5, 25-29.9, and 30-39.9 (range of aRR 1.20-1.77). However,

there was no significant difference in severe maternal morbidity in BMI 40-49.9, and 50-59.9.

CONCLUSION: Attempting labor was associated with improved neonatal outcomes in all BMI classes as well as improved maternal outcomes except for BMI 40-49.9 and 50-59.9 compared to non-labor cesarean. Even for individuals with high BMI, it is reasonable to allow an attempt for vaginal delivery.

Table 1

	Severe Maternal Morbidity		Neonatal Composite Outcome	
BMI	No labor	Attempted Labor	No labor	Attempted Labor
BMI<18	19,084	443,117	19,084	443,117
n (%)	129 (0.7)	1712 (0.4)	1621 (8.5)	25377 (5.7)
aRR (99%CI)	1.77 (1.39-2.25)		1.44 (1.35-1.53)	
BMI 18.5-24.9	228,699	4,653,838	228,699	4,653,838
n (%)	1221 (0.5)	17015 (0.4)	19258 (8.4)	287789 (6.2)
aRR (99%CI)	1.49 (1.38-1.61)		1.31 (1.29-1.34)	
BMI 25-29.9	141,116	2,201,589	141,116	2,201,589
n (%)	666 (0.5)	8111 (0.4)	19258 (8.4)	287789 (6.2)
aRR (99%CI)	1.34 (1.21-1.49)		1.24 (1.21-1.27)	
BMI 30-39.9	125,567	1,537,736	125,567	1,537,736
n (%)	578 (0.5)	6063 (0.4)	12102 (9.6)	121076 (7.9)
aRR (99%CI)	1.20 (1.07-1.35)		1.17 (1.15-1.20)	
BMI 40-49.9	32,200	285,713	32,200	285,713
n (%)	137 (0.4)	1280 (0.4)	3450 (10.7)	26306 (9.2)
aRR (99%CI)	0.98 (0.77-1.23)		1.12 (1.07-1.17)	
BMI 50-69.9	5,529	37,042	5,529	37,042
n (%)	27 (0.5)	217 (0.6)	750 (13.6)	4278 (11.5)
aRR (99%CI)	0.91 (0.54-1.53)		1.13 (1.03-1.24)	

Those who attempted labor were the referent group.
Relative risks were adjusted for race, age, insurance, smoking, chronic hypertension, preeclampsia, and pregestational diabetes.
Abbreviations: BMI (body mass index); RR (relative risk)

868 Impact of the ARRIVE Trial in Nulliparous Individuals with Morbid Obesity: Interrupted Time Series Analysis

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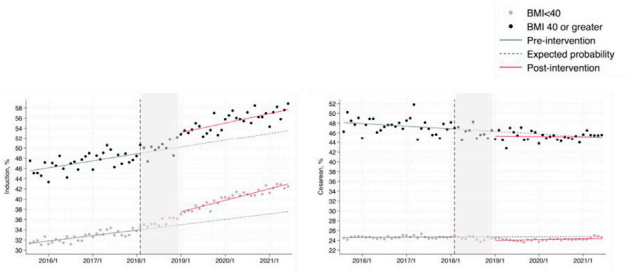
OBJECTIVE: Since the ARRIVE trial (A Randomized Trial of Induction Versus Expectant Management) was published in 2018, the number of induction of labor (IOL) in nulliparas has increased. Given that the median body mass index (BMI) in the ARRIVE trial was 30.5 kg/m^2, the generalizability of the benefits of elective induction to patients with morbid obesity (BMI≥40kg/m^2) is not clear. We aimed to examine rates of induction of labor (IOL) and cesarean delivery (CD) before and after the ARRIVE trial stratified by BMI category at the population level.

STUDY DESIGN: This was a repeated cross-sectional analysis of publicly available US birth certificate data from 2015 to 2021. We limited analyses to nulliparas with singleton pregnancy without chronic hypertension and diabetes (gestational or pregestational) who delivered between 39 and 42weeks' gestation. The dissemination period of the ARRIVE trial was from Feb 2018 to Dec 2018. The pre-ARRIVE period was from Aug 2015 to Jan 2018. The Post-ARRIVE trial period was from Jan 2019, to June 2021. We conducted an interrupted time series analysis after stratifying by BMI (< 40 or ≥40). Poisson regression to calculate adjusted incident rate ratios (aIRR) with 95% confidence intervals (95%CI).

RESULTS: Of 2,666,235 individuals 2,578,484(96.7%) had BMI< 40 and 87,751(3.3%) had BMI ≥40. In nulliparas with BMI< 40, the post-ARRIVE period compared to the pre-ARRIVE period was associated with increased rates of IOL (37.0% observed vs. 35.0% expected; aIRR, 1.06; 95%CI 1.05-1.08) and decreased rates of CD (24.4% observed vs. 24.7% expected; aIRR, 0.97; 95%CI, 0.96-0.99). On the other hand, in nulliparas with BMI≥40, there was a significant increase in IOL (52.8% observed vs. 50.2% expected; aIRR, 1.06 95%CI, 1.01-1.11); however, the decrease in CD was not significant (44.7% observed vs. 46% expected; aIRR, 0.97; 95%CI, 0.92-1.02).

CONCLUSION: The dissemination of the ARRIVE trial had the expected impact on IOL rates in nulliparas with and without morbid obesity. Only nulliparas without morbid obesity benefited from decreased CD rates.



869 The Impact of Obstetrician's Gender on Maternal and Neonatal Outcomes in Vacuum-Assisted Deliveries

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OBJECTIVE: To investigate the association between obstetrician's gender and maternal and neonatal outcome following vacuum-assisted deliveries (VAD)

STUDY DESIGN: Retrospective cohort study at a single tertiary center between 2012 and 2022 included 5328 VADs. The outcomes of 2659 VADs performed by women obstetricians were compared to 2669 VADs performed by men obstetricians. The primary outcome was failed VAD. Secondary outcomes included maternal complications (Post Partum Hemorrhage, blood products transfusion, and OASIS) and neonatal complications (5-min Apgar< 7, umbilical cord pH< 7.1, and NICU admission).

The groups were compared using demographic and clinical independent variables in a univariate and multivariate analysis

RESULTS: Demographic characteristics did not significantly differ between the groups, except for body mass index (BMI) which was lower for mothers in the women obstetricians' group (23.07±4.40 vs 23.30±4.27, p=0.045). There were no between-group variations for regional analgesia, indication for intervention, and neonatal birthweight. Women obstetricians used more often metal caps than men (86.6% vs. 84%, p=0.009). Failed VADs analysis displayed gender-based differences: women obstetricians exhibited lower rates of failure compared to men (1.7% vs. 2.8%; p=0.08). This association was further supported by multivariate analysis (OR 1.57, 95% CI 1.047-2.366) with p< 0.029. However, these differences were not associated with increased adverse maternal or neonatal outcomes. When analyzing the final mode of delivery, women obstetricians achieved higher rates of vaginal deliveries (0.3% vs. 0%), while men obstetricians had higher rates of cesarean deliveries (2.3% vs. 1.2%; p< 0.001) (Table 1)

CONCLUSION: Women obstetricians demonstrated a notably lower rate of failed VAD compared to their men counterparts. These findings highlight the necessity for additional research and targeted interventions to understand the underlying factors contributing to this gender-based discrepancy

Table 1: Baseline characteristics, delivery characteristics and maternal and neonatal outcomes

Variables	Women operator N=2659	Men operator N=2669	p-value
Demographic and clinical characteristics			
Maternal Age, years	30.03±5.13	30.19±5.21	0.275
Body Mass Index, Kg/m2	23.07±4.40	23.30±4.27	0.045
Current delivery characteristics			
Regional Analgesia	2360 (88.8)	2335 (87.5)	0.152
VAD Indication:			
Non-reassuring fetal heart rate	1591 (63.3)	1575 (62.5)	0.558
Prolonged second stage	847 (33.7)	852 (33.8)	
Maternal exhaustion	58 (2.3)	71 (2.8)	
Other	16 (0.6)	21 (0.8)	
Fetal Head Position:			
Occiput anterior	1753 (72.5)	1775 (72.6)	0.975
Occiput posterior	664 (27.5)	671 (27.4)	
Second Stage Duration, min	126.83±75.32	122.97±77.70	0.064
Metal Vacuum Cap	2213 (86.6)	2144 (84.0)	0.009
Failed VAD	46 (1.7)	75 (2.8)	0.008 OR 1.64 CI 95% 1.13-2.38
Final mode of delivery after VAD attempt:			< 0.001
Vaginal	7 (0.3)	0 (0.0)	
VAD	2613 (98.3)	2597 (97.3)	
Forceps	8 (0.3)	10 (0.4)	
Cesarean	31 (1.2)	62 (2.3)	
Maternal outcomes			
Post Partum Hemorrhage	212 (8.0)	206 (7.7)	0.730
OASIS	32 (1.2)	24 (0.9)	0.276
Blood Transfusion	154 (5.8)	170 (6.4)	0.378
Neonatal outcomes			
Birthweight	3245±433.89	3262±431.97	0.133
5-min Apgar<7	27 (1.0)	35 (1.3)	0.314
Umbilical cord pH< 7.1	37 (1.8)	43 (2.1)	0.565
NICU admission	110 (4.2)	138 (5.2)	0.075

VAD – Vacuum assisted delivery.

Data presented as frequency, n (%) for categorial variables and mean ± standard deviation (SD) for continuous variables

870 MicroRNAs as Markers of Aspirin Response and Pregnancy Outcome in High Risk Singletons

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OBJECTIVE: Aspirin decreases the risk of preeclampsia and preterm birth in high risk pregnancies, but individual response to aspirin varies and has not been correlated with outcomes. MicroRNAs (miRNA) are non-coding RNAs that regulate gene expression. Circulating miRNAs are associated with aspirin response and cardiovascular risk in non-pregnant adults, and placental miRNAs with preeclampsia and preterm birth. We sought to evaluate selected miRNAs associated with platelet activity and preeclampsia/preterm birth to determine whether they are markers of response to aspirin in pregnancy and predictors of adverse outcomes

STUDY DESIGN: This is a prospective study of singletons at high risk for preeclampsia taking aspirin daily. Blood was drawn at baseline prior to aspirin (10-16 weeks'), 2-4 weeks after aspirin initiation (follow-up 1), and at 28-32 weeks' (follow-up 2). PFA-100 epinephrine closure time (PFA-100 (epi)) is a known marker of aspirin response that increases with platelet inhibition. miRNAs (16, 18a, 181a, 126, 155, 223) were quantified in highly purified platelets and reported as fold-change from baseline. Pearson correlation coefficient was used to correlate PFA-100(epi) and miRNA fold change. Regression analysis was used to correlate fold-change in miRNAs and outcome of preeclampsia and preterm birth.

RESULTS: Of N=130 participants in parent study, N=57 had sufficient sample for miRNA extraction and reliable, reproducible quantification. At follow up-1, an increase in PFA-100(epi) was associated with a reduced miRNAs 223 (r=-0.33, p=0.017), 18a (r=-0.29, p=0.035), and 181a(r=-0.28, p=0.046). No miRNA at follow up-1 was associated with outcomes. At follow up-2, increased miRNA 223 was associated with preterm birth (B=6.5 (1.5-27.2), p=0.01) but not preeclampsia (B=2.0 (0.7-6.3, p=0.22).

CONCLUSION: MicroRNAs are markers of both aspirin response in pregnancy and adverse pregnancy outcome. Platelet derived miRNA 223 has been associated with platelet activity and activation of inflammatory pathways, and is a promising marker for both tracking aspirin response and prediction of adverse pregnancy outcome.

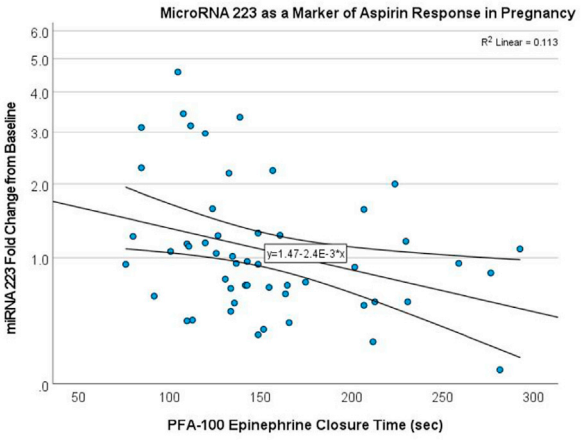

Figure: Correlation between PFA-100 epinephrine closure time and fold change in miRNA223 in purified platelets in singleton pregnancies 2-4 weeks after aspirin initiation. Pearson correlation coefficient r=-0.33, p=0.017.

871 Maternal Fetal Medicine Unit (MFMU) vaginal birth after cesarean calculator validation at academic community hospital

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OBJECTIVE: The MFMU vaginal birth after cesarean (VBAC) calculator was revised in 2021 due to concerns that the original 2007 calculator propagated health disparities by including race and ethnicity. The objective of our study was to compare predicted success rates of the 2007 vs 2021 calculators in a population who underwent a trial of labor after cesarean (TOLAC).

STUDY DESIGN: This is a retrospective cohort study of pregnant individuals ≥ 18 years who underwent TOLAC after 1 cesarean (CD) at our institution between 9/1/19-8/31/2022. Success scores were calculated using both calculators, categorized (< 50%, 50-59%, 60-69%, and ≥70% success), and compared, stratifying by race. Receiver operating characteristic (ROC) curves were created to compare the overall performance of both calculators using these predicted success categories.

RESULTS: 2009 individuals with a history of CD delivered during the study period, of which 1291 had one previous CD and no contraindication to TOLAC. Of these, 457 attempted TOLAC, with an overall VBAC success rate of 76.4%. Success rates by race are shown in Table 1. When applying both calculators to this population, a higher proportion of Black individuals had lower predicted success score categories compared to other races when using the 2007

calculator but not the 2021 calculator (Table 2). The overall ability to predict VBAC success was similar for the two calculators (area under the curve for the 2007 calculator 0.70 vs 0.72 for the 2021 calculator, p=0.27).

CONCLUSION: In our population, predicted VBAC success rates were lower for Black women when using the 2007 vs 2021 MFMU VBAC calculator, while both calculators performed similarly in predicting overall VBAC success. Our data validate the 2021 revised MFMU VBAC calculator without race or ethnicity.

Table 1. Successful VBAC rates by race & ethnicity in our population

Race	VBAC rate	p value
White	200 (78.4%)	
Black	15 (40.5%)	
Asian	17 (85.0%)	p<0.001
Other	108 (81.2%)	
Unknown	9 (75.0%)	
Hispanic ethnicity	**VBAC rate**	**p value**
Yes	127 (82.5%)	0.03
No	222 (73.3%)	

Table 2. Comparison of 2007 and 2021 MFMU VBAC calculator scores among our population by race and ethnicity

2007 calculator predicted success	White (n=255)	Black (n=37)	Other (n=145)	p value
<50%	24 (9.4%)	11 (29.8%)	32 (22.1%)	<0.001
50-59%	28 (11.0%)	6 (16.2%)	21 (14.5%)	
60-69%	44 (17.3%)	6 (16.2%)	25 (17.2%)	
≥70%	159 (62.4%)	14 (37.8%)	67 (46.2%)	
2021 calculator predicted success	**White (n=255)**	**Black (n=37)**	**Other (n=145)**	**p value**
<50%	30 (11.8%)	8 (21.6%)	21 (14.5%)	0.53
50-59%	38 (14.9%)	5 (13.5%)	25 (17.2%)	
60-69%	57 (22.4%)	7 (18.9%)	23 (15.9%)	
≥70%	130 (51.0%)	17 (46.0%)	76 (52.4%)	

872 Validation and clinical case report in non invasive prenatal testing for all chromosomes

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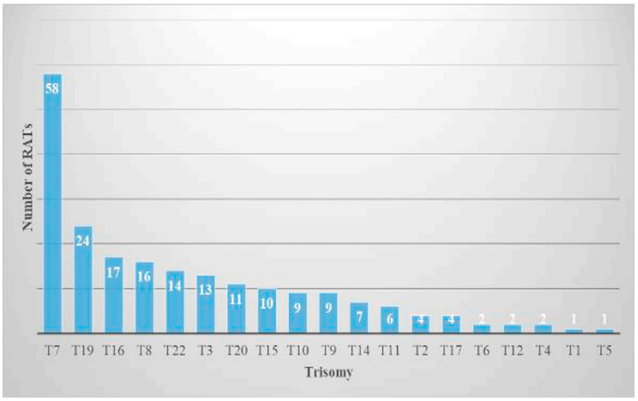
OBJECTIVE: Whole-Genome Sequencing (WGS)-based bioinformatics algorithms have a potential advantage to detect the aneuploidies for all chromosomes. Despite this advantage, chromosome 21, 18, 13 and sex chromosome have typically been applied for Non-invasive prenatal testing (NIPT) and have sufficient validation results. As Rare Autosomal Trisomies (RATs) research helps the understanding of feto-placental biology, a detection algorithm with higher accuracy is also importantly required.

STUDY DESIGN: We first searched for RAT cases from the literature and generated artificial data for each case, according to various fetal fraction. We used an in-house pipeline, which applied the z-score twice to maximize the sensitivity and set the threshold. Finally, we calculated the demographic statistics using clinical data.

RESULTS: Depending on the fetal fraction, the accuracy varies for each chromosome. In most chromosomes, the proposed algorithm showed high accuracy (> 99%) with 10% fetal fraction, and most of chromosomes had high accuracy (> 95%) even at 5% fetal fraction, while chromosome 19 showed low accuracy as 80%. One hundred eighty-seven RATs were identified in 30,364 clinical samples, and Trisomy 7 (n=58) was the most frequent, followed by Trisomy16 (n=17), Trisomy 8 (n=16). Amniotic karyotyping was performed in 23 cases, with 6 confirming an abnormality (mosaic or trisomy). The other 17 cases were normal amniocentesis results, which may suggest confined placental mosaicism (CPM).

CONCLUSION: Our results show that we have developed an algorithm, with well-designed artificial samples for detecting all chromosomes aneuploidies. All chromosome testing can help to detect the presence of RATs that may adversely affect pregnancy outcomes, with respect to placental dysfunction, fetal growth restriction and potential uniparental disomy (UPD).



873 Timing of antenatal steroid administration in twin gestations

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OBJECTIVE: The administration of antenatal steroids to improve neonatal outcomes is common in situations of anticipated preterm delivery both before and after 34 weeks. Our objective was to evaluate maternal and neonatal outcomes in twin gestations delivered after 34 weeks.

STUDY DESIGN: We conducted a retrospective cohort study of twin gestations delivered at ≥ 34 weeks gestation within our health system from 2020-2021. Subjects were excluded if they delivered before 34 weeks gestation. Included subjects were categorized based upon presence and timing of antenatal steroid administration (< 34 weeks, ≥ 34 weeks, or none). Our primary outcome was presence of respiratory distress syndrome. Secondary outcomes included other adverse neonatal outcomes, including use of surfactant, use of supplemental oxygen with a fraction of inspired oxygen of 30% for at least 24 hours, neonatal hypoglycemia, and birthweight < 10th percentile. Groups were compared via t-tests, chi-square analysis, Fisher's exact test, and linear and logistic regression.

RESULTS: 522 subjects were included, of which 374 (71.6%) did not receive steroids, 66 (12.6%) received steroids < 34 weeks, and 82 (15.7%) received steroids ≥ 34 weeks. When controlling for other factors that differed among groups with p< 0.05, those receiving steroids < 34 weeks demonstrated significantly lower rates of respiratory distress syndrome (aOR 0.32, 95%CI 0.12-0.85), but higher rates of transient tachypnea of the newborn (aOR 2.42, 95%CI 1.16-5.04) when compared to those who did not receive steroids. This significant improvement was not noted in cases of steroids received ≥ 34 weeks gestation. Additional neonatal complications were not significantly different between groups when controlling for other factors.

CONCLUSION: Rates of respiratory distress syndrome were significantly lower in twin gestations who received steroids < 34 weeks gestation, without similar significant improvement seen with steroid administration ≥ 34 weeks gestation.

Adjusted Regression comparing steroids given ≥ 34 weeks or < 34 weeks versus no steroids		
	Steroids < 34 weeks	Steroids ≥ 34 weeks
	aOR / aRC (95% CI)	aOR / aRC (95% CI)
Respiratory distress syndrome	**0.32 (0.12-0.85)**	0.57 (0.27-1.20)
Surfactant use	0.35 (0.04-2.99)	0.81 (0.22-3.03)
FiO2 >30% for at least 24 hours	0.39 (0.04-3.64)	0.81 (0.15-4.48)
Transient tachypnea of the newborn	**2.42 (1.16-5.04)**	1.27 (0.59-2.74)
Apnea	0.59 (0.15-2.37)	0.50 (0.14-1.80)
Apgar < 7 at 5 minutes	0.73 (0.22-2.45)	0.53 (0.14-2.01)
Birth weight < 10th %ile		
Twin A	1.85 (0.65-5.26)	1.40 (0.48-4.08)
Twin B	1.54 (0.69-3.44)	1.19 (0.53-2.65)
Hypoglycemia	1.01 (0.55-1.83)	1.52 (0.88-2.64)
Neonatal intensive care unit admission	0.74 (0.38-1.41)	0.92 (0.51-1.65)
Controlled for hypertensive disorders of pregnancy, chorionicity/amnionicity, preterm labor, preterm premature rupture of membranes, gestational age at delivery		

874 How common are fetal genetic abnormalities in "low-risk" patients undergoing genetic testing?

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OBJECTIVE: While amniocentesis and chorionic villus sampling (CVS) are typically performed in those with risk factors, they should be offered to all patients. Our aim was to evaluate the rate of chromosomal abnormalities or copy number variants (CNVs) in patients at low risk who chose to undergo diagnostic testing.

STUDY DESIGN: This was a retrospective review of low-risk patients who underwent invasive testing from 2016-2022. "Low-risk" was defined as those without abnormal screening tests for aneuploidy or single gene disorders. Those with ultrasound abnormalities prior to invasive testing, no prior genetic screening test, and those who terminated for reasons unrelated to genetic diagnosis were excluded. Advanced maternal age (AMA) (age ≥35) patients with normal non-invasive prenatal test (NIPT) were considered low-risk, due to the high sensitivity of NIPT for age-related chromosomal abnormalities. The primary outcome was the rate of genetic abnormalities in low-risk patients. Analysis was done using Fisher's exact.

RESULTS: 668 patients at a median age of 37 (35-40) underwent invasive testing. 77.2% underwent amniocentesis, 21.9% CVS, and 0.9% both. 97% had normal karyotype and microarray. 20 patients (3%) had abnormal genetic testing, including 4 with abnormal karyotype (all inherited rearrangements) and 16 with abnormal microarray. Of the 16 abnormal microarrays, two (12.5%) were considered pathogenic or potentially pathogenic. Genetic findings are shown in Table 1. Overall, three patients (0.4%) chose to terminate the pregnancy due to genetic results. The rate of AMA was not different in those with and without genetic abnormalities (86.9% vs 75%; p=0.25).

CONCLUSION: Genetic screening can identify a population at very low-risk of abnormalities on karyotype or microarray. While most patients in this population had normal genetic testing, clinically significant abnormalities were encountered. These results reinforce the importance of offering invasive testing to all patients, regardless of risk, especially in those who would consider abortion.

Table 1: Demographics and Genetic Outcomes for "low-risk" patients

		Total patients N=668
Abnormal Karyotypes		
	Autosomal trisomy	0 (0%)
	Sex chromosome aneuploidy	0 (0%)
	Inherited inversion or translocation	4 (0.6%)
	De novo inversion or translocation	0 (0%)
Abnormal Microarrays		
	CNV (pathogenic)	2 (0.3%)
	Inherited VUS	14 (2.1%)
	De novo VUS	0 (0%)

Abbreviations: CNV – copy number variant; VUS – variant of uncertain significance

875 Nocturnal Time Above Range with Continuous Glucose Monitoring and Large for Gestational Age Newborn

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OBJECTIVE: Recent data suggests a correlation between nighttime maternal blood sugars and neonatal birthweight. We aimed to examine the association between nighttime continuous glucose monitor (CGM) metrics and neonatal birthweight among individuals using CGM during gestational diabetes (GDM) screening.

STUDY DESIGN: This was a secondary analysis of the prospective study (06/2020 to 01/2022) of individuals who underwent 2-step GDM screening at ≤ 30 weeks. Participants wore a blinded CGM (Dexcom G6 Pro) for ten days during the 1-hour glucose challenge test (GCT). We evaluated nocturnal TAR defined as the percentage of time >140 mg/dL between midnight to 6:00 am. The primary outcome was the rate of large for gestational age, defined as >90th percentile on the Duryea et al. nomogram. TAR was expressed as a percentage of all CGM readings, mean glucose and standard deviation (SD) were analyzed. Spearman's rank correlation coefficient test was used to examine nocturnal TAR and neonatal birthweight; p value of < 0.05 was considered as a statistically significant value.

RESULTS: Of the 92 recruited participants, 6 (6.5%) had a LGA neonate. Individuals with LGA did not have a significantly increased nocturnal TAR as compared to those without LGA (p= 0.24). A correlation between increasing nocturnal TAR and increasing birthweight was not significant (p=0.51).

CONCLUSION: An association between increased nocturnal TAR and neonatal birthweight was not found. Larger studies are needed to investigate the role of nocturnal hyperglycemia and other adverse outcomes, as well as other maternal outcomes related to neonatal birthweight.

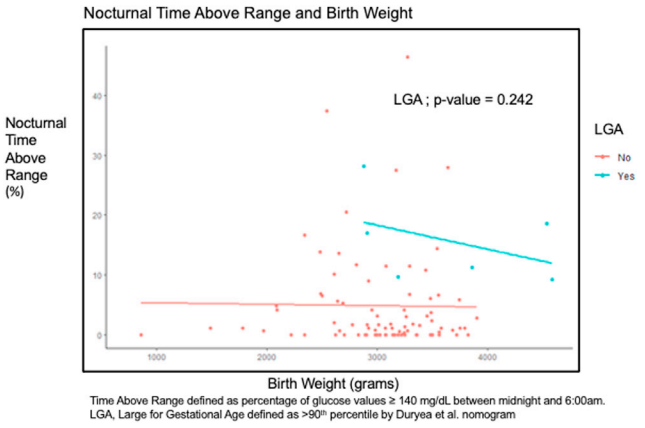

Table 1. Outcomes in a theoretical cohort of 3,664,292 live births

	Screening	No Screening	Difference (Screening-No Screening)
Correct Primary CMV Diagnoses	28,475	0	28,475
Vertical Transmission	6,128	15,687	-9,559
Abortion	877	492	385
Stillbirths	12,000	12,043	-43
Neonatal Death	3,671	3711	-40
Hearing Loss	653	1,891	-1238
Neurodevelopmental Disability	3,989	4,265	-276
Cost ($)	4,395,827,136	5,004,495,682	-608,668,546
Effectiveness (QALYs)	95,834,479	95,828,257	6,222
Strategy	Dominant	Dominated	

876 Universal Screening and Valacyclovir for Maternal Primary CMV in the First Trimester: A Cost-Effectiveness Analysis

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OBJECTIVE: Universal prenatal screening for CMV is not recommended in the United States as, historically, no effective interventions were available. With growing evidence that valacyclovir treatment in first trimester primary infections reduces vertical transmission, universal screening may become an important tool in congenital CMV prevention. This study examined the cost-effectiveness of universal screening for first trimester primary CMV and subsequent valacyclovir treatment for congenital CMV prevention in the United States.

STUDY DESIGN: A decision-analytic model was constructed to compare outcomes of universal screening and valacyclovir treatment in a theoretical cohort of 3,664,292 individuals, the estimated number of annual live births in the United States. Individuals found to be IgG+, IgM+, and to have low IgG avidity were considered to have primary CMV infection and received valacyclovir. Outcomes included correctly diagnosed primary CMV infections, cases of vertical CMV transmission, abortions, stillbirths, neonatal deaths, hearing loss, neurodevelopmental disabilities, costs, and quality adjusted life years (QALYs). Model inputs were derived from literature.

RESULTS: In our study, universal screening in the first trimester for primary CMV and subsequent treatment with valacyclovir in positive cases correctly diagnosed 28,475 cases of primary CMV, led to 385 additional abortions, and decreased adverse outcomes by 9,559 vertical transmission cases, 43 stillbirths, 40 neonatal deaths, 1,238 cases of hearing loss, and 276 cases of neurodevelopmental disability. Universal screening and subsequent treatment was the dominant strategy as it saved $608,668,546 and led to 6,222 additional QALYs.

CONCLUSION: Our results demonstrate that screening for first trimester primary CMV may be a cost-saving intervention, as identification of cases allows for the provision of treatment, which in turn reduces CMV transmission and costly sequelae.

877 Resource Utilization in Abdominal Hysterectomy for Placenta Accreta Spectrum versus other Benign Indications

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OBJECTIVE: Placenta Accreta Spectrum (PAS) patient outcomes are significantly improved under the care of multidisciplinary teams. Currently, hysterectomies for PAS management are billed under the same codes as benign non-obstetric abdominal hysterectomies, though we hypothesized that more surgeon resources are used for the former. We compared the required operating room times and number of attending OBGYNs between hysterectomies for PAS and benign gynecologic (GYN) indications.

STUDY DESIGN: Hysterectomies performed between 2015-2023 at a single institution were included. GYN hysterectomies included scheduled cases with procedure codes for abdominal hysterectomy (total or supracervical). Laparoscopic and robotic hysterectomies as well as those including other unrelated procedures were excluded. PAS hysterectomies included cesarean hysterectomies with pathology-confirmed PAS. Wilcoxon rank sum and Chi-squared analyses were used for continuous and categorical variables, respectively.

RESULTS: Three-hundred twenty-three hysterectomies were included, 147 PAS and 176 GYN. Cases of PAS comprised of 54 grade 1 (36.7%) and 93 grade 2 or above (63.3%). PAS hysterectomies were significantly more likely to require >1 attending OBGYN than GYN hysterectomies (29.9% vs 3.98%, OR 10.3 [4.48-23.8]). Compared to GYN hysterectomies (median 184 min, IQR 156, 235), attending OBGYN time in the operating room (OR) was similar when compared to all PAS hysterectomies (median 198 min, IQR 160, 240, p=0.78). However, this time was significantly greater for PAS hysterectomies grade 2 or above (median 214 min, IQR 167, 252, p=0.02) and those with placenta previa (median 222 min, IQR 192, 256, p< 0.01).

CONCLUSION: PAS hysterectomies are more likely to require multiple attending OBGYNs, and in cases with placenta previa or invasive PAS, longer time in the OR. As multidisciplinary delivery care is now the standard of care for PAS management, reimbursement rates for PAS hysterectomies should better reflect the resources and personnel required to care for these complex patients.

878 Intimate partner violence is associated with increased adverse perinatal outcomes

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OBJECTIVE: Pregnancy is a high-risk time for intimate partner violence (IPV), with varying estimates of IPV prevalence globally. Existing population-level research on IPV in pregnancy often examines cohorts outside of the United States (US). The objective of this study is to examine the association between IPV in pregnancy and perinatal outcomes in a large, US-based cohort.

STUDY DESIGN: This is a retrospective cohort study using California linked vital statistics and hospital discharge data from 2016-2019. We included singleton, non-anomalous births with gestational age 23-42 weeks. IPV was identified using International Classification of Diseases (ICD-10-CM) codes. Chi-square tests and multivariable logistic regression models were to determine association of IPV in pregnancy with perinatal outcomes.

RESULTS: A total of 1,518,741 births were included, of which 2,756 (0.2%) had reported IPV in pregnancy. Compared with no reported IPV, pregnancies with IPV had higher proportions of chorioamnionitis (6.6% vs. 3.3%; p< 0.001), severe maternal mortality (SMM) (2.5% vs. 1.3%; p< 0.001), preterm delivery < 37 weeks (9.1% vs. 6.8%; p< 0.001), and neonatal intensive care unit (NICU) admission (11.8% vs. 8.6%; p< 0.001). Pregnancies with reported IPV had increased odds of preeclampsia (aOR=1.41, (1.21, 1.65)), chorioamnionitis (aOR=2.23, (1.90, 2.61)), placental abruption (aOR=1.68, (1.27, 2.24)), and SMM (aOR=1.73, (1.35, 2.21)). With regards to neonatal outcomes, reported IPV in pregnancy was associated with increased odds of Apgar score < 7 at 5 minutes (aOR=2.02, (1.58, 2.59)) and NICU admission (aOR=1.23, (1.09, 1.38)). We did not find a statistically significant difference in preterm birth < 32 weeks, small for gestational age, stillbirth, or infant death.

CONCLUSION: IPV in pregnancy is associated with increased odds of adverse maternal outcomes, as well as increased odds of Apgar score < 7 at 5 minutes and NICU admission. The results of this study reinforce the need for universal screening for IPV in pregnancy to inform care in during this high-risk period.

Table 1: Multivariable logistic regression analyses showing adjusted odds ratios (aOR) for perinatal outcomes among patients with reported IPV in California (2016-2019)

	Births with reported IPV N=2,756 (0.2%)	Births with no report of IPV N=1,515,985 (99.8%)	p-value*	Adjusted odds ratio (aOR (95% CI)**
Maternal outcomes				
Preeclampsia	6.8%	4.5%	<0.001	1.41 (1.21, 1.65)
Chorioamnionitis	6.6%	3.3%	<0.001	2.23 (1.90, 2.61)
Pyelonephritis	0.3%	0.1%	<0.001	3.85 (1.91, 7.74)
Antepartum hemorrhage	0.3%	0.1%	0.002	2.82 (1.46, 5.45)
Placental abruption	2.0%	1.1%	<0.001	1.68 (1.27, 2.24)
Severe maternal morbidity	2.5%	1.3%	<0.001	1.73 (1.35, 2.21)
Neonatal outcomes				
Preterm birth (<37 weeks)	9.1%	6.8%	<0.001	1.15 (1.00, 1.32)
Preterm birth (<32 weeks)	1.4%	0.8%	<0.001	1.35 (0.96, 1.92)
Apgar score <7 at 5 minutes	2.5%	1.1%	<0.001	2.02 (1.58, 2.59)
NICU admission	11.8%	8.6%	<0.001	1.23 (1.09, 1.38)
Small for gestational age	9.0%	8.7%	0.75	0.95 (0.83, 1.09)
Stillbirth	0.3%	0.4%	0.17	0.50 (0.21, 1.20)
Infant death	0.4%	0.2%	0.03	1.48 (0.77, 2.86)

* Chi-square test
**Adjusted for race/ethnicity, age, education, body mass index (BMI), insurance, parity, prenatal care, and nicotine use.

879 Perinatal outcomes of methamphetamine use in pregnancy in California, 2008-2019

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OBJECTIVE: While methamphetamine use has been rising in recent years, occurring amongst a wider demographic and in broader geographical areas, there is limited research on its use in pregnancy. The objective of this study is to examine the association between prenatal methamphetamine use and perinatal outcomes in a large, recent birth cohort.

STUDY DESIGN: This is a retrospective cohort study using California linked vital statistics and hospital discharge data from 2008-2019. We included singletons with gestational age 23-42 weeks. We further excluded cocaine, opioid, or other substance use. Methamphetamine use was identified using ICD-9 and ICD-10 codes. Chi-square tests and multivariable logistic regression models were used to evaluate associations of methamphetamine use with perinatal outcomes.

RESULTS: A total of 5,148,972 births were included, of which 6,056 (0.12%) had prenatal methamphetamine use. Compared with no use, individuals with methamphetamine use had higher proportions of severe maternal morbidity (3.1% vs. 1.2%; p< 0.001), preterm delivery < 37 weeks (16.0% vs. 6.7%; p< 0.001), and neonatal intensive care unit (NICU) admission (21.6% vs. 10.2%; p< 0.001). Individuals with methamphetamine use had increased odds of gestational hypertension (aOR=1.63, (1.44, 1.83)), preeclampsia (aOR=1.65, (1.48, 1.85)), placental abruption (aOR=2.09, (1.76, 2.48)), cardiovascular morbidity (aOR=2.11, (1.61, 2.77)), and severe maternal morbidity (aOR=2.11, (1.81, 2.47)). Hispanic patients and those with public insurance had higher odds of adverse maternal outcomes. With regards to neonatal outcomes, methamphetamine use was associated with increased odds of preterm birth < 37 weeks (aOR=2.10, (1.95, 2.26)), NICU admission (aOR=1.99, (1.87,

2.12)), small for gestational (aOR=1.30, (1.20, 1.41)), and infant death (aOR=3.29, (2.56, 4.23)).

CONCLUSION: Methamphetamine use in pregnancy is associated with increased odds of both adverse maternal and neonatal outcomes. The results of this study can inform care in pregnancy and postpartum for this high-risk, socioeconomically vulnerable population.

Table 1: Multivariable logistic regression analyses showing adjusted odds ratios (aOR) for perinatal outcomes among patients with methamphetamine use in California (2008-2019)

	Pregnant individuals with methamphetamine use N=6,056 (0.12%)	Pregnant individuals with no methamphetamine use N=5,142,916 (99.88%)	p-value*	Adjusted odds ratio (aOR (95% CI)**
Maternal outcomes				
Gestational hypertension	5.1%	3.4%	<0.001	1.63 (1.44, 1.83)
Preeclampsia	5.9%	3.8%	<0.001	1.65 (1.48, 1.85)
Placental abruption	2.4%	1.0%	<0.001	2.09 (1.76, 2.48)
Cardiovascular morbidity***	1.1%	0.3%	<0.001	2.11 (1.61, 2.77)
Severe maternal morbidity	3.1%	1.2%	<0.001	2.11 (1.81, 2.47)
Neonatal outcomes				
Preterm birth (<37 weeks)	16.0%	6.7%	<0.001	2.10 (1.95, 2.26)
Preterm birth (<32 weeks)	2.4%	0.9%	<0.001	1.98 (1.65, 2.37)
NICU admission	21.6%	10.2%	<0.001	1.99 (1.87, 2.12)
Small for gestational age	11.6%	8.7%	<0.001	1.30 (1.20, 1.41)
Congenital anomalies	10.2%	9.9%	0.576	1.04 (0.96, 1.14)
Infant death	1.1%	0.2%	<0.001	3.29 (2.56, 4.23)

* Chi-square test
**Adjusted for race/ethnicity, age, education, BMI, insurance, parity, alcohol use, nicotine use, mental health disorder, chronic hypertension, and preexisting diabetes.
*** Cardiovascular morbidity is a composite outcome of stroke, myocardial infarction, pulmonary edema, peripartum cardiomyopathy, and venous thromboembolism.

880 Paracetamol versus Ibuprofen for Postpartum Pain control: A Randomized Controlled Trial

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OBJECTIVE: The use of opioids for postpartum pain control raises concerns regarding their transfer through breastfeeding and potential side effects. We aimed to compare the pain control efficacy between paracetamol and ibuprofen during the immediate postpartum period.

STUDY DESIGN: A randomized controlled interventional study was conducted, including women who underwent vaginal delivery and provided informed consent for participation. When participants requested pain relief at any time during their hospitalization, they were randomly assigned treatment in a double-blind manner using pre-prepared envelopes containing either 400 mg of Ibuprofen or 1000 mg of paracetamol. Women who had undergone a cesarean section had a known sensitivity to any of the study drugs, had preeclampsia, pre or gestational diabetes, a history of depression, or chronic pain or fibromyalgia, were excluded from participation in the study.

Pain level was reported using the Numeric Rating Scale (NRS) at various time points immediately after treatment (T0), one, four, and six hours after treatment (T1, T4, and T6, respectively). The indicated site of the most intense pain and the need for additional analgesia were recorded. The study also evaluated the impact of pain control on breastfeeding initiation, mobilization, and urination.

RESULTS: 1. There were no differences in demographic characteristics and perinatal outcomes between the two study groups.

2. No significant differences were found in the interval from delivery to demand for pain control between the groups (8±6-10.5 hours and 11±6-16 hours for the paracetamol and ibuprofen groups respectively, p-value = 0.13).

3. Pain scores by NRS were similar between the groups for the paracetamol and ibuprofen groups (table)

4. No significant differences were noted in breastfeeding initiation, mobilization, urination, or the need for additional analgesia between the groups.

CONCLUSION: This study suggests comparable effectiveness of paracetamol and Ibuprofen for immediate postpartum analgesia and both medications can be considered as a non-opioid alternative for postpartum pain control.

Table - Analgesia effectiveness

Variable			All population (n=107)	paracetamol (n=52)	ibuprofen (n=55)	p-value
T0	Time delivery to analgesia request, mean (SD), hours		9 (6-12.5)	8 (6-10.5)	11 (6-16)	0.13
	NRS*, median (IQR)		6 (5-7)	6 (5-7)	6 (5-6)	0.3
	Location, n (%)	Sutures / vagina	27 (35.5)	17 (37.8)	10 (32.3)	0.62
		Abdomen / uterus	69 (72.6)	29 (59.2)	40 (87)	0.002
		Back	15 (20.5)	8 (19)	7 (22.6)	0.71
		Other	3 (4.3)	0 (0)	3 (10.3)	0.07
T1	NRS, median (IQR)		1.5 (0-4)	1 (0-4)	2 (0-3)	0.72
	NRS relative to T0, median (IQR), %		32.67 (0-66.6)	20 (0-66.7)	33 (0-60)	0.68
	Added medication, n (%)		14 (13.1)	8 (15.4)	6 (10.9)	0.49
T4	NRS, median (IQR)		1 (0-5)	2 (0-5)	0.5 (0-5)	0.23
	NRS relative to T0, median (IQR), %		20 (0-71.4)	33.3 (0-83.3)	8.3 (0-66.7)	0.2
	Added medication, n (%)		25 (23.3)	12 (23.1)	13 (23.6)	0.88
T6	NRS, median (IQR)		1 (0-3)	1 (0-4)	0.5 (0-3)	0.16
	NRS relative to T0, median (IQR), %		16.67 (0-52.5)	20 (0-66.7)	6.3 (0-42.5)	0.16
	Added medication, n (%)		19 (17.8)	10 (19.2)	9 (16.4)	0.7

881 Gestational inflammation induces a cyclooxygenase-2 dependent disruption of vascular integrity of the placental barrier

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OBJECTIVE: This study aimed to identify cellular and molecular pathways mediating severe maternal immune activation (MIA) effects on placental permeability and vasculature in a mouse model. Pharmacological and immunohistological methods identified the role of cyclooxygenase-2 (COX2) pathway and cellular localization of COX2 molecular pathway components to identify key players and potential therapeutic targets.

STUDY DESIGN: Pregnant mice were injected with saline or a viral mimetic, polyinosinic-polycytidylic acid (polyI:C; 10 mg/kg), to induce inflammation on gestational day 13. After 24 hours, mice

either received celecoxib (20 mg/kg) or vehicle only. On gestational day 15, live MRI was performed and specimens collected. Immunohistochemistry was used to evaluate placental pericyte coverage of endothelial cells and cellular localization of key elements of the COX 2 pathway.

RESULTS: Live MRI revealed that severe MIA increases placental permeability to a gadolinium contrast agent. In vivo pharmacological inhibition experiments demonstrated that this effect is from a COX2-dependent signal which increases macrophage activity and decreases pericyte coverage of endothelial cells in the placental villi. Similar responses were observed in human placental histological samples from patients with infections. Immunohistological studies revealed COX2 expression in decidual cells, microsomal Prostaglandin E synthase-1 (mPGES1) in syncytiotrophoblasts, and Prostaglandin E_2 receptor 3 (EP3) in adjacent pericytes.

CONCLUSION: Our results suggest that severe gestational MIA activates a decidual COX2 pathway leading to immune activation in placental villi and disruption of the blood-placental barrier integrity via EP3 receptor signaling in pericytes. Disruption of placental vascular structure and permeability may increase the risk of abnormal fetal development and negatively impact long-term health due to exposure to pathogens and inflammatory molecules. These results have implications extending beyond infection as COX2-mediated disruption of pericyte coverage of endothelial cells is observed in in vivo models of preeclampsia.

882 Impact of continuous glucose monitoring on glycemic control in type 1 diabetes in pregnancy

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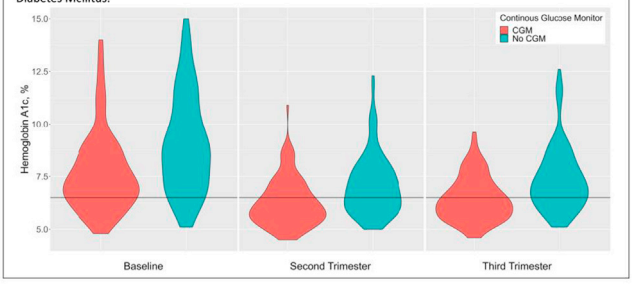
OBJECTIVE: Continuous glucose monitoring (CGM) is an expanding technology with potential benefits in pregnancy related outcomes. We aim to determine the effect of CGM use on glycemic control in patients with type 1 diabetes mellitus (T1DM) in pregnancy.

STUDY DESIGN: This was a retrospective cohort study of patients with T1DM with singleton pregnancy who received prenatal or diabetes care and delivered within a single large hospital system from 1/2016 - 1/2023. Patients using CGM were compared to those using traditional blood glucose monitoring (TBGM). Patients were excluded if missing delivery information, care was established after 20 weeks, or if unable to determine CGM status in pregnancy. Logistic regression was used to control for maternal age, body mass index, chronic hypertension, and insurance. Primary outcome was glycemic control in pregnancy, with on-target defined as hemoglobin A1c (HgA1c) $<$ 6.5%. Secondary outcomes included baseline poor glycemic control (HgA1c $\geq$10%), DKA admission, hypertensive disorders of pregnancy, indicated preterm birth, and primary cesarean delivery.

RESULTS: Among 288 patients with T1DM, 145 (50.3%) used CGM compared to 143 using TBGM monitoring. Patients using CGM were more likely to use insulin pumps and were less likely to be Black, nulliparous, or to use publicly funded insurance. On-target baseline glycemic control was more common in the CGM group (24.8% vs 9.8%, aOR 2.15, 95% CI 1.04-4.46) while poor glycemic control at baseline was less common in the CGM group (10.3% vs 28.7%, aOR 0.26, 95% CI 0.13-0.51). Differences in glycemic control persisted through pregnancy with on-target A1C values more common in the CGM group in second (55.2% vs 25.2%, OR 3.28, 95% CI 1.88-5.71) and third trimesters (42.1% vs 18.2%, OR 3.44, 95% CI 1.90-6.24). Persistent suboptimal or worsening glycemic control was less common in the CGM group (31% vs 46.2%, OR 0.29, 95% CI 0.16-0.53). Non-glycemic outcomes were similar between groups.

CONCLUSION: CGM use in T1DM is predictive of glycemic control throughout pregnancy, even when controlling for factors associated with poor glycemic outcomes.

Figure. Hemoglobin A1c through Pregnancy by Continuous Glucose Monitor Use Among Patients with Type 1 Diabetes Mellitus.



883 Impact of continuous glucose monitoring on non-glycemic perinatal outcomes in type 1 diabetes in pregnancy

Shannon McCloskey[1], Joseph R. Biggio Jr.[2], Naiha Mussarat[3], John A. Morgan[4], James D. Toppin[5], Sarah Sternlieb[6], Nicholas Manuel[6], Kali Juracek[6], Sharon Shu[6], Jesse Stone[6], Frank Williams[7]

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OBJECTIVE: Continuous glucose monitoring (CGM) is an expanding technology with potential benefits in glycemic and non-glycemic perinatal outcomes. We aim to determine the impact of CGM use in type 1 diabetes mellitus (T1DM) on non-glycemic perinatal outcomes.

STUDY DESIGN: This was a retrospective cohort study of patients with type 1 diabetes who received prenatal or diabetes care and delivered within a single large hospital system from January 2016 to January 2023. Patients using CGM were compared to those using traditional capillary blood glucose monitoring (BGM). Inclusion criteria included diagnosis of type 1 diabetes prior to pregnancy and singleton gestation. Patients were excluded if missing delivery information, care was established after 20 weeks, or if unable to determine CGM status in pregnancy. Logistic regression was used to control for maternal age, body mass index, and insurance type. Primary outcome was prenatally diagnosed fetal anomalies. Secondary outcomes included stillbirth, perinatal death, small for gestational age (SGA), large for gestational age (LGA), neonatal intensive care (NICU), and 5-minute Apgar $<$4.

RESULTS: Among 288 patients with type 1 diabetes, 145 (50.3%) used CGM compared to 143 using traditional BGM monitoring. Patients using CGM were more likely to use insulin pumps and were less likely to be Black, nulliparous, or use publicly funded insurance. Median baseline hemoglobin A1c was lower in the CGM group (7.3 vs 8.8%, p$<$ 0.001). Fetal anomalies were less common in the CGM group compared to the traditional BGM group (3.4 vs 10.5%, aOR

0.27, 95% CI 0.09-0.81). Antenatal stillbirth (excluding those with congenital anomalies) was also less common in the CGM group (0.7% vs 6.3%, aOR 0.12, 95% CI 0.01-0.98). Secondary outcomes including LGA, SGA, NICU admission, perinatal death, and 5-minutes Apgar <4 were similar between groups (Table).

CONCLUSION: Preconception and pregnancy CGM use in T1DM is associated with a lower rate fetal anomalies and antenatal stillbirth, even when controlling for factors associated with adverse glycemic outcomes.

Table. Non-glycemic perinatal outcomes.

	All N = 288	CGM N = 145	TBGM N = 143	OR (95% CI)
Congenital anomaly	20 (6.9%)	5 (3.4%)	15 (10.5%)	0.27 (0.09-0.81)
Stillbirth	10 (3.5%)	1 (0.7%)	9 (6.3%)	0.12 (0.01-0.98)
Perinatal death	15 (5.2%)	4 (2.8%)	11 (7.7%)	0.33 (0.1-1.13)
LGA	96 (33.3%)	50 (34.5%)	46 (32.2%)	1.09 (0.66-1.78)
SGA	12 (4.2%)	5 (3.4%)	7 (4.9%)	0.68 (0.21-2.21)
5-minute Apgar <4	18 (6.2%)	7 (4.8%)	11 (7.7%)	0.62 (0.23-1.64)
NICU admission	164 (56.9%)	77 (53.1%)	87 (60.8%)	0.69 (0.42-1.11)

884 Influence of growth restriction on perinatal outcomes in singleton pregnancies with fetal congenital heart disease

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OBJECTIVE: To evaluate perinatal outcomes in singleton fetal congenital heart disease (CHD) cases with and without fetal growth restriction (FGR).

STUDY DESIGN: Single center retrospective analysis of singleton pregnancies with diagnosis of fetal CHD delivering at ≥ 37 weeks between July 1, 2020 and July 31, 2022. Cardiac anomalies were stratified by the neonatal level of care plan and graded from 1-4 in increasing order of complexity. The primary outcomes were birth-surgery interval and survival to hospital discharge. The FGR group was compared to the appropriately grown (AGA) group.

RESULTS: 389 pregnancies delivered during the study period. Of these, 61 (15.7%) were FGR and 328 (84.3%) were AGA. Pregnancies with FGR delivered at an earlier gestational age (p< 0.0001). Induction of labor rates were higher in the FGR group (69% vs 51%). Mode of delivery and NICU length of stay were comparable in both groups. On univariate analysis, birth-surgery interval was significantly greater (p=0.02), and neonatal survival rate was lower in the FGR group (p=0.03). On multiple regression (Table 2), the diagnosis of FGR did not influence birth-surgery interval (p=0.29) which was driven by the complexity of cardiac anomaly (p< 0.0001). However, FGR diagnosis along with the complexity of cardiac anomaly had a significant impact on the survival rate on logistic regression (p=0.03 and 0.007) (Table 3). Upon stratification of the FGR pregnancies by gestational age at delivery, 10 pregnancies delivered beyond 39 weeks and were not included due to small sample size. Outcomes were compared for gestational age at delivery between 37-37.6 weeks and 38-38.6 weeks. Gestational age at delivery influenced birth-surgery interval (p=0.008) and survival rate (p=0.04) in the FGR group on regression analysis.

CONCLUSION: In singleton term pregnancies with fetal CHD, FGR was associated with a lower neonatal survival rate. In the FGR group, early gestational age at delivery had greater birth-surgery interval and lower neonatal survival rates.

Table 1: Univariate analysis in term CHD pregnancies with and without FGR

	FGR (n=61)	AGA (n=328)	p-value
Extra-cardiac anomalies, N(%)	19 (31.1)	68 (20.7)	0.09
Genetic abnormalities, N(%)	19 (31.1)	82 (25)	0.34
Level 1 care plan, N(%)	28 (45.9)	128 (39.0)	0.71
Level 2 care plan, N(%)	24 (39.3)	135 (41.2)	
Level 3 care plan, N(%)	8 (13.1)	59 (18.0)	
Level 4 care plan, N(%)	1 (1.7)	6 (1.8)	
Gestational age at delivery, weeks	38.1 [37.2 – 38.4]	38.6 [38.1 – 39.2]	**<0.0001**
Early term delivery, N(%)	51 (83.6)	163 (49.7)	**<0.0001**
Induction of labor, N(%)	42 (68.9)	167 (50.9)	**0.01**
Vaginal delivery, N(%)	32 (52.5)	176 (53.7)	0.89
Cesarean delivery, N(%)	29 (47.5)	152 (46.3)	
Emergency Cesarean delivery, N(%)	17 (27.9)	64 (19.5)	0.17
Cesarean delivery for NRFHT, N(%)	13 (21.3)	44 (13.4)	0.12
PGE2, N(%)	36 (59)	205 (62.5)	0.67
Birth weight, grams	2555.0 [2210 – 2730]	3295.0 [3010 – 3575]	**<0.0001**
1-min Apgar	8	8	0.99
5-min Apgar	9	9	0.56
Cord gases- arterial ph	7.27 [7.24 - 7.31]	7.26 [7.22 - 7.31]	0.44
Birth-surgery interval, days	6 [3-38]	4 [2-10]	**0.02**
Survival, N(%)	52 (85.2)	309 (94.2)	**0.03**
NICU LOS, days	20.5 [5.5-62.5]	16 [8-27]	0.1

Results are given in [median, interquartile range] or proportions. (NRFHT=non-reassuring fetal heart tracing; PGE2= Prostaglandin E2 administration; NICU=neonatal intensive care unit; LOS=length of stay)

Table 2: Multiple linear regression evaluating factors affecting birth-surgery interval in all term CHD pregnancies

Birth-surgery interval	Coefficient	Std error	P-value	95% CI
Level care plan	-24.20	4.56	<0.0001	-33.2 - -15.2
Diagnosis of FGR	12.1	11.38	0.29	-10.3 – 34.5
Gestational age at delivery	-6.1	4.82	0.21	-15.6 – 3.4
Birth weight	0.000	0.01	0.97	-0.0 – 0.0

Table 3: Logistic regression evaluating factors affecting neonatal survival in all term CHD pregnancies

Survival	Odds ratio	Std error	P-value	95% CI
Level care plan	0.51	0.13	0.007	0.32 – 0.84
Diagnosis of FGR	0.29	0.16	0.03	0.1 – 0.86
Gestational age at delivery	0.76	0.23	0.37	0.42 – 1.38
Birth weight	1.0	0.00	0.74	0.0 – 0.0

885 Outcomes in monochorionic diamniotic pregnancies with proximate placental cord insertions

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OBJECTIVE: To evaluate outcomes in monochorionic diamniotic (MCDA) pregnancies with proximate placental cord insertions (pPCI).

STUDY DESIGN: Single center retrospective analysis of MCDA pregnancies between 2014-2022. Distance between placental cord insertions (PCI) was defined by ultrasound examination. Outcomes of pregnancies with pPCI (≤ 4 cm) were compared to those with intermediate PCI or iPCI (4.1-6.0 cm) from the same study period. For each pPCI pregnancy, 2 controls with PCI distance > 6 cm (normal or nPCI) were selected after matching for the diagnosis and the type of intervention.

RESULTS: 60 pregnancies with pPCI and 46 with iPCI were evaluated. More than 90% of pregnancies were twins in both groups. The rate of pathologies related to monochorionic placentation like TTTS was

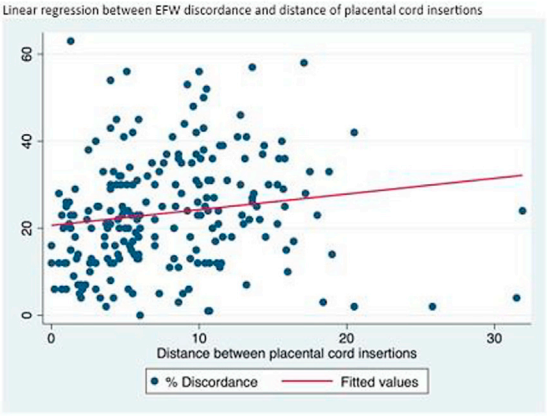
similar between groups. There was a non-significant trend towards a greater number of type III sFGR cases in the pPCI group (37% vs 22%). The rate of intervention was similar in both groups, though there were a smaller number of cases that underwent laser in the pPCI group (3.3% vs 10.8%). The intertwin estimated fetal weight (EFW) discordance was lower in the pPCI group (18% vs 22%, p=0.04). Upon comparing pPCI and nPCI group, the rate of intervention was similar though the percentage of cases undergoing laser were greater in the nPCI group (3.3% vs 14.2%, p=0.04). A greater number of cases were managed with "amnioreduction (AR) only" in the pPCI group (8.3 vs 1.7, p=0.04). The EFW discordance was considerably lower in the pPCI group (18% vs 26%, p< 0.0001) though perinatal outcomes were similar in both groups. Linear regression model included all patients (n=226) and the distance between PCI significantly influenced EFW discordance after controlling for sFGR and gestational age at initial evaluation.

CONCLUSION: Presence of pPCI was associated with lower EFW discordance likely due to even distribution of placental share. Lower rates of laser and higher rates of AR management in this group suggests technical challenges associated with laser though the overall outcomes are comparable likely driven by the underlying diagnosis.

	pPCI (n=60)	nPCI (n=120)	p-value
Intervention, N(%)	29 (48.3)	62 (51.7)	0.75
Laser, N(%)	2 (3.3)	17 (14.2)	0.04
RFA, N(%)	24 (40)	44 (36.7)	0.74
GA at RFA, N(%)	19.2 [18.5 – 20.3]	19.3 [18.6 – 19.6]	0.92
AR only, N(%)	5 (8.3)	2 (1.7)	0.04
Maternal age, years	32.0 [29.2 – 32.2]	30.5 [29.8 – 31.8]	0.61
BMI, kg/m²	27.4 [26.2 – 30.0]	27.6 [28.4 – 31.0]	0.49
GA at consult, weeks	19.2 [19.2 – 20.6]	19.1 [19.1 – 20.2]	0.61
EFW discordance, %	18.0 [15.7 – 21.9]	26.0 [24.4 – 29.1]	<0.0001
Distance between placental cord insertions, cms	2.2 [2.0 – 2.6]	10.8 [11.2 – 12.8]	<0.0001
GA delivery, weeks	33.6 [31.5 – 34.0]	34.3 [32.6 – 34.2]	0.35
Procedure-delivery interval, days	100 [77.7 – 123.1]	114.5 [100.1 – 117.0]	0.24
Two live births in twins, N(%)	29/56 (51.8)	60/112 (53.6)	0.87
Two survivors to discharge in twins, N(%)	29/56 (51.8)	51/112 (45.5)	0.51

Results are given in [median, interquartile range] or proportions. (RFA=radiofrequency ablation; GA=gestational age; AR=amnioreduction; EFW=estimated fetal weight)

Linear regression between EFW discordance and distance of placental cord insertions



886 Non-Criteria Obstetrics Antiphospholipid Syndrome is an independent risk factor for adverse pregnancy outcome

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OBJECTIVE: Non-Criteria Obstetric Antiphospholipid Syndrome (NC-OAPS) includes individuals who fit OAPS clinical criteria but not the Sydney laboratory requirements. The aims of the study were to determine the prevalence of NC-OAPS, antiphospholipid antibodies (APLab) profile, pregnancy outcomes among NC-OAPS and long-term thrombotic and obstetric complications.

STUDY DESIGN: A population-based retrospective cohort study included all singleton gestations (n=116,409) delivered at our medical center from 1998 to 2020. We defined NC-OAPS patients according to low titers of IgM/IgG anticardiolipin (aCL) or anti-β2-glycoprotein (aβ2GP) antibodies, a single positive lupus anticoagulant test (LAC) or positive IgA antibodies present on two or more occasions at least 12 weeks apart; together with at least one clinical criterion.

RESULTS: The rate of NC-OAPS was 0.22% (258/116409) and of OAPS 0.04% (49/116,409). The most frequent APLab tests were low titers of IgM & IgG aCL and LAC antibodies (33.7%, 35.3, and 35.3% respectively). Women with NC-OAPS had a higher rate of chronic hypertension, hypercholesterolemia, lupus, and aspirin and LMWH treatments than those in the general obstetrical population (GOP) (p< 0.001 for all). In comparison to women with OAPS, the NC-OAPS group had lower median gravidity and parity, a lower rate of lupus and aspirin or LMWH treatments. The rate of obstetric complications prior to and following the diagnosis of OAPS or NC-OAPS did not differ between the groups. The rate of DVT was lower in the NC-OAPS group (p=0.01). In a multivariable Generalized Estimating Equation model adjusting for maternal age, gravidity, and ethnicity, NC-OAPS patients had an independent risk to develop fetal loss, stillbirth, preeclampsia, placental abruption, fetal growth restriction and preterm birth than those in the GOP, which was similar to those with OAPS (Table).

CONCLUSION: NC-OAPS carries an independent risk for the development of pregnancy complications. These findings have implications on the prenatal follow-up and prevention strategies among women with NC-OAPS.

Comparison of obstetric complications in NC-OAPS, OAPS patients, and the general obstetric population

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI) *
Placental abruption		
NCOAPS	3.6 (2-6.6)	3.2 (1.8-5.9)
OAPS	2.3 (0.3-16.7)	2.2 (0.3-16.1)
General Obstetric Population	Reference	Reference
Preterm birth		
NCOAPS	2.2 (1.7-2.7)	2.3 (1.8-2.9)
OAPS	2.7 (1.5-4.7)	2.8 (1.6-5.1)
General Obstetric Population	Reference	Reference
Stillbirth		
NCOAPS	5.6 (3.1-10.1)	5.7 (3.1-10.5)
OAPS	5.7 (2.2-15.2)	6 (2.3-15.7)
General Obstetric Population	Reference	Reference
FGR		
NCOAPS	3.2 (2.4-4.2)	2.9 (2.1-3.9)
OAPS	3.8 (2-7.4)	4.4 (2.1-9)
General Obstetric Population	Reference	Reference
Fetal loss after 10th week of gestation		
NCOAPS	10.8 (8-14.7)	13.4 (9.7-18.5)
OAPS	14.7 (8.5-25.2)	15.7 (8.7-28.3)
General Obstetric Population	Reference	Reference
Pre-eclampsia		
NCOAPS	3.4 (2.4-4.6)	3.2 (2.3-4.3)
OAPS	3.9 (2-7.6)	4.1 (2-8.3)
General Obstetric Population	Reference	Reference

* Adjusted for maternal age, pregnancy number and ethnicity.

887 Perinatal outcomes of Small-for-Gestational-Age (SGA) newborns to mothers with and without a Müllerian anomaly

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OBJECTIVE: Müllerian anomalies contribute to a distinct uterine environment which influence fetal development and have implications for both fetal growth and obstetrical outcomes. The current study aimed to compare the immediate perinatal outcomes of SGA newborns after development in a uterus with a Müllerian anomaly to SGA newborns who developed in a normal uterus.

STUDY DESIGN: A retrospective population-based cohort study was conducted including all SGA infants born between 1991 and 2021 in a tertiary medical center. The delivery data were collected from the institutional computerized database. Multiple gestations and chromosomal abnormalities were excluded. The study group included SGA newborns from uterus with a Müllerian anomaly compared to a group of SGA newborns from a normal uterus. Maternal characteristics and immediate perinatal outcomes were evaluated. Multiple logistic regression models were used for statistical analysis.

RESULTS: During the study period, 16,210 SGA neonates delivered in our medical center; 0.61% (n = 99) were born to mothers with Müllerian anomalies and 99.39% (n=16,111) were born to mothers with a normal uterus. Müllerian anomalies were related to higher rates of cesarean delivery (OR 20.4; 95% CI [12.3-33.7]; p < .001), preterm delivery < 37 weeks (OR 4.3; 95% CI [2.7-6.7]; p < .001), preterm delivery< 34 weeks (OR 4.1; 95% CI [2.2-7.7]; p < .001) and very low birth weight (< 1500g) (OR 3.5; 95% CI [1.9-6.3]; p < .001). However, perinatal outcomes, such as Apgar score < 7 at 5 minute and pH < 7 were comparable between the study groups.

CONCLUSION: Offspring with SGA that developed in a uterus with a Müllerian anomaly have a higher risk of cesarean delivery, preterm delivery and very low birth weight compared to SGA offspring developed in a normal uterus. However, there were no significant differences regarding adverse perinatal outcomes between the study groups.

Obstetric and perinatal outcomes of SGA newborns after gestation in Müllerian anomaly uterus versus newborns with SGA in normal uterus.

	Infants from Malformative uterus n=99	Infants from normal uterus n=16,111	Odds ratio	95%CI	P-value
Obstetric perinatal outcomes					
Cesarean section	80 (80.8)	2756 (17.1)	20.4	12.3-33.7	<0.001
Preterm delivery < 37 weeks	26 (26.3)	1246 (7.7)	4.3	2.7-6.7	<0.001
Preterm delivery < 34 weeks	11 (11.1)	478 (3)	4.1	2.2-7.7	<0.001
Very low birth weight (VLBW)	13 (13.1)	669 (4.2)	3.5	1.9-6.3	<0.001
Immediate Perinatal outcomes					
APGAR 5 < 7	1 (1.1)	225 (1.5)	0.7	0.1-5.3	0.756
PH < 7	0 (0)	5 (0.9)	-	-	0.846

*Data presented as numbers and percentages

888 Vaginal progesterone effects at the endocervical epithelium in cell culture and preterm birth mouse model

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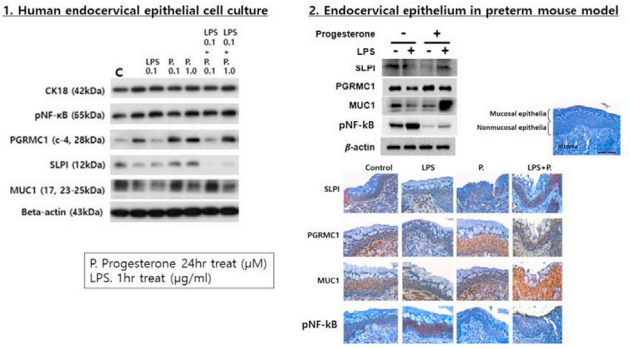
OBJECTIVE: The vaginal progesterone has used to decrease preterm birth in women with short cervical length. The mechanism of progesterone on short cervix is not understood clearly. In this study, we investigated the effects of vaginal progesterone at the uterine endocervical epithelium in cell culture and preterm birth mouse model.

STUDY DESIGN: First, endocervical epithelial cell culture from human (hysterectomy due to postpartum hemorrhage) was conducted and treated with lipopolysaccharide (LPS) and progesterone. Second, the C57BL/6 mice (n = 7/group) were used. On days 13 -15 of gestation, mice received intrauterine injections of either LPS or sterile medium. Vaginal progesterone supply into upper vagina through vaginal plug. Four groups of mice were experimented, the controlled group, vaginal progesterone group, LPS group, and LPS with vaginal progesterone group. The expressions of progesterone receptor membrane component-1 (PGRMC1), secretory leukocyte protease inhibitor (SLPI), mucin-1, and phosphate nuclear factor-kB (pNF-kB) were determined by WB and IHC.

RESULTS: First, in cell culture, the expression levels of PGRMC1, SLPI, and mucin-1 were decreased after LPS treatment, but pNF-kB level was increased. After LPS pretreat and progesterone treat, PGRMC1 and SLPI levels were decreased and lower than that after progesterone treat, but mucin-1 level was increased. Second, in group of LPS treat, the expression of pNF-kB was increased and mucin-1 and SLPI and PGRMC1 expressions were decreased. In group of vaginal progesterone, pNF-kB expression was decreased and PGRMC1 expression was increased. In LPS with vaginal progesterone group, compare to LPS group, the expressions of PGRMC1, SLPI, and mucin-1 were increased, and pNF-kB expression was decreased.

CONCLUSION: Vaginal progesterone showed anti-inflammatory effects at the endocervical epithelium by increased expression of mucin-1, SLPI, and PGRMC1 and decreased expression of pNF-kB.



889 Measurements of pregnancy-related anxiety in sub-saharan africa: A scoping review

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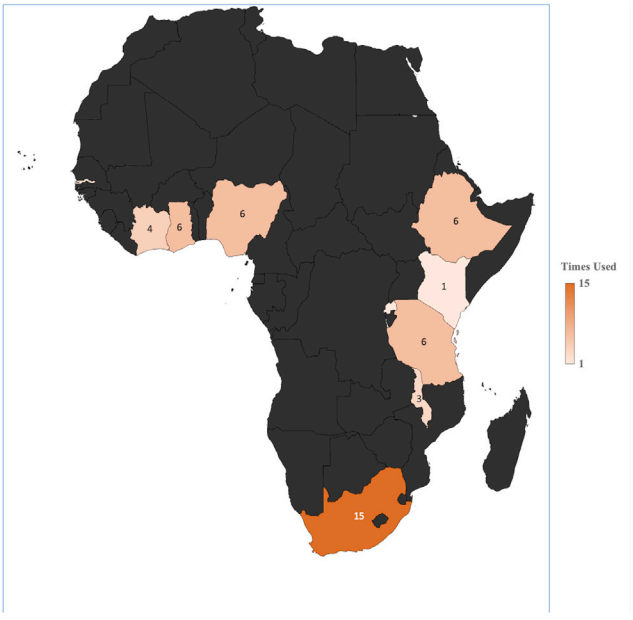
OBJECTIVE: This paper intends to evaluate existing literature to determine which pregnancy-related anxiety scales have been used in Sub-Saharan Africa.

STUDY DESIGN: PubMed, Health and Psychosocial Instruments (HaPI), and APA PsycNet were searched systematically for relevant studies in the English language. Eligible studies (1) screened for anxiety; (2) examined anxiety specifically in pregnant people; (3) were conducted in Sub-Saharan Africa; and (4) specified a validated measurement or scale used to evaluate pregnancy-related anxiety.

Articles were evaluated blindly by three researchers for inclusion in two stages: An abstract and title review, followed by a full text review. Screening tools and evaluation of validity were extracted for each study, as well as region, country, clinical population, and number of participants.

RESULTS: Of the 271 articles screened for inclusion, 37 full-text articles were included in the final paper. These articles yielded 25 different screening tools used to evaluate anxiety in pregnant women in Sub-Saharan Africa. The most frequent location for the study administrations was South Africa (11 studies), with Tanzania (5 studies), Ethiopia (5 studies), Nigeria (4 studies), and Ghana (4 studies) being other common study locations. The most commonly used tools to evaluate pregnancy-related anxiety in Sub-Saharan Africa were the GAD-7 (8 studies), STAI (6 studies), SRQ-20 (5 studies), and EPDS (5 studies).

CONCLUSION: In conclusion, this scoping review sheds light on the current state of research on pregnancy-related anxiety in Sub-Saharan Africa. There remains a significant need for further investigation into the impact of pregnancy on mental health in Sub-Saharan Africa and this study emphasizes the importance of developing and validating culturally sensitive scales that consider the local contexts and challenges faced by pregnant women in Sub-Saharan Africa. Addressing these gaps will contribute to the development of improved interventions for pregnancy-related anxiety in Sub-Saharan Africa, ultimately improving the mental health outcomes of pregnant women in these regions.



890 Oxytocin regimens to prevent postpartum hemorrhage: Comparison of two cohorts matched by propensity score analysis

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OBJECTIVE: To compare the efficacy of two different prophylactic oxytocin regimens (10 IU intramuscular injection vs 5 IU intravenous bolus) in preventing postpartum hemorrhage (PPH) after vaginal delivery.

STUDY DESIGN: Single-center retrospective cohort study including all vaginal deliveries between June 1st 2022 and January 31st 2023 at a tertiary referral unit. On October 1st 2022 the oxytocin regimen for PPH prophylaxis after vaginal delivery was switched from 10 IU intramuscular injection to 5 IU intravenous bolus, administered at the time of shoulder delivery. This amendment was introduced as standard of care in the local protocol for active management of the third stage of labor. The incidence of PPH > 500 mL was compared between the patients who gave birth before and after the implementation of the new protocol. A 1:1 propensity score matching of the 2 groups was done for the variables that proved to be independently associated with PPH.

RESULTS: In the study period, 1509 patients had a vaginal birth at our tertiary care unit (753 in the standard-care group and 756 in the new protocol group) and were enrolled in the study population. Of these, 262 (17.4%) had postpartum hemorrhage > 500 mL. At binomial analysis, nulliparity (48.6% vs 68.7%, P < .001), labor induction (31.4% vs 46.9%, P < .001), manual placenta removal (0.6% vs 9.5%, P < .001) and birthweight (3310 ± 518 vs 3528 ± 512, P < .001) were independently associated with the incidence of PPH. Following propensity score matching for the above cited factors, 294 patients from the standard protocol group vs 294 exposed to the new protocol were compared. A significant decrease in the incidence of PPH was noted with the use of intravenous vs intramuscular oxytocin (18.4% vs 8.8%, P < .001) although after matching a higher rate of perineal tears was allocated in the former group.

CONCLUSION: Administering an intravenous bolus of 5 IU of oxytocin seems more effective than an intramuscular injection of 10 IU in preventing PPH after vaginal delivery.

Tab 1. Univariate analysis of factors associated with PPH in our cohort.

Variabile	Physiological (n = 1247)	PPH (n = 262)	p
Age (y)	32.1 ± 5.21	31.7 ± 5.47	0.223
BMI (kg/m²)	23.8 ± 4.99	24.0 ± 4.67	0.583
GA at delivery (w)	39.4 ± 1.92	39.7 ± 1.38	0.074
Multiple gestation (%)	11 (0.9)	2 (0.8)	0.850
Nulliparity (%)	606 (48.6)	180 (68.7)	<.001*
Previous C-section (%)	58 (4.7)	16 (6.1)	0.321
IoL (%)	392 (31.4)	123 (46.9)	<.001*
I stage length (min)	180 (90-330)	235 (126-398)	<.001
II stage length (min)	31 (13-82)	61 (19-144)	<.001
Epidural analgesia	502 (40.3)	149 (56.9)	<.001
Mode of delivery (%)			<.001
- VD	1181 (94.7)	230 (87.8)	
- AVD	66 (5.3)	32 (12.2)	
Perineal tears (%)			<.001
- None/First-degree	1159 (92.9)	226 (86.3)	
- Second- or higher-	88 (7.1)	36 (13.7)	
Manual placenta removal (%)	8 (0.6)	25 (9.5)	<.001*
Birthweight (g)	3310 ± 518	3528 ± 512	<.001*

*Still significant at logistic regression

Tab 2. Pair ways comparisons between patients submitted to 10IU IM vs 5IU IV bolus after propensity score matching.

Variabile	10IU IM (n = 294)	5IU IV (n = 294)	p
Age (y)	32.0 ± 5.61	31.7 ± 4.66	0.595
BMI (kg/m²)	23.6 ± 4.47	24.1 ± 5.14	0.362
GA at delivery (w)	39.7 ± 1.24	39.8 ± 1.15	0.444
Multiple gestation (%)	1 (0.3)	1 (0.3)	1.000
Nulliparity (%)	146 (49.7)	146 (49.7)	1.000
Previous C-section (%)	16 (5.4)	11 (3.7)	0.325
IoL (%)	74 (25.2)	74 (25.2)	1.000
I stage length (min)	180 (93.3-360)	198 (109-375)	0.359
II stage length (min)	32 (13-97)	34 (15-87.5)	0.749
Epidural analgesia	97 (32.0)	124 (42.2)	**0.022**
Mode of delivery (%)			1.000
- VD	276 (93.9)	276 (93.9)	
- AVD	18 (6.1)	18 (6.1)	
Perineal tears (%)			**0.032**
- None/First-degree	278 (94.6)	264 (89.8)	
- Second- or higher-	16 (5.4)	39 (10.2)	
Manual placenta removal (%)	1 (0.3)	1 (0.3)	1.000
Birthweight (g)	3360 ± 353	3360 ± 353	1.000
PPH (%)	54 (18.4)	26 (8.8)	**<.001**
- Minor	41 (75.9)	18 (69.2)	0.781
- Maior (1000-1500)	9 (16.7)	6 (23.1)	
- Massive (>1500)	4 (7.4)	2 (7.7)	

891 Maternal risk factor clusters and risk of infant congenital heart disease and maternal morbidity

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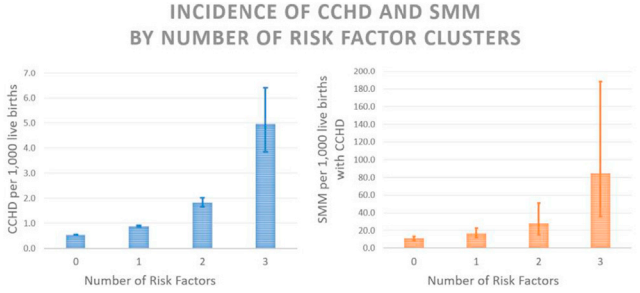
OBJECTIVE: Clustering of cardiovascular disease (CVD) risk factors is associated with greater CVD incidence. In pregnant women, such risk factors are associated with congenital heart disease in the infant. This study aimed to determine the association of maternal clustered CVD risk with infant critical congenital heart disease (CCHD) and associated severe maternal morbidity (SMM).

STUDY DESIGN: This retrospective cohort study used Centers for Disease Control birth certificate data for all live births from 2014-2018. Maternal CVD risks factors (yes/no) included pregestational

diabetes and hypertension, pre-pregnancy smoking status, and history of preterm delivery. SMM was defined as maternal intensive care unit admission, ruptured uterus, unplanned hysterectomy, or maternal transfusion. Cases were grouped as having 0, 1, 2, or 3 maternal CVD risk factors. Incidence and relative risk (RR) of infant CCHD and SMM were calculated for each cluster group and compared to a group with no risk factors.

RESULTS: The cohort included 11,638 infants with CCHD (0.06%) and 19,329,552 without. CCHD incidence increased with a greater number of maternal CVD risk factors (Figure). When compared to the group with no risk factors, the RR for infant CCHD in groups with 1, 2, or 3 risk factors were RR 1.63 (1.56-1.71), RR 3.37 (3.04-3.75), and RR 9.22 (7.15-11.91) respectively. SMM was more common in mothers with infant CCHD (1.30% vs 0.51%, p< 0.001) and incidence increased with additional maternal risk factors (Figure). In mothers with infant CCHD, the RR for SMM in groups with 1, 2, or 3 risk factors were RR 1.52 (1.05-2.20), RR 2.54 (1.33-4.82), and RR 7.74 (3.27-18.31) respectively when compared to the group with no risk factors.

CONCLUSION: CVD risk clustering in mothers of CCHD infants suggests that biological mechanisms underlying CVD may also disturb fetal cardiac development and contribute to poor maternal outcomes. These findings could inform CHD screening and delivery planning. Prevention strategies targeting these risks may benefit both mother and child.



892 Time to Resolution of Low Lying Placentas

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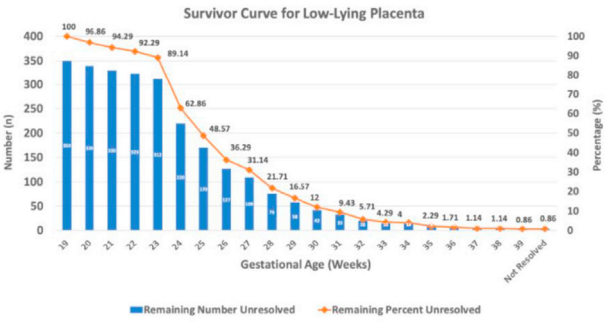
OBJECTIVE: Most pregnant women who have a 2nd-trimester ultrasound (US) also undergo trans-vaginal US to determine cervical length. A low-lying placenta (edge measuring ≤2cm from the cervix) is a frequent finding. Although most low-lying placentas will resolve by term, there is limited information on the time to resolution. The objective of this study was to determine the timeline to resolution of a low-lying placenta and the optimal timing of follow-up US examinations.

STUDY DESIGN: IRB approved retrospective cohort study of singleton pregnancies who had a trans-vaginal US between 16-6/7 to 24-0/7 weeks gestation from 1/2019-12/2022. Potential subjects were identified by querying the US database for ICD-10 code O44.42. Patients were included if they had follow-up transvaginal scans until resolution (placental edge >2cm from the cervix) or within 4 weeks of delivery. Patients were excluded if their low lying placenta resolved before 20 weeks. The proportion of resolved low-lying placentas at weekly intervals and mean and median weeks to resolution were calculated.

RESULTS: 626 patients were identified, of which 350 patients met inclusion criteria. Three (3) patients had an unresolved low lying placenta by time of delivery, leaving 347 patients with a resolved low lying placenta (99.14%). The mean (± SD) gestational age at diagnosis was 20-3/7 (±1-5/7) weeks. The mean (± SD) time to resolution was 6-3/7 (± 3-2/7) weeks. The median time to resolution was 5-1/7 weeks (range 1-1/7 to 19-0/7 weeks). A survival curve analysis was performed demonstrating that over 60% of low lying placentas had resolved by 26 weeks gestation and 88% had resolved by 30 weeks.

CONCLUSION: The vast majority of low-lying placentas diagnosed in the second trimester resolve by 30 weeks gestation. This information may help alleviate patient anxiety and direct optimal timing of follow-up US examinations.



893 What's the optimal threshold? Association of continuous glucose monitoring thresholds with adverse perinatal outcomes

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OBJECTIVE: Continuous glucose monitor (CGM) goals in pregnancy have been extrapolated from the American Diabetes Association (ADA) guidelines from those for nonpregnant adults (time-in-range, TIR >70%; time-above-range, TAR < 25%; time-below-range, TBR < 4%; and glycemic variability, GV ≤36%) with limited supporting data. We sought to determine risk of adverse perinatal outcomes (APOs) in people with type 1 diabetes mellitus (T1DM) using various CGM thresholds across gestation.

STUDY DESIGN: In a retrospective analysis (2019-22) of gravidas with T1DM using CGM, we determined average TAR, TIR, TBR, and GV per trimester using a target range 70-140 mg/dL. Generalized estimating equations determined odds ratios adjusted for microvascular complications (aOR) and 95% confidence intervals for hypertensive disorders of pregnancy (HDP), large-for-gestational age (LGA, birthweight ≥90%ile) and neonatal intensive care unit (NICU) admission at varying thresholds for each CGM metric in the 1st and 3rd trimesters. Receiver operating characteristic analysis determined area under the curve (AUC) for each metric at each threshold.

RESULTS: Among 92 gravidas with CGM data, HDP, LGA, and NICU admission occurred in 30 (33%), 29 (32%), and 20 (23%). For HDP, the 20% threshold for 3rd trimester TAR and 32% threshold for 1st trimester GV had the greatest adjusted odds (TAR: aOR 6.5, GV:

aOR 7.5), and 3rd trimester TAR < 20% had the greatest discriminatory ability (AUC 0.68, Table). For LGA, the 70% threshold for 1st trimester TIR had the greatest adjusted odds (aOR 27.1) and discriminatory ability (AUC 0.73) of any metric. For NICU admission, the 40% threshold for 1st trimester TAR had the greatest odds and discriminatory ability (aOR 9.1, AUC 0.74). TBR at any threshold has poor discriminatory ability (AUC ≤ 0.54) for all outcomes.

CONCLUSION: In this cohort, the optimal discriminatory ability for CGM thresholds and risk of APOs in pregnancy diverge from ADA guidelines, with the exception of the 1st trimester 70% TIR threshold for LGA risk. Larger studies should determine optimal CGM goals in pregnancy and corresponding risk of APOs.

Table. Association of continuous glucose monitoring thresholds with odds of perinatal outcomes

	n (%)		HDP aOR (95% CI)		LGA aOR (95% CI)		NICU admission aOR (95% CI)	
Trimester	1st	3rd	1st	3rd	1st	3rd	1st	3rd
TIR ≥60% (ref)	60 (65.2)	65 (70.7)	4.3 (1.7, 11.3)	2.1 (0.8, 5.3)	3.6 (1.4, 9.1)	1.4 (0.6, 3.7)	2.3 (0.8, 6.3)	4.0 (1.4, 11.5)
TIR <60%	32 (34.8)	27 (29.4)						
TIR ≥65% (ref)	44 (47.8)	56 (60.9)	3.2 (1.22, 8.2)	3.7 (1.5, 9.1)	4.5 (1.7, 12.0)	2.6 (1.1, 6.5)	1.5 (0.5, 4.0)	3.7 (1.3, 10.6)
TIR <65%	48 (52.2)	36 (39.1)						
TIR ≥70% (ref)	32 (34.8)	45 (48.9)	2.4 (0.9, 6.6)	4.2 (1.6, 11.1)	27.1 (3.5, 211.7)	2.4 (0.9, 5.9)	0.8 (0.3, 2.2)	3.5 (1.1, 10.6)
TIR <70%	60 (65.2)	47 (51.1)						
TIR ≥75% (ref)	24 (26.1)	33 (35.9)	2.2 (0.7, 6.6)	4.2 (1.4, 12.7)	16.1 (2.1, 126.3)	1.7 (0.7, 4.5)	0.5 (0.2, 1.3)	1.8 (0.6, 5.6)
TIR <75%	68 (73.9)	59 (64.1)						
TIR ≥80% (ref)	20 (21.7)	22 (23.9)	2.3 (0.7, 8.0)	2.8 (0.8, 9.5)	-	1.0 (0.4, 2.7)	0.6 (0.2, 1.8)	1.2 (0.4, 4.1)
TIR <80%	72 (48.3)	70 (76.1)						
TAR <20% (ref)	17 (18.5)	35 (38.0)	-	6.5 (2.0, 20.8)	-	2.5 (0.9, 6.7)	5.3 (0.7, 42.7)	2.9 (0.9, 9.6)
TAR ≥20%	75 (81.5)	57 (62.0)						
TAR <25% (ref)	26 (28.3)	46 (50.0)	2.6 (0.9, 7.7)	3.5 (1.4, 8.8)	5.0 (1.4, 18.3)	2.5 (1.0, 6.3)	4.5 (1.0, 21.1)	3.9 (1.3, 11.9)
TAR>=25%	66 (71.7)	46 (50.0)						
TAR <30% (ref)	35 (38.0)	58 (63.0)	2.7 (1.0, 7.2)	3.5 (1.4, 8.6)	1.6 (0.6, 4.0)	2.5 (1.0, 6.1)	4.6 (1.2, 17.2)	6.1 (2.1, 18.3)
TAR ≥30%	57 (62.0)	34 (37.0)						
TAR <35% (ref)	45 (48.9)	65 (70.7)	2.1 (0.9, 5.1)	3.3 (1.3, 8.5)	1.3 (0.5, 3.1)	1.4 (0.6, 3.7)	5.2 (1.6, 17.2)	5.9 (2.0, 17.2)
TAR ≥35%	47 (51.1)	27 (29.4)						
TAR <40% (ref)	55 (59.8)	71 (77.2)	3.6 (1.4, 9.1)	2.3 (0.9, 6.3)	1.1 (0.4, 2.6)	1.1 (0.4, 3.1)	9.1 (2.7, 30.7)	3.2 (1.1, 9.4)
TAR ≥40%	37 (40.2)	21 (22.8)						
TBR <2% (ref)	14 (15.2)	9 (9.8)	0.6 (0.2, 1.9)	0.3 (0.1, 1.4)	0.8 (0.2, 2.6)	0.9 (0.2, 3.9)	0.6 (0.2, 2.2)	0.2 (0.1, 1.1)
TBR ≥2%	78 (84.8)	83 (90.2)						
TBR <4% (ref)	27 (29.4)	27 (29.4)	0.5 (0.2, 1.2)	0.5 (0.2, 1.2)	0.4 (0.1, 0.9)	0.4 (0.2, 0.9)	1.0 (0.3, 2.8)	0.7 (0.2, 2.0)
TBR ≥4%	65 (70.7)	65 (70.7)						
TBR <6% (ref)	42 (45.7)	49 (53.3)	0.8 (0.3, 1.8)	0.4 (0.2, 1.1)	0.4 (0.2, 0.9)	0.6 (0.2, 1.5)	1.4 (0.5, 3.8)	0.7 (0.3, 2.0)
TBR ≥6%	50 (54.4)	43 (46.7)						
TBR <8% (ref)	49 (53.3)	63 (68.5)	0.8 (0.3, 2.0)	0.2 (0.1, 0.7)	0.3 (0.1, 0.8)	0.8 (0.3, 2.0)	0.9 (0.3, 2.6)	1.0 (0.3, 2.9)
TBR ≥8%	43 (46.7)	29 (31.5)						
TBR <10% (ref)	60 (65.2)	71 (77.2)	0.7 (0.3, 1.9)	0.3 (0.1, 1.0)	0.2 (0.1, 0.6)	0.6 (0.2, 1.9)	1.4 (0.5, 4.0)	0.3 (0.1, 1.6)
TBR ≥10%	32 (34.8)	21 (22.8)						
GV ≤32% (ref)	23 (25.0)	52 (56.5)	7.5 (1.6, 35.3)	3.4 (1.4, 8.4)	1.4 (0.5, 4.1)	1.1 (0.4, 2.6)	2.2 (0.6, 8.2)	2.3 (0.8, 6.5)
GV >32%	69 (75.0)	40 (43.5)						
GV ≤36% (ref)	48 (52.2)	78 (84.8)	2.1 (0.9, 5.0)	1.2 (0.4, 3.9)	0.8 (0.3, 2.0)	0.5 (0.1, 2.1)	3.4 (1.2, 10.0)	3.8 (1.1, 13.1)
GV >36%	44 (47.8)	14 (15.2)						
GV ≤40% (ref)	65 (70.7)	85 (92.4)	1.7 (0.7, 4.2)	0.8 (0.1, 4.5)	0.5 (0.2, 1.5)	1.7 (0.4, 8.2)	4.0 (1.4, 11.5)	3.9 (0.7, 21.0)
GV >40%	27 (29.4)	7 (7.6)						

aOR—odds ratio adjusted for microvascular complications; CI—confidence interval; GV—glycemic variability, assessed by the coefficient of variation for glucose; HDP—hypertensive disorders of pregnancy, LGA—large-for-gestational age, NICU—neonatal intensive care unit, ref—reference, TIR—time-in-range, TAR—time-above-range, TBR—time-below-range

TIR: percentage of time with capillary blood glucose 70-140 mg/dl; TAR: percentage of time with capillary blood glucose above 140 mg/dL
TBR: percentage of time with capillary blood glucose below 70 mg/dl; GV: measure of fluctuations of capillary blood glucose levels over 24 hours.

894 Neighborhood deprivation is not associated with abortion consideration or completion in patients with fetal myelomeningocele

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OBJECTIVE: Social determinants of health are key drivers of maternal morbidity and adverse pregnancy outcomes, but the relationship to abortion decision-making for severe fetal anomalies is not known. We hypothesized that higher neighborhood deprivation index (NDI) is associated with abortion consideration and completion for pregnant patients with fetal myelomeningocele (fMMC).

STUDY DESIGN: In this retrospective cohort study, patients with fMMC presenting to a tertiary fetal treatment center (FTC) in Illinois between 2018-2023 were identified. The exposure was NDI, calculated from patient zip codes. NDI was analyzed as both a dichotomous (i.e., above average to most v. average to least deprivation) and ordinal exposure. The co-primary outcomes were abortion consideration prior to FTC consultation, ascertained by nurse intake, and abortion completion after FTC consultation. Bivariate and log-binomial regression analyses were performed. Covariates were selected based on P< .10 on bivariate analyses. A subgroup analysis was performed on individuals residing only in Illinois. P< .05 indicated statistical significance.

RESULTS: 124 patients were included. In evaluating NDI as a dichotomous exposure, NDI was not associated with abortion consideration or completion (Table 1). On log binomial modeling, after controlling for confounders of GA and ethnicity, NDI was also not significantly associated with abortion consideration (aRR 0.93, 95% CI 0.57-1.52) or completion (aRR 0.98, 95% CI 0.51-1.87). For a subgroup of individuals residing in Illinois (n = 83 [63.5%]), NDI was also not significantly associated with consideration (aRR 0.84, 95% 0.53-1.32) or completion (aRR 1.07, 95% CI 0.52-2.19). These results were similar when treating NDI as an ordinal exposure.

CONCLUSION: Contrary to our hypothesis, NDI is not associated with abortion consideration or completion in patients with fMMC. While NDI has traditionally been associated with adverse pregnancy outcomes, the lack of relationship with abortion for severe fetal anomalies underscores the importance of comprehensive counseling for all patients presenting to FTCs.

	Above average to most deprivation (n=50)	*Average to least deprivation (n=75)*	*p-value[a]*
Age, in years	27 (23-33)	31 (28-35)	**0.001**
Self-reported race			
White	35 (70.0)	60 (80.0)	0.16
Black	7 (14.0)	3 (4.0)	
Other	8 (16.0)	12 (16.0)	
Latinx ethnicity	22 (44.0)	7 (9.3)	**<0.001**
Residing in Illinois	35 (70.0)	47 (62.7)	0.40
Nulliparous	21 (42.0)	27 (36.0)	0.50
Presentation to CIFH after passage of RHA	17 (34.0)	33 (33.3)	0.93
Presence of genetic and/or structural abnormality	3 (6.0)	4 (5.3)	1.0
Presence of talipes equinovarus[b]	8 (16.7)	23 (30.7)	0.08
Presence of severe ventriculomegaly	24 (40.0)	34 (45.3)	0.77
Grade III Chiari malformation[c]	29 (63.0)	50 (70.4)	0.41
Highest level of lesion[d]			
L3 and above	23 (50.0)	32 (45.7)	0.65
L4-S1	23 (50.0)	38 (54.3)	
Size of lesion, in centimeters[e]	1.5 (1.1-2.0)	1.4 (1.0-1.8)	0.30
GA at initial consultation	23 (21-23)	22 (21-23)	**0.001**
Candidate for prenatal repair[f]	32 (65.3)	58 (77.3)	0.14
Outcomes			
Abortion consideration[g]	16 (40.0)	24 (40.0)	1.0
Abortion completion	12 (24.0)	22 (29.3)	0.51

Data are median (IQR) or n (%) unless otherwise specified
[a]Chi-squared or Fisher's exact test for categorical variables, Wilcoxon rank-sum test for continuous variables
[b]Available for 123 participants
[c]Available for 117 participants
[d]Available for 116 participants
[e]Available for 114 participants
[f]Available for 124 participants
[g]Available for 100 participants
CIFH = Chicago Institute for Fetal Health; GA = gestational age; NDI = Neighborhood Deprivation Index; RHA = Reproductive Health Act
Bold indicates statistical significance < 0.05

895 Induction of labor at 40 weeks of gestation after the ARRIVE trial dissemination

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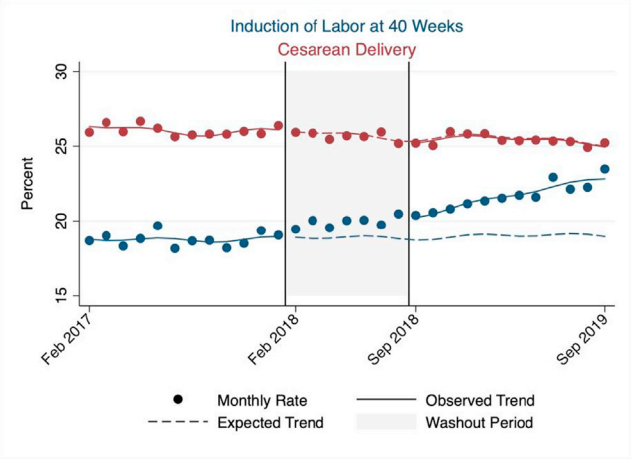
OBJECTIVE: The ARRIVE trial showed that induction of labor at 39 weeks among low-risk nulliparous patients led to a lower rate of

cesarean delivery. We sought to determine if the trial's dissemination was associated with a change in the rate of induction of labor at 40 weeks and associated outcomes.

STUDY DESIGN: This was a repeated cross-sectional analysis using US natality data of patients who gave birth to cephalic, non-anomalous, non-small-for-gestational age infants between 40-43 completed weeks of gestation without hypertension or diabetes from Feb 2017-Aug 2019. A population-level interrupted time series (ITS) analysis was performed using Poisson regression. The period from Feb 2018-Aug 2018 was excluded from the analysis due to ongoing evidence dissemination. Level change and temporal trends in the rate of induction, induction at 40 weeks of gestation, cesarean delivery, and adverse neonatal outcome were compared before and after the dissemination period. Seasonality was accounted for with sine and cosine terms.

RESULTS: A total of 870,217 births were included (367,062 in the pre-period, 312,676 in the post-period). In the immediate post-period, the rate of induction increased from a predicted rate of 36.4%, had the trial not been disseminated, to 37.7% (IRR 1.04, 95% CI 1.00-1.07); the rate of induction at 40 weeks increased from 18.7% predicted to 20.2% (IRR 1.08, 95% CI 1.05-1.12) (Figure). The rate of cesarean delivery and adverse neonatal outcome did not change (cesarean delivery: 25.3% predicted vs 25.2% observed, IRR 1.00, 95% CI 0.96-1.03; adverse neonatal outcome: 5.3% predicted vs 5.0% observed, IRR 0.95, 95% CI 0.87-1.02). Changes in the trend of induction over time were also noted, with an additional 21 inductions/10,000 births at 40 weeks occurring per month (95% CI 2.8-40.0 inductions/10,000 births).

CONCLUSION: Following the dissemination of the ARRIVE trial, induction of labor increased among low-risk patients at 40 weeks of gestation. However, there was no observed decrease in cesarean delivery, suggesting the benefits of induction of labor at 39 weeks may not extrapolate to this cohort.



896 Induction of labor in low-risk patients with pre-pregnancy obesity after the ARRIVE trial

Taylor S. Freret[1], Anjali J. Kaimal[2], Alexander Melamed[1], Mark A. Clapp[1]

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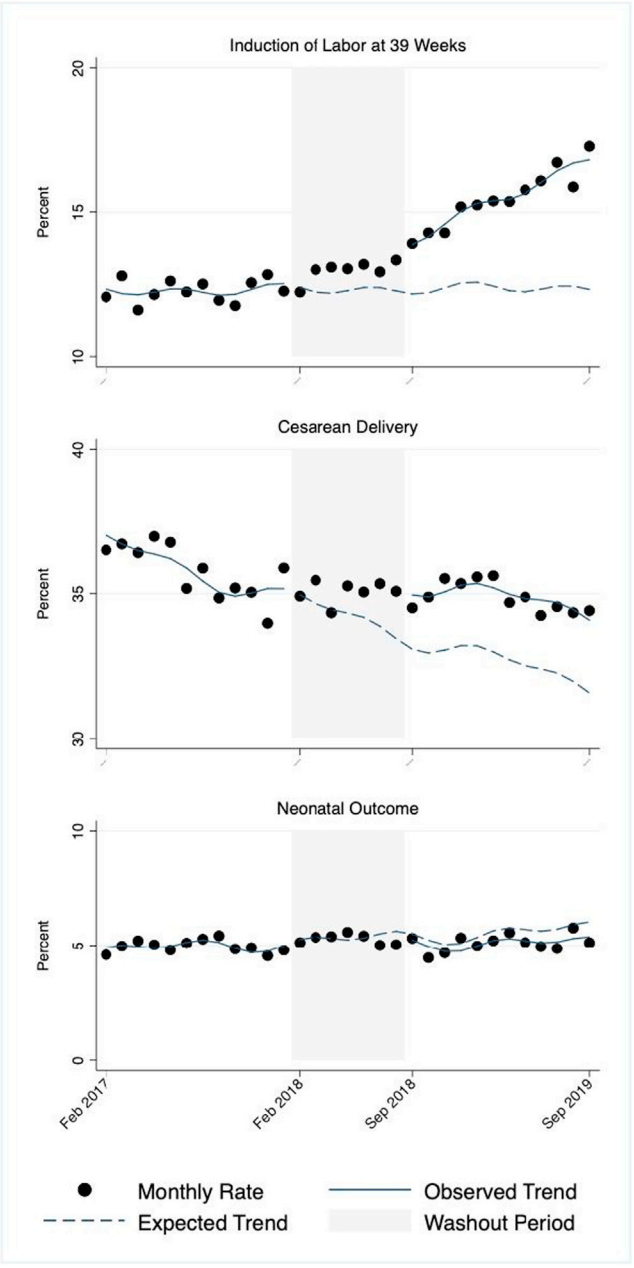
OBJECTIVE: The ARRIVE trial showed that induction of labor (IOL) at 39 weeks among low-risk nulliparous patients led to decreased cesarean delivery (CD) rates, with similar results in a subgroup analysis that stratified by obesity (BMI≥30) at randomization (38 weeks). We sought to determine if the trial was associated with changes in IOL, CD, or neonatal outcome among patients with pre-pregnancy obesity.

STUDY DESIGN: This repeated cross-sectional analysis used US natality data of nulliparous patients with a pre-pregnancy BMI ≥30 kg/m^2 who gave birth to cephalic, non-SGA infants between 39 and 43 completed weeks of gestation from Feb 2017-Aug 2019. Patients with hypertension or diabetes were excluded. A population-level interrupted time series analysis was performed using Poisson regression. The primary outcome was 39-week IOL. Secondary outcomes included CD and a composite neonatal outcome (perinatal death, respiratory support, seizures, antibiotic treatment, or 5-min Apgar ≤3). Feb to Aug 2018 was excluded from the analysis as a time of active trial dissemination. The pre-period occurred from Feb 2017 to Jan 2018; the post-period from Sep 2018 to Aug 2019.

RESULTS: The study included 286,576 patients; 111,502 in the pre-period, 63,690 in the dissemination period, and 111,384 in the post-period. In the first month after the dissemination, the rate of 39-week IOL increased from 12.2% (expected) to 13.9% (incidence rate ratio 1.14, 95% CI 1.07-1.22, p< 0.001). The monthly rate of change also increased (IRR 1.02, 95% CI 1.01-1.03, p=0.001). However, CD also increased, from 33.1% expected to 35.0% observed, (IRR 1.06, 95% CI 1.01-1.11, p=0.03). There was no significant difference in the rate of change of CD over time or in composite adverse neonatal outcome (Figure).

CONCLUSION: Dissemination of the ARRIVE trial resulted in a 14% increase in the rate of 39-week IOL among low-risk patients with pre-pregnancy obesity. However, this was associated with a 6% increase in cesarean delivery, suggesting that the reduction in cesarean anticipated with elective induction may not be observed in this group.

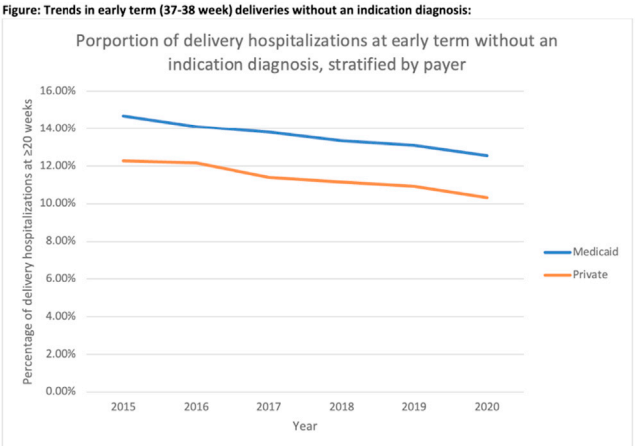


STUDY DESIGN: We conducted a repeated cross-sectional analysis of 18.8 million delivery hospitalizations in the National Inpatient Sample from October 2015-December 2020 at ≥20 weeks gestation. We identified those hospitalizations with a medical indication for early delivery as defined by ACOG/SMFM criteria or which occurred to patients who presented in spontaneous labor at 37-38 weeks gestation. We then described temporal trends in 37-38 week delivery without such indication, reporting average annual percent change (AAPC). Using survey-adjusted logistic regression, we calculated adjusted odds ratios (aOR) for the association between demographic and hospital factors and unindicated early term delivery.

RESULTS: Of 5.1 million 37-38 week deliveries, 2.3 million had no associated indication. The percentage of unindicated early term deliveries was higher among Medicaid-paid births as compared to those with private insurance for every year in our study interval, decreasing from 14.1% to 12.6% of Medicaid-paid births over 2015-2020 for an AAPC of -2.9% [95% confidence interval (CI) (-3.3%, -2.4%)] as compared to 12.3% to 10.3% of privately-insured births for an AAPC of -3.5% [95% CI (-4.6%, -2.5%)]. Deliveries to Black [aOR 1.15 95% CI 1.13, 1.16] and Hispanic [aOR 1.25 95% CI 1.23, 1.26] patients, deliveries paid for by Medicaid [aOR 1.10 95% CI 1.09, 1.11], and deliveries in the South [aOR 1.24 95% CI 1.21, 1.26] were more likely to be unindicated and at early term.

CONCLUSION: While early elective deliveries are decreasing nationally, these deliveries remain common. Disparities in these deliveries by race and payer have persisted despite nearly a decade of target Medicaid quality improvement initiatives.

Figure: Trends in early term (37-38 week) deliveries without an indication diagnosis:



Average annual percent change (AAPC) per 10,000 delivery hospitalizations with 95% confidence interval (CI) for the proportion of deliveries at early term without an indication diagnosis:
Among births paid for by Medicaid: AAPC -2.9% 95% CI (-3.3%, -2.4%)
Among births paid for by private insurance: AAPC -3.5% 95% CI (-4.6%, -2.5%)

897 Trends in and factors associated with early term deliveries without indication

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OBJECTIVE: Since 2009, ACOG and SMFM have recommended against induction or cesarean at 37-38 weeks without indication. Reducing nonmedically indicated early term deliveries has also been a priority over the past decade for state Medicaid programs seeking to improve neonatal outcomes. The purpose of this analysis is to describe current trends in and factors associated with these deliveries.

898 Early vs. late amniotomy following cervical ripening in individuals undergoing induction of labor: a meta-analysis

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OBJECTIVE: A meta-analysis found that early amniotomy shortened the duration of labor without impacting cesarean rates. However, the review was not adequately powered to detect infectious morbidity and included a limited number of women who had Foley balloon for cervical ripening methods. Moreover, two U.S. trials utilizing Foley

balloon have been completed since then. Our objective was to perform a systematic review and meta-analysis to evaluate the impact of early amniotomy on outcomes of induction of labor.

STUDY DESIGN: A literature search was conducted using various electronic databases from the inception of each database through July 2023. We included all randomized controlled trials (RCTs) that compared early amniotomy with late amniotomy (including spontaneous rupture of membranes) in women who underwent pre-induction cervical ripening by either Foley balloon or prostaglandins (PG). The primary outcome was chorioamnionitis. Secondary outcomes included cesarean delivery, delivery within 24 hours, induction to delivery time, intrapartum fever, neonatal intensive care unit (NICU) admission, and neonatal sepsis. Findings were summarized as relative risk (RR) or mean difference (MD) with 95% confidence interval (CI) using the random effects model of Restricted Maximum Likelihood.

RESULTS: Eight trials included 1,954 women who underwent induction of labor and cervical ripening by either Foley or PG (5 Foley, 2 PG, and 1 both). Outcomes are presented in Table 1. There were no differences in chorioamnionitis between early and late amniotomy (7.5% vs. 6.9%; RR 1.06 [0.72-1.58]; Figure 1). Similarly, there were no differences in other neonatal and maternal outcomes except for induction to delivery time (weighted MD -4.2 [-7.3 to -1.0] favoring early amniotomy). Heterogeneity was high (>70%) for many of the outcomes.

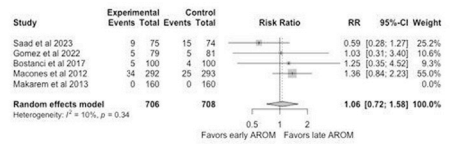
CONCLUSION: Early amniotomy after cervical ripening in women with singleton gestations and cephalic presentation at term does not decrease cesarean rates but reduces the duration from induction to delivery without impacting neonatal and maternal outcomes.

Table 1. Outcomes

Outcome	Early amniotomy	Control	I^2, %	RR or weighted MD (95%CI)
Chorioamnionitis	53/706 (7.5)	49/708 (6.9)	9.8	1.06 (0.72-1.58)
Cesarean delivery	273/972 (28.1)	291/982 (29.6)	45.2	0.92 (0.78-1.09)
Delivery within 24 hours	561/706 (79.5)	463/708 (65.4)	91.5	1.29 (0.99-1.68)
Induction to delivery (hr)	NA	NA	89.9	-4.2 (-7.3 - -1.0)
Intrapartum fever	70/793 (8.8)	61/801 (7.6)	49.6	1.21 (0.68-2.14)
NICU	91/822 (11.1)	97/824 (11.8)	0	0.95 (0.72-1.25)
Neonatal sepsis	54/632 (8.5)	51/634 (8.0)	26.0	1.11 (0.69-1.79)

Abbreviations: MD (mean difference); NA (not applicable); NICU (neonatal intensive care unit); RR (relative risk)

Figure 1. Forest plot for chorioamnionitis



899 Glucose Monitoring in Labor: Does the Frequency Matter?

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OBJECTIVE: In patients with gestational diabetes (GDM), there are limited protocols of intrapartum glucose monitoring with minimal guidance from obstetrical societies. Neonatal hypoglycemia is a complication of the maternal glucose levels intrapartum, with an incidence as high as 40%. The hypothesis of this study is that there is no difference in the rates of neonatal hypoglycemia with differing protocols in frequency of glucose monitoring during labor.

STUDY DESIGN: A retrospective cohort study of patients with GDM that were diet controlled (A1) and medication controlled (A2) undergoing labor/induction from 2020-2023 were studied. Two groups were identified: Group 1(infrequent) had blood glucose(BG) levels every 4 hours in latent labor, and 2 hours in active labor, and Group 2(frequent) had BG levels every 2 hours in latent labor, and 1 hour in active labor. Primary outcome was to assess rates of neonatal hypoglycemia between these 2 groups at delivery. Demographics as seen in table 1 were studied. Wald Confidence Limits of the Odds Ratio estimates were used to test for non-inferiority. Variables were compared using Chi-square and Mann-Whitney U test. $p< 0.05$ was considered significant.

RESULTS: Of 508 subjects, 285(56%) had infrequent monitoring, and 223(44%) had frequent monitoring. Patients with infrequent testing were more likely to have A1GDM($p< .01$), have better diabetic control($p< .01$), lower BMI($p< .01$), less likely to have LGA($p< .01$), and less likely to be induced($p< .01$). Neonatal hypoglycemia did not differ between the two groups($p=0.11$), as seen in table 1. Adjusting for control, compliance, type of GDM, age, BMI, and need for insulin drip showed infrequent monitoring was non-inferior to frequent monitoring in relation to neonatal hypoglycemia(aOR 0.56[90% 0-1.35]).

CONCLUSION: Our study suggests there is no difference in rates of neonatal hypoglycemia regardless of these glucose monitoring protocols intrapartum. This study can lay the foundation for future studies to provide intrapartum glucose monitoring protocols, which would lessen invasive testing and improve patient satisfaction.

Demographics: Table 1			
	Infrequent (N=285)	**Frequent (N=223)**	**P value**
Race			P value: 0.54
Non-Hispanic White	117 (41.05%)	94 (42.15%)	
Non-Hispanic Black	25 (8.77%)	17 (7.62%)	
Hispanic	42 (14.74%)	24 (10.76%)	
Asian/Pacific Islander	85 (29.82%)	78 (34.98%)	
Other	16 (5.61%)	10 (4.48%)	
Type of gestational Diabetes			P value: <.01
A1	271 (95.09%)	16 (7.17%)	
A2	14 (4.91%)	207 (92.83%)	
Compliant			P value: 0.46
Yes	268 (94.04%)	206 (92.38%)	
Controlled Diabetes			P value: <.01
Yes	264 (92.63%)	148 (66.37%)	
Age			P value: 0.60
Mean (SD)	34.4 (4.14)	34.2 (4.27)	
Baseline BMI			P value: <.01
Median (IQR)	24.27 (8)	26 (8.05)	

900 What is the clinical utility and accuracy of single gene NIPT for recessive mendelian disorders?

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OBJECTIVE: We sought to evaluate the clinical utility and accuracy of commercially available single gene NIPT (sgNIPT) for sickle cell, thalassemia, cystic fibrosis and SMA in at-risk preg pts

STUDY DESIGN: The MFM dept in our USA regional perinatal ctr performs primary genetic screening/US for nearly 4000 births annually. In 2022, we began offering sgNIPT (Unity) to ethnically diverse patients who were known to be carriers of, or who had family history of SMA, CF, sickle or alpha/beta thal. Fetal/newborn status was assessed via CVS/amnio or newborn screening. The biologic father was routinely offered carrier screening when available. sgNIPT results are designated increased/high risk (> 1/100; range 1/100 to 9/10) vs decreased/low risk. Small sample size precluded exact estimation of assay accuracy; wide confidence intervals were noted

RESULTS: During 2022-23, 135 preg pts desired sgNIPT (median gest 18 wks; range 12-36) after the preg pt was found to be a carrier of, affected by, or had family hx of one or more of the above recessive conditions. 80 pts were a carrier of 1 condition, 20 pts were a carrier of 2 dx and 1 pt was a carrier of 3 dx (total 101 carrier pts). 34 pts were not a carrier. 3/143 (2.1%) assays were uninformative. Outcome data was available for all preg. All 5 affected fetuses were classified as high risk while 1 unaffected fetus was labeled high risk (sens 100%, PPV 83%). 129/130 unaffected fetuses were labeled low risk (false pos rate 0.7%) in samples reporting informative results. Two affected preg were terminated while 3 affected preg were continued

CONCLUSION: sgNIPT for recessive conditions offers refined risk assessment that complements traditional carrier screening and may reliably inform fetal risk status when 1: partner carrier status is unknown/unavailable; 2: paternity is uncertain 3: both partners are carriers. Noninvasive sgNIPT analysis may result in a more precise risk assessment than traditional parental carrier screening alone. Further research with larger populations is needed to rigorously assess the sens/spec and accuracy of sgNIPT for recessive mendelian disorders

901 National trends and outcomes in births with co-occurring hypertensive disorders of pregnancy and gestational diabetes

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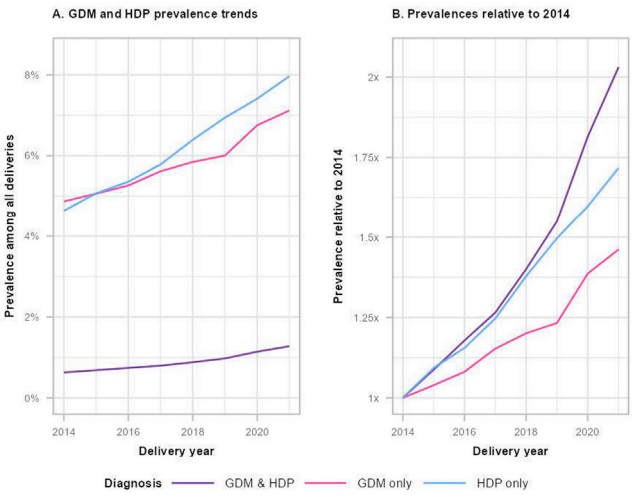
OBJECTIVE: To describe trends of births with co-occurring gestational diabetes (GDM) and hypertensive disorders of pregnancy (HDP) and estimate associated odds of maternal and neonatal adverse outcomes.

STUDY DESIGN: The 2014-2021 National Vital Statistics System data was used for this analysis, excluding those with pregestational diabetes, congenital anomalies, or missing diagnoses. Trends analysis for GDM, HDP, and co-occurring GDM/HDP were conducted using Joinpoint regression with measures of association expressed as annual average percent change (AAPC) and 95% confidence intervals (CI). Unadjusted and adjusted logistic regression models were fit to assess the exposure of GDM, HDP, co-occurring GDM/HDP on composite maternal (Cesarean delivery, transfusion, perineal laceration, unplanned hysterectomy, ICU admission) and neonatal (preterm birth < 37 weeks, large/small for gestational age, NICU admission) outcomes adjusting for demographic and other clinical variables.

RESULTS: 29.9 million births were included with prevalence of co-occurring GDM/HDP, GDM alone, and HDP alone at 0.9%, 5.7%, and 6.0%, respectively. The prevalence of co-occurring GDM/HDP increased from 0.6% to 1.3% (AAPC 10.8%, 95% CI: 9.4-12.2%), and GDM alone and HDP alone increased from 4.9% to 7.1% (AAPC 5.6%; 95% CI: 4.7-6.6%) and from 4.6% to 8.0% (AAPC 8.1%; 95% CI: 7.4-8.9%), respectively (Figure 1A). Co-occurring GDM/HDP rates showed the highest rate of increase; more than doubling from 2014 to 2021 (Figure 1B). Births with co-occurring diagnoses had higher odds of adverse maternal complications (aOR 1.85, 95% CI: 1.83-1.87; versus neither) which is marginally higher in magnitude than GDM alone (aOR 1.45, 95% CI: 1.44-1.47) and HDP alone (aOR 1.20, 95% CI: 1.19, 1.21). Similar findings were noted among neonatal outcomes.

CONCLUSION: The prevalence of patients with co-occurring GDM/HDP is increasing and is associated with higher odds of maternal and neonatal complications compared to either condition alone. These findings provide real-world evidence and highlight the need for additional for this growing high-risk cohort.

Figure 1: Trends of gestational diabetes (GDM) and hypertensive disorders of pregnancy (HDP) among US deliveries, 2014-2021



902 Impact of method of fetal extraction in second stage cesarean delivery on subsequent preterm delivery

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OBJECTIVE: Second-stage cesarean delivery (CD) is associated with subsequent preterm birth (PTB). Previous studies have shown that reverse breech extraction is associated with lower rates of uterine incision extensions compared to the "push" method. We aimed to investigate the association between the mode of fetal extraction during second stage CD and the rate of spontaneous PTB (sPTB), as well as other maternal and neonatal outcomes during the subsequent pregnancy.

STUDY DESIGN: A multi-center retrospective cohort study. The study population included women in their subsequent singleton pregnancy following a second-stage CD between 2004 and 2021. The main exposure of interest was the method of fetal extraction in primary CD ("push" method vs reverse breech extraction). The primary outcome of this study was sPTB< 37 weeks. Secondary outcomes were overall PTB, vaginal birth rate and other adverse maternal and

neonatal outcomes. Univariate analysis was followed by multiple logistic regression modeling.

RESULTS: During the study period, 615 women met inclusion criteria, of whom 275 (44.7%) had fetal extraction using the reverse breech extraction technique, while 340 (55.3%) had the "push" method for extraction. In univariate analysis, women the "push" method had similar rates of sPTB and overall PTB (< 37, < 34 and < 32 weeks), as well as other maternal outcomes except of higher rates of overall CD. This was confirmed by multivariate analyses with adjusted odds ratio of 0.64 (95% CI 0.23-1.75) for sPTB.

CONCLUSION: Among women with a previous second-stage cesarean, no significant difference was observed in the rates of PTB in subsequent pregnancies following the "push" method compared to the reverse breech extraction technique.

Table: Crude rate, odds ratio (OR) adjusted OR and 95% confidence intervals (CI) of preterm birth among women with the push method vs reverse breech extraction technique during section stage cesarean delivery for impacted fetal head in primary cesarean delivery

Outcome	Method of extraction at primary delivery		OR* (95% CI)	aOR** (95% CI)
	Push method n=340	Reverse breech extraction n=275		
Spontanous preterm delivery <37 weeks	9 (2.6%)	10 (3.6%)	0.72 (0.29-1.80)	0.64 (0.23-1.75)
All Preterm birth <37 weeks	21 (6.2%)	18 (6.5%)	0.94 (0.49-1.80)	0.8 (0.38-1.67)
Preterm birth <34 week	7 (2.1%)	3 (1.1%)	1.91 (0.49-7.44)	2.7 (0.51-14.38)
Preterm birth <32 week	3 (0.9%)	3 (1.1%)	0.81 (0.16-4.03)	1.21 (0.2-7.5)

*Reverse breech extraction serves as the referent group. ** Adjusted for inter-pregnancy interval, maternal age, and preterm birth <37 weeks in primary delivery.

903 Impact of Pre-Pregnancy Depressive Disorders on Adverse Perinatal Outcomes

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OBJECTIVE: The rate of mental health disorders continues to rise in the United States. While post-partum mental health for pregnant patients is often examined, the impact of pre-pregnancy mental health on perinatal outcomes is also large. We sought to examine the impact of a pre-pregnancy depressive disorder diagnosis on adverse perinatal outcomes.

STUDY DESIGN: This is a retrospective cohort study of singleton non-anomalous pregnancies from 23-42 weeks gestation in the state of California from 2008-2019. We further excluded patients with Type 1 diabetes and Type 2 diabetes mellitus. Multivariable logistic regressions were also conducted to further evaluate the relationship between a diagnosed depressive disorder and adverse perinatal outcomes while controlling for maternal age, BMI, race/ethnicity, education, prenatal care, insurance status, and parity.

RESULTS: In our cohort of 4,902,521 pregnancies, 87,556 (1.79%) had a diagnosis of a prenatal depressive disorder. Patients with a pre-pregnancy depressive disorder had increased odds of delivery before 32 weeks (1.65 (1.55, 1.76), delivery before 37 weeks (1.54 (1.51, 1.58)), preeclampsia (1.42 (1.38, 1.47)) as well as severe maternal morbidity (1.83 (1.74, 1.93)). Odds of cesarean delivery were found to be decreased in multiparous women who had a prior cesarean delivery (0.76 (0.71, 0.81)), and increased in those without a prior cesarean delivery (1.71 (1.13, 1.21)). When examining neonatal outcomes, patients with a pre-pregnancy depressive disorder had increased odds of NICU admission (1.15 (1.12, 1.18)), APGAR scores of < 7 at 5 minutes (2.00 (1.89, 2.10)), hypoglycemia (1.58 (1.51, 1.65)), respiratory distress syndrome (1.78 (1.72, 1.85)), neonatal death (1.59 (1.30, 1.95)) and infant death (1.59 (1.39, 1.81)) (Table 1).

CONCLUSION: Depressive disorders are associated with significantly increased risks of several adverse maternal and neonatal outcomes. This indicates that prioritizing mental health treatment can lead to improved perinatal outcomes.

Table 1: Adverse outcomes in those with and without pre-pregnancy depressive disorder diagnoses

	No Depressive disorder diagnosis N%	Depressive disorder diagnosis N%	aOR (95%CI)
Preterm Delivery <32 weeks	0.71%	1.23%	1.65 (1.55-1.76)*
Preterm Delivery <37 weeks	6.38%	9.62%	1.54 (1.51-1.58)*
Preeclampsia	3.57%	5.47%	1.42 (1.38-1.47)*
Severe Maternal Morbidity	1.10%	1.98%	1.83 (1.74-1.93)*
Cesarean Delivery (nulliparous)	29.39%	31.56%	1.00 (0.98-1.03)
Cesarean Delivery (multiparous with prior CD)	90.69%	88.05%	0.76 (0.71-0.81)*
Cesarean Delivery (multiparous without prior CD)	9.84%	12.15%	1.17 (1.13-1.21)*
NICU Admission	9.42%	11.60%	1.15 (1.12-1.18)*
Apgar Score <7	0.82%	1.97%	2.00 (1.89-2.10)*
Small for Gestational Age	8.64%	8.89%	1.12 (1.09-1.15)*
Neonatal Deaths	0.07%	0.16%	1.59 (1.30-1.95)*
Infant Deaths	0.16%	0.33%	1.59 (1.39-1.81)*
Hypoglycemia	1.45%	2.72%	1.58 (1.51-1.65)*
Respiratory Distress Syndrome	2.07%	4.39%	1.78 (1.72-1.85)*

Adjusted for maternal race and ethnicity, age, education, BMI, insurance, prenatal care and parity.

904 Transient Ischemic Attack and Obstetric and Neonatal Outcomes - A Population-Based Study

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OBJECTIVE: Transient ischemic attack (TIA) is rare in women of reproductive age. We aimed to compare pregnancy, delivery, and neonatal outcomes between women who suffered from TIA to those who did not.

STUDY DESIGN: We conducted a retrospective population-based cohort study using the Healthcare Cost and Utilization Project, Nationwide Inpatient Sample (HCUP-NIS). Included in the study were all pregnant women who delivered or had a maternal death in the US between 2004-2014. We compared women with an ICD-9 diagnosis of TIA to those without. Pregnancy, delivery, and neonatal outcomes were compared between the two groups using multivariate logistic regression models adjusting for baseline maternal characteristics.

RESULTS: A total of 9,096,788 women met the inclusion criteria. Amongst them, 203 women (2.2/100,000) had a diagnosis of TIA (either prior to or during pregnancy). Women with TIA, compared to those without, were more likely to be older than 35 years of age; Caucasian; in the highest income quartile; be insured by private insurance; and suffer from obesity and chronic hypertension (P< 0.001, all). Patients in the TIA group, compared to those without, had a higher rate of pregnancy-induced hypertension (aOR 2.5, 95%

CI 1.55-4.05, p< 0.001), preeclampsia (aOR 3.77, 95% CI 2.15-6.62, p< 0.001, and eclampsia (aOR 28.05, 95% CI 6.91-113.95, p< 0.001). Additionally, they had a higher rate of preterm delivery (aOR 1.78, 95% CI 1.03-3.07, p=0.039) and maternal complications such as venous thromboembolism (aOR 22.66, 95% CI 5.49-93.48, p< 0.001). Regarding neonatal outcomes, patients with a TIA, compared to those without, had a higher rate of congenital anomalies (aOR 7.04, 95% CI 2.86-17.32, p< 0.001).

CONCLUSION: Women diagnosed with a TIA before or during pregnancy had a higher incidence of maternal complications, including hypertensive disorders of pregnancy and venous thromboembolism, as well as an increased risk of congenital anomalies.

Table 1 Pregnancy and perinatal outcomes

	TIA (%)	No TIA (%)	Crude OR (95% CI)	Adjusted OR (95% CI)	Adjusted p-value
Pregnancy outcomes [a]					
Pregnancy-induced hypertension	40 (19.7%)	673,709 (7.4%)	3.07(2.17-4.34)	2.5 (1.55-4.05)	**<0.001**
Preeclampsia	25 (12.3%)	327,365 (3.6%)	3.76 (2.48-5.72)	3.77 (2.15-6.62)	**<0.001**
Eclampsia	(1.5%)	6,941 (0.1%)	19.64 (6.28-61.44)	28.05 (6.91-113.95)	**<0.001**
GDM	20 (9.9%)	523,172 (5.8%)	1.79 (1.13-2.84)	1.772 (0.98-3.22)	0.06
Delivery and Neonatal outcomes [b]					
Preterm delivery	30 (14.8%)	653,865 (7.2%)	2.24 (1.52-3.3)	1.78 (1.03-3.07)	**0.039**
CD	95 (46.8%)	2,939,823 (32.3%)	1.84 (1.4-2.43)	1.35 (0.92-1.98)	0.12
Hysterectomy	0 (0%)	7,099 (0.1%)	0 (0-0)	0 (0-0)	0.997
PPH	(4.9%)	263,955 (2.9%)	1.73 (0.92-3.27)	0.79 (0.25-2.5)	0.69
Maternal Death	0 (0%)	638 (0%)	0 (0-0)	0 (0-0)	0.997
VTE	(2%)	5,306 (0.1%)	34.44 (12.8-92.7)	22.66 (5.49-93.48)	**<0.001**
DIC	(1%)	18,242 (0.2%)	4.95 (1.23-19.94)	0 (0-0)	0.997
SGA	(2%)	198,066 (2.2%)	0.9 (0.34-2.43)	0.58 (0.14-2.37)	0.452
IUFD	(0.5%)	38,258 (0.4%)	1.17 (0.16-8.36)	1.92 (0.27-13.8)	0.517
Congenital Anomalies	10 (4.9%)	38,234 (0.4%)	12.28 (6.5-23.18)	7.04 (2.86-17.32)	**<0.001**

a- Adjusted for Age, Race, Plan type, Income quartiles, Obesity, and Chronic hypertension.
b- Adjusted for Age, Race, Plan type, Income quartiles, Obesity, Chronic hypertension, Pregnancy-induced hypertension, Preeclampsia, and Eclampsia.
Abbreviations and definitions: TIA – transient ischemic attack; GDM – gestational diabetes mellitus; CD – cesarean delivery; PPH – post-partum hemorrhage; VTE – venous thromboembolism; DIC – disseminated intravascular coagulation; SGA – small for gestational age; IUFD – intrauterine fetal death.
Per convention of the HCUP database when N<11, absolute cell number of subjects was not provided to protect patient anonymity.

905 Mode of delivery in chorioamnionitis: impact on neonatal and parturient outcomes

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OBJECTIVE: The impact of mode of delivery in chorioamnionitis on neonatal outcomes is unclear. This retrospective cohort study compares risk of early onset neonatal sepsis between vaginal delivery and cesarean section. Subgroup analysis was done by indication for cesarean section.

STUDY DESIGN: Singleton pregnancies at greater than 24+0 weeks gestation with live birth and clinical chorioamnionitis from January 1, 2019 to December 31, 2021 were included. Cases with multiple gestations, terminations or histological chorioamnionitis alone were excluded. Risk of early onset neonatal sepsis and a composite outcome of parturient infectious morbidity were compared using propensity score weighting.

RESULTS: 378 cases were included with 197 delivering vaginally and 181 delivering via cesarean section. The groups differed on age, parity, hypertension, renal disease, gestational age, corticosteroid use, magnesium sulfate use, presence of meconium and percentage meeting Gibb's criteria. Risk of early onset neonatal sepsis was greater in the cesarean section group (13.8% versus 3.1%, adjusted risk difference 8.3% [3.5-13.1], p=0.0007). Secondary neonatal outcomes were similar between groups. When compared by indication, risk of early onset neonatal sepsis was greater in the cesarean section for abnormal fetal surveillance group compared to vaginal delivery but not in the cesarean section for other reasons group. In parturients, the risk of infectious morbidity was greater with cesarean section (13.8% versus 1.5% [adjusted risk difference 13.0% [7.1-18.9], p < 0.0001). No other difference in parturient secondary outcomes was identified except a longer hospital stay after cesarean section (2.3days ±0.93 versus 1.6days ±0.92, p < 0.0001).

CONCLUSION: The risk of early onset neonatal sepsis was highest in the cesarean section group, particularly in those with abnormal fetal surveillance. Neonates affected by or vulnerable to sepsis likely have a greater need for cesarean section. The evidence supports cesarean section only for routine obstetrical indications in chorioamnionitis.

906 Patient Weight, Not Height, Significantly Influences cfDNA Screening Performance

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OBJECTIVE: Asses the role of patient weight, versus height and BMI, in influencing the performance of cell-free DNA (cfDNA) screening, with a focus on fetal fraction and the rate of no calls due low fetal fraction.

STUDY DESIGN: Retrospective study of 7606 consecutive patient samples submitted for cfDNA screening at one laboratory. The samples were subjected to DNA extraction, library preparation, and whole-genome massively parallel sequencing, as outlined by Jensen et al. These samples were systematically sorted into BMI groups as per the World Health Organization criteria. Fetal fraction and samples reported as QNS across each BMI category were reviewed.

RESULTS: A strong inverse relationship between patient weight and fetal fraction across all BMI categories was identified (correlation coefficient -0.993). The highest average fetal fraction (10.6%) was observed in the Underweight category, while the lowest average fetal fraction (6.0%) was noted in the Obesity Class III category. Conversely, patient BMI and height exhibited only a weak relationship across the BMI categories, with a correlation coefficient of -0.44. The average patient height stayed relatively constant across all BMI categories, ranging from a low of 64.3 inches in the Pre-obesity and Obesity Class I categories to a high of 64.9 inches in the Underweight category. The overall QNS rate was 0.41% (n=31) across all BMI categories, with the most frequent occurrence in the Obesity Class III category (1.58%, n=8).

CONCLUSION: This analysis highlights that patient weight significantly influences the performance of cfDNA screening, particularly in terms of fetal fraction and the rate of QNS results. While BMI can be used to make similar comparisons, it does so primarily because it includes weight as a variable. These findings highlight the importance of focusing on patient weight when discussing the performance of cfDNA screening.

907 Hereditary Hemorrhagic Telangiectasia: pregnancy and delivery-specific considerations and outcomes

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OBJECTIVE: Prior studies have evaluated maternal outcomes in patients with hereditary hemorrhagic telangiectasia (HHT), yet

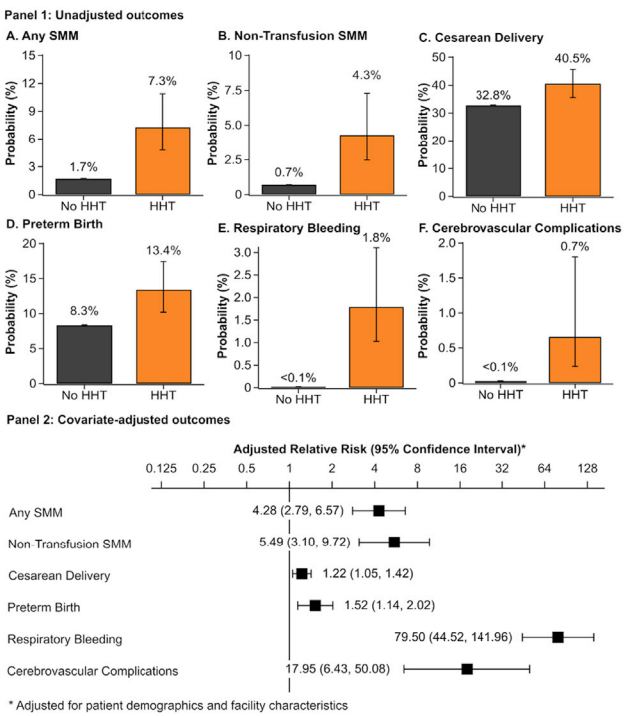
pregnancy and delivery specific data remains limited in this patient population. This study aims to evaluate pregnancy and delivery outcomes in patients with HHT.

STUDY DESIGN: This retrospective study used the National Readmissions Database to identify patients with HHT diagnosis on delivery hospitalizations between 2010-2020. The primary outcome was severe maternal morbidity (SMM). Secondary outcomes included non-transfusion SMM, preterm birth, cesarean delivery, respiratory bleeding, and cerebrovascular complications. Trends in the prevalence of HHT at delivery hospitalization were assessed with logistic regression. Logistic regression analyses, adjusting for age, payer, zip code income, hospital size and teaching status, were also used to produce adjusted relationships between HHT status and outcomes.

RESULTS: The cohort of 19,812,073 delivered pregnancies corresponded to a national estimate of 40,819,063. Of those, 1,132 (2.7 per 100,000) had a diagnosis of HHT. A steady rise in HHT diagnosis rate during pregnancy from 2010 to 2020 (1.7 per 100,000 in 2010, 4.0 per 100,000 in 2020, $p< 0.001$ for trend) was seen. Patients with HHT were significantly more likely to experience SMM compared to patients without HHT (7.3% vs 1.7%, $p< 0.001$). Additionally, rates of preterm birth (13.4% vs 8.3%), cesarean delivery (40.8% vs 32.9%), respiratory bleeding (1.8% vs < 0.1%) and cerebrovascular complications (0.7% vs < 0.1%) were higher in patients with HHT than non-HHT patients (all $p< 0.001$; Panel A). After adjusting for patient and facility characteristics, these associations remained significant (Panel B).

CONCLUSION: Patients with HHT have higher rates of severe maternal morbidity and adverse delivery outcomes when compared to the baseline population. As the prevalence of HHT during pregnancy is increasing, guidelines for pregnancy and delivery management in these patients are warranted.

Figure 1: Primary and secondary outcomes



908 Maternal outcomes by mode of delivery among pregnant patients with eclampsia: a retrospective cohort study

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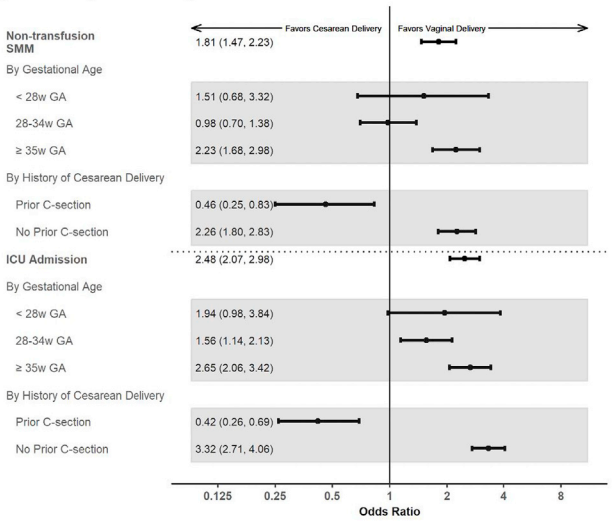
OBJECTIVE: For most patients with preeclampsia, cesarean delivery can be reserved for usual obstetric indications, but data are limited for patients with eclampsia. The goal of this study is to evaluate maternal outcomes by intended mode of delivery in patients with eclampsia.

STUDY DESIGN: This retrospective cohort study used the Premier Healthcare Database. Patients delivered between 2016-2020 with a diagnosis of eclampsia prior to delivery were included. The primary analysis compared intended cesarean delivery (non-intrapartum cesarean) to intended vaginal delivery (vaginal delivery and intrapartum cesarean) using a target trial emulation strategy. The primary outcome was non-transfusion severe maternal morbidity (SMM). The secondary outcome was ICU admission. We performed two subgroup analyses evaluating outcomes by gestational age (< 28 weeks, 28-34 weeks, ≥ 35 weeks) and history of cesarean delivery. Logistic regression models were used to compare outcomes.

RESULTS: The cohort included 3,491 patients. Patients with eclampsia who underwent intended cesarean delivery had significantly increased rates of non-transfusion SMM (16.0% vs 9.4%, OR 1.81 [1.47, 2.23]) and ICU admission (27.8% vs 13.1%, OR 2.48 [2.07, 2.98]) compared to patients with a trial of labor (Figure 1). These results remained significant with adjustment for patient demographic and facility characteristics as well as comorbid diagnoses. There was evidence of effect measure modification noted based on gestational age at delivery and history of prior cesarean delivery – for the latter, patients with a history of prior cesarean delivery who underwent intended vaginal delivery had *higher* rates of both SMM and ICU admission than those undergoing planned cesarean delivery.

CONCLUSION: While intended vaginal delivery is associated with *decreased* risk of non-transfusion SMM and ICU admission in patients with eclampsia, particularly if ≥ 35 weeks, TOLAC is associated with *increased* morbidity in this population. These results speak to a personalized approach to delivery route planning in patients with eclampsia.

Figure 1: Primary and secondary outcomes



909 Optimally timed antenatal corticosteroids over a 5-year period in a large US birth cohort

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OBJECTIVE: Antenatal corticosteroids (ACS) improve outcomes for preterm neonates and are most effective when administered within the 7 days preceding preterm birth. ACS also have an uncertain long term safety profile for babies born at term. Optimizing ACS is therefore important to maximize benefits and minimize potential harm. Our objective was to evaluate optimal ACS use in a contemporary US birth cohort over a 5-year period.

STUDY DESIGN: This retrospective observational study included consecutive births (24^{+0}-42^{+6} weeks' gestation) at 12 hospitals in the Northwest US (Jan 2017-Dec 2021). Pregnancies missing data for ACS (n=153) were excluded. ACS exposure was based on >=1 dose of a first course of ACS. Clinical data were collected from medical records. The outcomes evaluated were: optimally timed ACS in *early preterm* births (ACS given within 7 days of live births < 34 weeks, expressed as a % of all live births < 34 weeks); % of *term* births given ACS; and % of *late preterm* (34^{+0}-36^{+6}weeks) live births given ACS within 7 days. Overall and annual rates of each outcome were calculated. Univariate estimates of Odds Ratios (OR) and 95% Confidence Intervals (95% CI) were calculated for change over time with 2017 as the reference year.

RESULTS: Our study comprised 106,146 births: 10,112 preterm and 96,034 term births. In all, 54.8% of early preterm and 27.2% of late preterm births were given ACS within 7 days; 1.3% of term births also received ACS. Between 2017 and 2021, the annual rate of optimally timed ACS in *early preterm* births remained unchanged while ACS within 7 days of *late preterm* births increased (OR 1.38; 95% CI 1.17, 1.63) (Table 1). ACS exposure in *term* births also increased from 1.0% to 1.7% (OR 1.66; 95% CI 1.39, 1.98). Of 1250 *term* births with timing of ACS, 41.3% received ACS at 34^{+0}-36^{+6} weeks and 3.7% at term.

CONCLUSION: Given the suboptimal timing of ACS in preterm births and increasing ACS exposure in term births, our study highlights a need for greater focus on optimal timing of ACS and on strategies to avoid unnecessary ACS in term births.

Table 1. Delivery within 7 days of antenatal corticosteroids (ACS) in early and late preterm births. Time interval from ACS to birth was missing for 34 (1.5%) early preterm and 45 (0.7%) late preterm births and these cases were excluded from the analysis.

Year of birth	% of early preterm births (<34 weeks) given antenatal corticosteroids: within 7 days of birth % (OR; 95% CI)	% of late preterm births (34^{+0}-36^{+6} weeks) given antenatal corticosteroids within 7 days of birth % (OR; 95%CI)	Balancing measure: % of term births (>=37 weeks) given antenatal corticosteroids % (OR; 95%CI)
All, % (n/N)	55.45% (1,466/2,644)	27.26% (1,947/7,143)	1.34 (1,285/96,034)
2017	57.86% (Reference group)	23.25% (Reference group)	1.02% (Reference group)
2018	54.20% (0.86; 0.68, 1.09)	25.76% (1.15; 0.97, 1.36)	1.28% (1.26; 1.04, 1.51)
2019	55.64% (0.92; 0.72, 1.16)	26.11% (1.17; 0.98,1.38)	1.20% (1.18; 0.97, 1.43)
2020	54.83% (0.88; 0.69, 1.13	31.69% (1.53; 1.30, 1.81)	1.50% (1.48;1.23, 1.77)
2021	54.44% (0.87; 0.68, 1.11)	29.54% (1.38; 1.17, 1.63)	1.68% (1.66; 1.39, 1.98)
Pearson chi2	p=0.735	P<0.0001	P<0.0001

910 Performance of SNP-based cell-free DNA prenatal screening for 22q11.2 deletion syndrome in a commercial population

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OBJECTIVE: Evaluate positive predictive value (PPV) of 22q11.2 deletion syndrome (22q del) with SNP-based prenatal cfDNA screening in a commercial population.

STUDY DESIGN: Included all domestic SNP-based prenatal cfDNA screening with a high-risk result for a fetal 22q del over a 21 month period. Suspected maternal 22q del results were excluded from analysis. Diagnostic testing and ultrasound (u/s) results were collected. PPVs were calculated for samples with genetic truth via microarray (CMA) performed prenatally, postnatally or on products of conception.

RESULTS: Out of 1,057,710 cases, 753(0.071% or 1/1400) were high-risk for fetal 22q del. Average (avg) maternal age was 30.2 yrs(range 18-46); avg maternal weight 165.6 lbs(91-321 lbs, n=723); avg gestational age 14.0 wks(7.0-35.4); avg fetal fraction 7.9%(2.8-28.6%). Outcomes obtained in 155 cases(20.6%, table 1).

PPV was 47.0%. Including cases with suggestive u/s findings raised the PPV to 56.7%. 46.3% of CMA-positive cases did not have u/s finding(s). For cases with u/s anomalies(n=73), PPV was 78.4%. When u/s findings were limited to a cardiac(CHD) or renal anomaly(n=51), PPV was 92.6%.

CONCLUSION: The 22q del affects ~1/1,500-2000 pregnancies and is a common cause of developmental delay and CHDs. Early diagnosis allows for better pregnancy management and improves neonatal outcomes. This study shows a PPV ~50% in the general population and >90% in fetuses with cardiac and/or renal abnormalities. Importantly, less than 50% of true positive cases had u/s findings typically associated with 22q del. Without prenatal cfDNA screening, cases lacking u/s findings may be missed leading to delayed postnatal diagnosis (diagnostic odyssey) with previously reported median time to diagnosis of 4.7 yrs.

A previous prospective study (SNP-based Microdeletion and Aneuploidy RegisTry: SMART) showed a similar PPV of 52.6% in a cohort of 12 affected pregnancies. Results of this study confirm a

PPV of ~50% in a larger, real-world study and illustrate the limitations of u/s findings as a screening tool for the 22q del.

Table 1. Results of Follow-up

Follow-up Status	Cases (n)	Cases without Ultrasound Anomalies (n, %)	Cases with Ultrasound Anomalies (n, %)	Cases with Heart Defects (n)	Cases with Renal Anomalies (n)
Follow-up Collected	155				
True Positive by CMA	54	25 (46.3%)	29 (53.7%)	22*	4*
Clinical Finding(s) *Suggestive* Of 22q del Diagnosis; no genetic testing	26	0	26	19**	7**
False Positive	61	53 (86.9%)	8 (13.1%)	2	0
Insufficient Testing (microarray not performed)	14	14	0	0	0
Lost to follow-up	598				
No response from Clinic	486	-	n/a	n/a	n/a
No Testing of Pregnancy/ Transfer of Care	112	-	10	0	0

*1 case with both findings, **2 cases with both findings

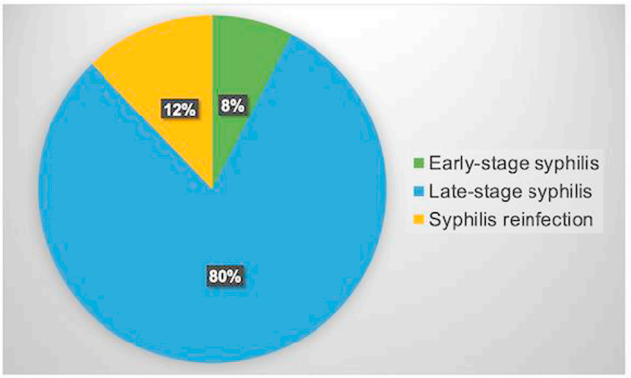

Figure. Percentage of pregnant patients with early-stage (primary, secondary, early latent) syphilis, late-stage (late latent, unknown duration) syphilis or syphilis reinfection who received PrEP counseling in an antepartum clinic, March 2022 – February 2023

911 High acceptance of PrEP prescriptions among pregnant patients regardless of syphilis stage

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OBJECTIVE: HIV preexposure prophylaxis (PrEP) is an underutilized tool in the fight to end the HIV epidemic — especially in pregnant populations. We implemented an intervention to counsel and offer PrEP to all pregnant patients treated for syphilis in our high-risk ambulatory clinic. The purpose of this study was to determine if patients with early-stage syphilis are more likely to accept PrEP than those with late-stage syphilis or syphilis reinfection.

STUDY DESIGN: This was an observational cohort study of HIV-negative pregnant patients who were treated for syphilis at an antepartum clinic. Standardized PrEP counseling was provided at the time of each bicillin injection. Prescriptions were sent to our institutional ambulatory pharmacy for those who accepted. Demographics were collected including stage of syphilis at treatment. Medication dispensation was verified by chart review. Acceptance and dispensation rates of patients with primary, secondary, or early latent syphilis (early-stage) were compared to those with late latent or syphilis of unknown duration (late-stage) or syphilis reinfection. Statistical methods included use of chi-square with $p < 0.05$ considered significant.

RESULTS: From March 1, 2022 through February 28, 2023, 107 patients were treated for syphilis and received PrEP counseling with 8 (8%) with early-stage syphilis, 86 (80%) with late-stage syphilis, and 13 (12%) with syphilis reinfection. Fifty-five (51%) patients accepted PrEP, and acceptance rates by stage were 75%, 51%, and 38% respectively, although this was not statistically significant ($p = 0.26$). Thirty (55%) patients picked up PrEP and dispensation rates by stage were 50%, 57%, and 40% respectively ($p = 0.75$).

CONCLUSION: Pregnant patients treated for early-stage syphilis were more likely to accept a PrEP prescription than those with late-stage syphilis or syphilis reinfection, although these results were not statistically significant. Over half of all patients who received standardized PrEP counseling accepted a prescription. Further opportunities to increase acceptance and dispensation should be pursued.

912 Oxytocin versus oral misoprostol for PROM induction in nulliparas with unfavorable cervix: A randomized trial

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OBJECTIVE: To determine if oxytocin or oral misoprostol (miso) results in a shorter time to delivery after induction of labor (IOL) for premature rupture of membranes (PROM) in nulliparas with an unfavorable cervical exam.

STUDY DESIGN: This randomized trial was conducted at an urban tertiary care center from 2019-2023. For nulliparas with a singleton gestation undergoing PROM IOL, we compared time from IOL to delivery (hours, h) between oxytocin vs oral miso (50 mcg q4h). Subjects were $\geq$ 36 wks with an unfavorable starting cervical exam ($\leq$ 2 cm and Bishop $<$ 8). Secondary outcomes included intraamniotic infection, cesarean, composite maternal and neonatal morbidity, and patient satisfaction. Sub-group analyses for those with BMI $\geq$ 30kg/m^2 and cervical dilation $\geq$ 1cm were performed. We needed 148 subjects to have 80% power to detect a 2-hour difference in time to delivery. The study was stopped early by the DSMB due to feasibility concerns in recruiting desired sample size.

RESULTS: 108 subjects were randomized: 56 oxytocin; 52 oral miso. There were no differences in demographic or baseline characteristics (Table 1). For time to delivery, there was no statistical difference between groups (14.9h oxytocin vs. 18.1h miso, p =0.06). In subgroup analyses with oxytocin compared to miso, there was a 5h shorter time to delivery for those with a BMI $\geq$ 30kg/m^2 and 4.5h shorter time to delivery for those with cervix $\geq$ 1cm. There was no difference in intraamniotic infection, cesarean, maternal or neonatal morbidity (Table 1). Satisfaction was higher for those receiving oxytocin compared to miso (29.0 vs. 26.3, p=0.03).

CONCLUSION: There was no overall difference in time to delivery between oxytocin and oral miso in this group of nulliparas with PROM and an unfavorable cervix. There was, however, a shorter time to delivery with oxytocin in obese patients and those with cervical dilation of at least 1 cm. Additionally, patient satisfaction was increased with oxytocin with no difference in cesarean or morbidity.

Table 1: Demographic/Clinical Characteristics and Trial Outcomes

	IV Oxytocin (n=56)	Oral Misoprostol (n=52)	p
Demographic and Obstetric Characteristics			
Age, years [a]	28.5 (5.9)	30.0 (5.4)	-
Race			-
Black	25 (44.6)	27 (51.9)	
Non-Black[b]	31 (55.4)	25 (48.1)	
Insurance			-
Private	33 (58.9)	32 (61.5)	
Public	23 (41.1)	20 (38.5)	
Body mass index (kg/m^2)[c,d]	31.9 [28.7, 35.2]	31.9 [26.7, 37.1]	-
Prenatal visit number [d]	9 [7,10]	9 [7,10]	-
Gestational age at PROM [d]	39.3 [38.5, 40.2]	39.7 [38.9, 40.5]	-
Starting cervical dilation [a]	1.1 (0.5)	1.1 (0.6)	-
Starting Bishop score [a]	3.9 (1.7)	3.6 (1.5)	-
Primary Outcome and Subgroup Analyses			
IOL to delivery (h)[d]	14.9 [10.9, 18.9]	18.1 [12.2, 24]	0.06
BMI ≥ 30 kg/m^2 (n=29) [a]	16.6 (7.1)	21.8 (6.8)	0.04
Cervix ≥ 1 cm (n=84)[d]	12.9 [9.4, 16.4]	17.3 [11.5, 23.0]	0.04
Secondary Outcomes			
IOL to Vaginal Delivery [d]	12.9 [9.2, 16.4]	17.9 [11.7, 24.1]	0.07
Intraamniotic Infection	6 (10.7)	8 (15.4)	0.47
Cesarean Delivery	14 (25.0)	13 (25.0)	1.0
Maternal Morbidity [e]	9 (16.1)	8 (15.4)	0.92
Neonatal Morbidity [f]	2 (3.6)	1 (1.9)	0.60
Patient Satisfaction [a,g]	29.0 (5.6)	26.3 (5.7)	0.03
BSSR-Stress[a]	10.0 (2.5)	8.8 (3.1)	0.06
BSSR-Personal[a]	4.8 (2.3)	3.8 (2.5)	0.04
BSSR-Quality[d]	15 [13, 17]	14 [12.8, 15.3]	0.26
Adverse Outcomes			
Nausea/vomiting	13 (23.2)	13 (25)	0.83
Terbutaline use	6 (10.9)	11 (21.6)	0.14

N(%) unless otherwise specified
[a] Mean (SD)
[b] Includes subjects self-identifying as White, Asian, or Latino, not otherwise specified.
[c] At prenatal visit most proximate to delivery
[d] Median [IQR]
[e] Composite outcome of postpartum hemorrhage (estimated blood loss ≥ 1000mL), blood transfusion, endometritis, wound infection, venous thromboembolism, hysterectomy, intensive care unit admission, readmission within 30 days of delivery, or death
[f] Composite outcome of neonatal care unit admission greater than 48 hours, neonatal blood transfusion, hypoxic ischemic encephalopathy, grade III or IV intraventricular hemorrhage, neonatal cooling, severe respiratory distress syndrome, necrotizing enterocolitis, neonatal sepsis, or death
[g] Missing data on 9 subjects (n=99). Assessed via Birth Satisfaction Scale-Revised (BSS-R) with higher score indicating greater satisfaction. The BSS-R is subdivided into 3 domains: 1. Stress experienced during labor, 2. Birthing person's personal attributes, and 3. Quality of care provided.

913 Use of postpartum text-based support platform is not associated with breastfeeding outcomes

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OBJECTIVE: To describe the relationship between utilization of a text-based breastfeeding support platform and feeding outcomes at 6 weeks postpartum.

STUDY DESIGN: This is a secondary analysis of a randomized controlled trial (RCT) conducted at an urban tertiary care center from January 2020 to January 2021 comparing (1) a control group (2) an intervention group receiving weekly educational text messages and personalized text-based breastfeeding support as needed. Only patients randomized to intervention arm were included. The exposure of interest was engagement with the breastfeeding support platform as defined by asking one or more questions on the platform during 6 postpartum weeks of trial enrollment. The primary outcome was breastfeeding exclusivity at 6 weeks postpartum.

RESULTS: Of the 216 subjects in the RCT, 106 were randomized to the intervention arm, and 93 subjects had data on the primary outcome. Clinical characteristics of the cohort included a mean age of 31.9 years, 46.2% self-identified Black, 51.6% nulliparous and 58.1% had commercial insurance. Fifty (53.8%) of the subjects asked at least one breastfeeding question of the platform. Nulliparous subjects and those who saw a lactation consultant in the hospital were more likely to ask a question. There was, however, no difference in the primary outcome between those who queried the platform and those who did not (48% v. 48.8% p =0.94). This remained true after adjustment for prior lactation consultation (aOR 0.80, 95% CI 0.34-1.86). Number of interactions with the platform ranged from 0-21 with a median of 1; there was also no difference in breastfeeding exclusivity by number of interactions (p=0.69). There were no differences in measured secondary outcomes (Table).

CONCLUSION: There was no relationship between utilization of a personalized text-based breastfeeding support platform and breastfeeding outcomes at 6 weeks postpartum. This finding warrants further exploration as we consider innovative ways to improve breastfeeding rates.

Table. Demographic and Obstetric Characteristics, Feeding, and Postpartum Outcomes

	At least one question sent to platform (n=50)	No questions sent to platform (n=43)	p value
Demographic and Obstetric Characteristics			
Age, years[a]	32.9 (5.3)	30.9 (5.7)	0.11
Black race	24 (48)	19 (44.2)	0.71
Insurance			0.09
Private	33 (66.0)	21 (48.8)	
Public/Uninsured	17 (34.0)	22 51.2)	
Nulliparcus	32 (64)	16 (37.2)	0.01
BMI[b,c]	32.2 [27.4, 37.0]	31.6 [26.7, 36.5]	0.46
Prenatal visit number[c]	9 [7.5, 10.5]	9 [7, 11]	0.11
Intend tc exclusively breastfeed	49 (98)	42 (97.7)	0.71
Gestational age at delivery[a]	38.9 (1.0)	38.8 (0.9)	0.90
Delivery method			
Vaginal	32 (64)	29 (67.4)	0.73
Cesarean	18 (36)	14 (32.6)	
Breastmilk for first feed	49 (98)	40 (93)	0.25
Lactation consultation during postpartum stay	49 (98)	37 (86.1)	0.03
Primary Outcome			
Exclusive breastfeeding at 6 weeks postpartum	24 (48)	21 (48.8)	0.94
Secondary Outcomes			
Any breastfeeding at 6 weeks postpartum	41 (82)	32 (74.4)	0.38
Exclusive formula at 6 weeks postpartum	9 (18.0)	11 (25.6)	0.38
Postpartum visit compliance	47 (94)	43 (100)	0.10
PHQ-2 at 2 weeks[c,d]	3 [2,4]	2 [1.5, 2.5]	0.29
PHQ-2 at 6 weeks[c,e]	2 [1.5, 2.5]	2 [0.5, 3.5]	0.43

Data are N (%) unless otherwise indicated
[a]Mean (Standard Deviation)
[b]Body Mass Index (Kilogram/meter^2) at time of prenatal visit most proximate to delivery. Missing data on 3 subjects
[c] Median [Interquartile Range]
[d]N=55. (n=36 in question cohort and n=19 in no question cohort)
[e]N=47. (n=28 in question cohort and n=19 in no question cohort)

914 Once GDM, always GDM? Pregnancy with GDM preceding non-GDM pregnancy- A retrospective cohort study

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OBJECTIVE: To investigate whether women previously diagnosed with gestational diabetes mellitus (GDM) but not in a subsequent pregnancy present similar diabetes-related complications, despite the lack of diagnosis.

STUDY DESIGN: A retrospective cohort design was employed, including women with at least two consecutive births at Rabin Medical Center between July 2012 and December 2022. Participants were categorized into three groups: GDM in both pregnancies (group 1), GDM in the first but not in the subsequent pregnancy (group 2), and no GDM in both pregnancies (group 3). Groups were compared for various diabetes-related complications.

RESULTS: The study population comprised 19,703 women. Group 2 showed higher rates of macrosomia (OR 1.4, 95% CI 1.01-1.92, p=0.03), large-for-gestational-age (LGA) (OR 1.6, 95% CI 1.2-2.0, p< 0.01) and preeclampsia (OR 2.35, 95% CI 1.32-4.15, p< 0.01) when compared to group 3. Rates of LGA, macrosomia and preeclampsia were similar between group 1 and 2. Both Group 1 and Group 2 exhibited significantly elevated composite maternal-neonatal outcomes compared to Group 3 (OR 1.91, 95% CI 1.58-2.3, p< 0.01 and OR 1.48, 95% CI 1.23-1.77, p< 0.01 , respectively).

In a multivariate logistic regression, the adjusted OR (accounting for age, BMI and parity) for composite maternal-neonatal outcomes was 1.75 (95% CI 1.36-2.25, p< 0.01) and 1.30 (95% CI 1.01-1.67, p=0.03) in groups 1 and 2 respectively, compared to group 3. Elective cesarean delivery rate was higher in groups 1 (22%) and 2 (13%) compared to group 3 (8.7%). However, the rate was also significantly higher in group 1 versus 2. Preterm birth rates were higher in group 1 (OR 1.7, 1.2-2.3, p< 0.01) but not 2, when compared to group 3.

CONCLUSION: Women with a history of GDM in a previous pregnancy but not in subsequent pregnancy are at increased risk of diabetes-related complications, including preeclampsia, macrosomia, and LGA. The findings suggest that these women may have underlying insulin resistance, as well as other, still occuring, risk factors; and their lack of diagnosis does not withhold adverse outcome.

Maternal and neonatal outcomes

	Group 1-GDM-GDM (n=541)	Group 2-GDM-NonGDM (n=647)	Group 3-NonGDM-NonGDM (n=18703)	OR (95% CI) #	OR (95% CI) $
mean birth weight grams (SD)	3288 (452)	3331 (454)	3264 (447)	--	--
clinical estimated fetal weight	3381 (306)	3348 (327)	3270 (337)	--	
Macrosomia n (%)	29 (5.3%)	39 (6.0%)	801 (4.2%)	1.25 (0.87-1.79, p=0.2)	1.4 (1.01-1.92, p=0.03)
Large for Gestational Age* n (%)	70 (12.94%)	72 (11.13%)	1032 (6.94%)	1.86 (1.4-2.3), P<0.01)	1.6 (1.2-2.0, p<0.01)
Preeclampsia n (%)	10 (1.84%)	13 (2.01%)	162 (0.87%)	2.15 (1.13-4.1, p=0.03)	2.35 (1.32-4.15, p<0.01)
arterial cord pH less than 7.2 n (%)	17 (0.03%)	16 (0.02%)	365 (0.01%)	1.62(0.99-2.67, p=0.058)	1.27 (0.76-2.11, p=0.3)
Hypoglycemia n (%)	9 (1.6%)	2 (<1%)	68 (<1%)	4.63(2.3-9.3, p<0.01)	0.85 (0.2-3.4, p=1)
Hyperbilirubinemia n (%)	66 (12.1%)	66 (10%)	1433 (7.6%)	1.67 (1.2-2.1, p<0.01)	1.36(1.05-1.77, p-0.02)
respiratory complications (RDS, TTN) n (%)	5 (<1%)	4 (<1%)	40 (<1%)	4.35 (1.7-11.0, p<0.01)	2.9 (1.03-8.14, p=0.05)
shoulder dystocia n (%)	3 (<1%)	1 (<1%)	51 (<1%)	2.03 (0.6-6.5, p=1)	0.5 (0.07-4.1, p=1)
NICU admission n (%)	11 (2%)	11 (1.7%)	281 (1.5%)	1.36 (0.7-2.5, p=0.28)	1.13 (0.6-2.0, p=0.62)
composite outcome n (%)	162 (29.9%)	161 (24.8%)	3414 (18.2%)	1.91 (1.58-2.3, p<0.01)	1.48 (1.23-1.77, p<0.01)

GDM in both pregnancies versus no GDM in both pregnancies

$ GDM in first but not second pregnancy versus no GDM in both pregnancies

*calculated using Dollberg charts for live birth weights

915 Health Inequity Observed in Demographic Correlations with Pregnancy-Associated Hypertensive Morbidity During the Coronavirus Pandemic

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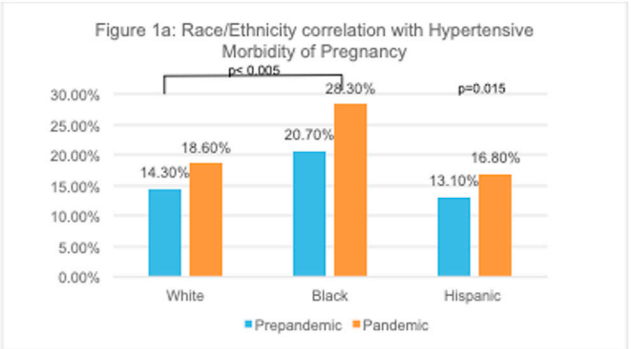
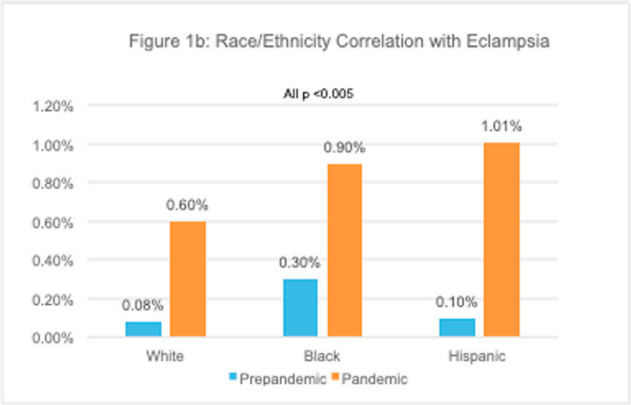
OBJECTIVE: To characterize race and ethnicity associations with the prevalence of hypertensive (HTN) morbidity during pregnancy in relationship to the COVID-19 pandemic.

STUDY DESIGN: Retrospective, ecological cohort study of a 10-county birth certificate database with a pre-pandemic cohort from April 2018 to February 2019 and a pandemic cohort from April 2020 to February 2021, excluding transitional deliveries during the emerging pandemic. Cohorts were analyzed for the primary outcome of diagnosed HTN morbidity in pregnancy (including pregnancy related HTN and chronic HTN) and eclampsia among different ethnicity groups, as well as a secondary outcome of neonatal morbidities. Data analysis was performed via T-Test and Chi-squared Test.

RESULTS: 19062 deliveries were included, 9726 in the pre-pandemic and 9335 in the pandemic cohorts. Patient demographics, including maternal age, gestational age and BMI were not significantly different between the two cohorts. Prevalence of HTN morbidity (from 14.9% to 20.2%, OR 1.45, CI 1.34-1.56, p< 0.05) and eclampsia (from 0.1% to 0.7%, OR 6.8, CI 3.50-13.3, p< 0.05) during the COVID pandemic increased. The increased prevalence of HTN morbidity persisted among patients identifying as non-Hispanic White (from 14.3% to 18.6%, OR1.37, CI 1.24-1.50, p< 0.005), non-Hispanic Black (from 20.7% to 28.3%, OR 1.51, CI 1.29-1.78, p< 0.005), and Hispanic (from 13.1% to 16.8%, OR 1.34, CI 1.05-1.71, p=0.015). The increased prevalence of eclampsia was also persistent and profound (Figure 1). There was no clinically significant change in neonatal outcomes, including birth weight, preterm delivery rate, APGAR scores and NICU admission rates.

CONCLUSION: These data demonstrate an increased prevalence of HTN morbidity and eclampsia during the COVID-19 pandemic across different race/ethnicity groups, with most significant increase of HTN morbidity experienced in those identifying as non-Hispanic Black and eclampsia in Hispanic populations. These trends reveal disparate concentrations of morbidity across populations that may be a reflection of differing burden of baseline health disparities.





916 Nutrition Pattern and Adverse Pregnancy Outcomes in nulliparous individuals: A cluster analysis

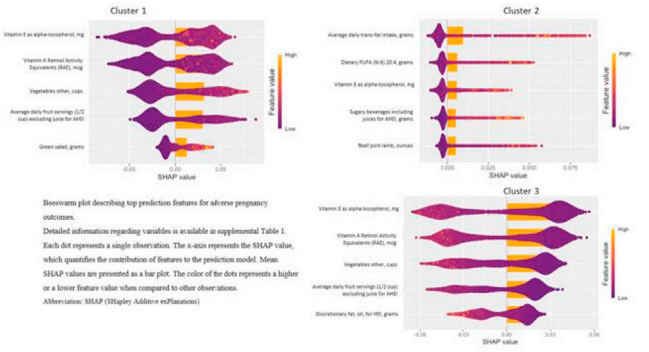
Yara Hage Diab, Kazuma Onishi, George R. Saade, Tetsuya Kawakita
Eastern Virginia Medical School, Norfolk, VA

OBJECTIVE: Studies evaluating association between nutrition and pregnancy outcomes did not take into consideration the various aspects of each patient diet or the large amount of variables within each dietary exposure. Our objective was to use unsupervised machine learning models to characterize dietary profiles and determine their associations with pregnancy outcomes.

STUDY DESIGN: This was a secondary analysis of the Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-Be. The primary outcome was a composite of preterm birth, stillbirth, eclampsia, preeclampsia, gestational hypertension, and small for gestational age. An unsupervised machine learning algorithm was developed (k-means). A total of 335 clustering variables were considered. The proportion of the primary outcome was examined within each cluster. Multivariable logistic regression was performed to obtain adjusted odds ratios (aOR) with 95% confidence intervals (95%CI), controlling for predefined confounders.

RESULTS: Of 7074 individuals, there were 2593 (36.7%) in cluster 1, 546 (7.7%) in cluster 2, and 3935 (55.6%) in cluster 3. Cluster 2 was associated with increased odds of adverse pregnancy outcomes (22.4% vs.31.3%; aOR 1.35 [95%CI 1.06-1.71]) and gestational diabetes (3.9% vs.6.0%; aOR 1.86 [95%CI 1.15-3.01]). Cluster 3 was not associated with adverse pregnancy outcomes (22.4% vs. 25.6%; aOR 1.13 [95%CI 0.99-1.29]). Cluster 1 was characterized by higher intake of vitamin E, vitamin A, fruits, vegetables, and green salad. Cluster 2 was characterized by higher intake of trans-fat, polyunsaturated fatty acids, red meat, sugar beverages, and theobromine intake. Cluster 3 was characterized by lower intake of vitamin E, vitamin A, vegetables, fruits, and fat or oil consumption.

CONCLUSION: We were able to use machine learning to categorize food intake into clusters, each with its own risk of adverse pregnancy outcome. Food intake pattern that is characterized by higher intake of trans-fat, polyunsaturated fatty acids, red meat, and sugar beverage intake was associated with adverse pregnancy outcomes.



917 Incidence of umbilical cord accidents as a cause of fetal death and associated histologic characteristics

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OBJECTIVE: The underlying mechanisms of umbilical cord accidents (UCA) as the cause of fetal death are poorly understood. We aim to report the incidence of fetal death due to UCAs at a large, urban hospital and identify the associated histologic characteristics.

STUDY DESIGN: This is a retrospective cohort study of all singleton fetal deaths $\geq$ 24 weeks that were attributed to umbilical cord accidents at a large, urban health system that serves medically-indigent patients. Each fetal death underwent a complete cause of death analysis by a multi-disciplinary committee of neonatologists, genetic counselors, obstetricians, and pathologists. Diagnosis of fetal death due to umbilical cord accidents was made by committee consensus opinion after review of the antepartum pregnancy course, fetal autopsy, chromosomal microarray, placental pathology, and fetal surveys. The placental slides for each case were reviewed by two pathologists and a consensus report was issued. The pathology reports were systematically reviewed and tabulated.

RESULTS: Between January 2010 and December 2022 there were 150,090 singleton births at our facility, 782 of which were fetal deaths $\geq$ 24 weeks and weighing $\geq$ 500 grams at delivery. After case review by the committee, 31 (4%) of the fetal deaths were attributed to umbilical cord accidents. Fetal survey at time of delivery and subsequent pathologic cord evaluation was notable for a nuchal cord in 15 patients (48.4%), a true knot in 7 patients (22.6%), and cord hyper-coiling in 7 patients (22.6%) (Table). Placental pathology was notable for vasculopathy in 16 patients (51.6%) and villitis in 7 patients (22.6%) (Table).

CONCLUSION: Umbilical cord abnormalities are an important risk factor for stillbirth. Umbilical cord accidents account for

approximately 4% of fetal deaths at a large urban hospital system. Associated histologic findings include cord hyper-coiling, placental vasculopathy, and placental villitis.

Perinatal characteristics	Patients (n)
Maternal age (mean + SD)	27.8 y/o (5.6)
Parity	
0	12
1	8
2	5
>2	6
Race	
White	0
Black	7
Hispanic	24
Gestational age at delivery (mean + SD)	33.6 wks (5.7)

Cord pathology	Patients (n)	Incidence (%)
Nuchal cord	15	48.4%
Number of loops	1 to 4	
True knot	7	22.6%
Body loop	2	6.5%
Shoulder cord	1	3.2%
Cord stricture	4	12.9%
Cord prolase	2	6.5%
Hypercoiled cord	7	22.6%
Umbilical cord hematoma	2	6.5%
Eccentric cord insertion	2	6.5%

Placental pathology	Patients (n)	Incidence (%)
Large for gestational age placenta (>90%ile)	2	6.5%
Small for gestational age placenta (<10%ile)	5	16.1%
Retroplacental hematoma	1	3.2%
Eccentric cord insertion	2	6.5%
Vasculopathy	16	51.6%
Intervillious thrombosis	8	25.8%
Vascular involution	6	19.4%
Iner-vessel fibrosis	1	3.2%
Parenchymal infarcts	1	3.2%
Villitis	7	22.6%
Placental edema and congestion	5	16.1%
Decreased Wharton's jelly	1	3.2%

918 Parental Acceptance of Fetal Tissue Donation: Insights from the Dutch Fetal Biobank

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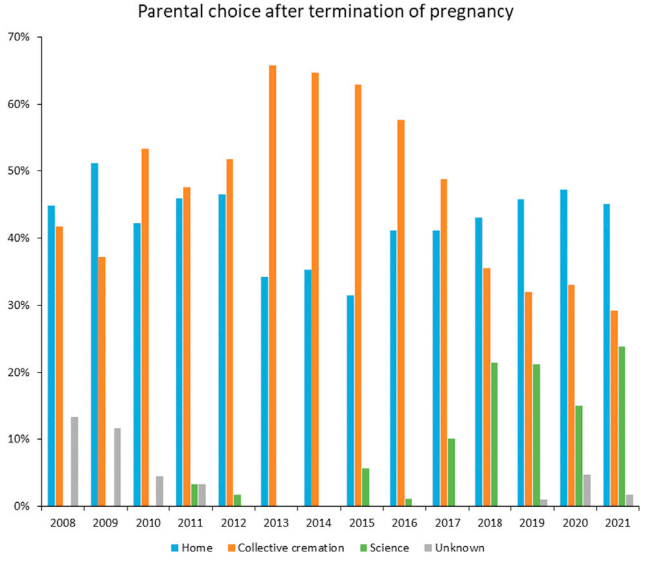
OBJECTIVE: Traditionally parents have had two options after termination of pregnancy. Either they take the fetal remains home for burial/cremation or the fetus remains in the hospital for collective cremation. Since 2017, a new choice emerged in the Netherlands: donation to the Dutch Fetal Biobank. This shift in options has led to an exploration of parents' willingness to contribute to research through donation.

STUDY DESIGN: We performed a cohort study at the Amsterdam UMC aimed to understand the impact of this new choice on post-termination decision-making. From 2008 to 2022, we included maternal age, ethnicity, gestational age, reason for termination, and post-termination decision in our analyses.

RESULTS: Prior to the introduction of the Dutch Fetal Biobank (DFB), of 689 terminations, 40.8% of parents took remains home, 55.3% chose collective cremation, 1.3% donated to science, and for 2.6% data was not available. After introduction of the DFB, of 459 terminations, 44.2% took remains home, 30.7% chose collective cremation, 21.4% donated to science, and for 1.7% information was missing. When we omitted those uninformed about the DFB or excluded from donation, 31.4% consented to donate.

Maternal age, ethnicity, and termination reason did not significantly influence the likelihood of donation. However, gestational age negatively impacted donation likelihood, reducing odds of donation by a factor of 0.986 with each additional day.

CONCLUSION: The considerable uptake of the Biobank donation option illustrates broad acceptability of this choice among parents. The increased donation rates, uninfluenced by maternal age, ethnicity, or termination reason, suggest potential for the establishment of more fetal biobanks globally. Our results indicate donation is increasingly chosen and acceptable, thus providing an opportunity to expand this service, offering additional support for parents post-termination and valuable contributions to scientific research.



Abstracts 919-1193

919 Retrospective analysis of opioid prescribing following obstetric procedures in patients with and without opioid exposure

Bryan L. Aaron[1], Dana Feldman[2], Jennifer Waljee[2], Mark Bicket[2], Michelle Moniz[2], Vidhya Gunaseelan[2], Alex Peahl[2]
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OBJECTIVE: To compare opioid prescribing practices following obstetric procedures in pregnancy across opioid-naive patients and patients diagnosed with opioid use disorder (OUD).

STUDY DESIGN: We performed a retrospective cohort study using claims data from *Truven Medicaid* and *Truven Marketscan* for patients aged 18-55 who gave birth from 1/1/2016 to 12/31/2020. We included patients who underwent an obstetric procedure in pregnancy from 270 to 4 days prior to childbirth admission. We compared opioid-naive patients (i.e., patients with no opioid prescriptions or diagnoses of OUD in pregnancy) to patients with OUD (i.e., patients with a diagnosis of OUD or who received medication for OUD). Outcomes included receipt of an opioid and prescription size (standardized to 5 mg tabs of oxycodone). Descriptive statistics between patients' insurance type and opioid exposure were used to summarize the data.

RESULTS: Among all patients that underwent an obstetric or non-obstetric procedure, 16,028 of 20,782 patients (77.1%) underwent obstetric procedures in pregnancy (opioid naive: 15,858/20,521; OUD: 170/261). The most common obstetrical procedure was amniocentesis (opioid-naive: 44.4%, OUD: 53.5%), followed by transvaginal cerclage (opioid-naive: 39.3%, OUD: 38.2%), and chorionic villus sampling (CVS; opioid-naive: 15.9%, OUD: 7.6%). Across all procedures, the rate of opioid prescribing was higher for patients with OUD than for opioid-naive patients and higher for patients with public insurance versus private insurance. For example, following amniocentesis, rates of opioid prescribing for patients with OUD with public (32.4%) and commercial (23.5%) insurance were higher than for opioid-naive patients with public (1.0%) or commercial (0.2%) insurance.

CONCLUSION: Patients with OUD and public insurance were more likely to receive opioid prescriptions following obstetric procedures in pregnancy than opioid-naive and commercially insured patients. Future work is needed to define appropriate, tailored prescribing recommendations for these groups that balance opioid stewardship with the need for excellent pain management.

920 Retrospective analysis of opioid prescribing following surgical procedures in patients with commercial vs. public insurance

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[1]University of Michigan Medical School, Ann Arbor, MI, [2]University of Michigan, Ann Arbor, MI

OBJECTIVE: To compare opioid prescribing practices following non-obstetrical procedures in pregnancy among public versus private insurance enrollees.

STUDY DESIGN: We performed a retrospective cohort study using claims data from *Truven Medicaid* (public) and *Truven Marketscan* (private) for all opioid-naive patients aged 18-55 undergoing a procedure in pregnancy from 01/01/2016 to 12/31/2020. We included opioid-naive patients (e.g., no opioid prescription in pregnancy) who underwent 6 common procedures from 270 to 4 days prior to childbirth admission. Outcomes included opioid prescribing characteristics (e.g., receipt of opioid, prescription size in 5 mg tabs of oxycodone). Descriptive statistics and tests of comparison were used to summarize the data.

RESULTS: Among those undergoing all procedure types, 10.1% (2,080 of 23,396 patients) had non-obstetrical procedures and were opioid-naive (Public: 790 of 7,324 [10.8%]; Private 1,290 of 16,072 [8.0%]). The most common procedures differed by insurance type (public: laparoscopic (lap.) cholecystectomy [54.1%], lap. appendectomy [21.4%], lap. oophorectomy [17.3%]; private: lap. cholecystectomy [40.1%], lap. oophorectomy [25.8%], lap. appendectomy [25.5%]). The procedure with the highest proportion of opioid prescribing for public enrollees was lap. oophorectomy (84.7%, Median: 20); For private enrollees, this was lap. cholecystectomy (77.0%, Median: 14.5). Of those who received opioid prescriptions, the proportion of patients who received a prescription and prescription size were higher for five of the six procedures for patients with public compared to private insurance.

CONCLUSION: Compared to patients with private insurance those with public insurance more commonly received an opioid prescription following procedures in pregnancy and received larger prescription sizes. Because one in 25 patients who receive an opioid prescription during pregnancy will develop new-persistent opioid use, standardized pain management guidelines for pregnant patients may reduce this observed inequity and reduce the risk of harm from opioid overprescribing.

921 Maternal and fetal outcomes among pregnant women with endometriosis

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OBJECTIVE: Endometriosis, a prevalent disorder affecting approximately 10% of women of reproductive age which has been associated with obstetric complications during pregnancy. The primary objective of this study was to evaluate the prevalence of endometriosis in pregnancy and explore the maternal and newborn outcomes of pregnant women diagnosed with endometriosis.

STUDY DESIGN: A retrospective cohort study was conducted using data from the Healthcare Cost and Utilization Project, Nationwide Inpatient Sample (HCUP-NIS) database of the United States between 1999 and 2019. Multivariate logistic regression analysis, controlling for diverse baseline maternal characteristics were used to investigate pregnancy and newborn outcomes in births to women diagnosed with endometriosis as compared to those without.

RESULTS: The study cohort consisted of 16,911,497 births to women without endometriosis and 14,956 pregnant women diagnosed with

endometriosis. Over the 20-year period, there was a significant upward trend in the prevalence of endometriosis among births, rising from 34.9 to 160.6 per 100,000 births. Births to women with endometriosis exhibited distinctive demographic characteristics, being of advanced maternal age, predominantly of Caucasian ethnicity, belonging to higher income quartiles, obese, smokers, and having private insurance coverage. Births to women with endometriosis were at heightened risk of experiencing obstetric complications, including gestational diabetes, preeclampsia, preterm birth, and postpartum hemorrhage. Neonates born to mothers with endometriosis also demonstrated an elevated likelihood of growth restriction and congenital anomalies.

CONCLUSION: This study provides comprehensive insights into the baseline characteristics of pregnant women with and without endometriosis. Moreover, it establishes a compelling association between endometriosis and elevated risks of adverse maternal and newborn outcomes. These findings emphasize the significance of early interventions and vigilant monitoring to ameliorate obstetrical and fetal outcomes in pregnant women diagnosed with endometriosis.

922 Temporal, regional and hospital-type variation in EMTALA violations involving obstetric emergencies, 2018-2023

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[1]Keck School of Medicine of USC, Los Angeles, CA, [2]University of Southern California, Pasadena, CA, [3]USC Mann School of Pharmacy, Los Angeles, CA

OBJECTIVE: The Emergency Medical Treatment and Labor Act (EMTALA) requires hospitals to screen, stabilize, and, if appropriate, transfer patients presenting to emergency departments (EDs) seeking emergency care and/or labor evaluation. EMTALA is enforced by the 10 regional offices of the Centers for Medicare & Medicaid Services (CMS), which may vary in their processes. We aim to describe regional variations in EMTALA enforcement related to obstetric (OB) emergencies in the United States from 2018 to 2023, with attention to temporal variations related to the COVID-19 pandemic.

STUDY DESIGN: This is a retrospective study of 2837 EMTALA violations from 2018 to March 2023 obtained from CMS, including dates, locations, and hospital types. Inspection text was systematically reviewed for keywords for the involvement of pregnant patients and/or OB emergencies. We compared temporal and regional variations in EMTALA violations involving OB versus non-OB emergencies.

RESULTS: During the study period, 294 (10.4%) violations involved OB emergencies. Rates of clinical deficiencies were 11 percentage points higher in OB violations versus non-OB violations. OB-related violations accounted for 12% of EMTALA-related violations prior to the COVID-19 pandemic versus 8.7% from 2020 to 2021. While violations from 2022 and 2023 are incompletely reported, available data note a continued downtrend to 8.3%. By CMS region, regions 4 (South Atlantic), 9 (Southwest), and 10 (Northwest) contributed to disproportionately more OB-related violations (differences of 2.8, 2.5, and 2.1 percentage points, respectively). Critical Access Hospitals (CMS-designated eligible rural hospitals) account for 20.7% of OB-related violations but only 17.5% of non-OB-related violations in contrast to short-term hospitals with near-identical proportions.

CONCLUSION: The proportion of EMTALA violations involving OB emergencies decreased over time. Proportions additionally varied by CMS region and hospital type. Recent changes in legislation impacting access to reproductive services may impact future temporal and regional variations in OB-related EMTALA violations.

923 The July Phenomenon and Postpartum Hemorrhagic Morbidity

Naahanna B. Akahara[1], Rachel L. Wiley[1], Ipsita Ghose[2], Saloni Kumar[1], Rylee Trotter[3], Emily Johnson[1], Yossi Bart[1], Hector Mendez Figueroa[4], Suneet P. Chauhan[3]

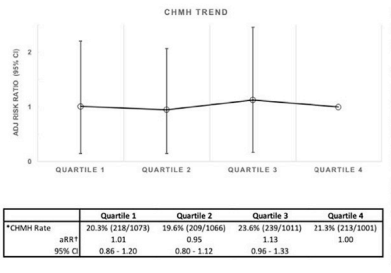
[1]McGovern Medical School at UTHealth Houston, Houston, TX, [2]University of Texas Medical School at Houston, Houston, TX, [3]University of Texas-Houston Medical School, Houston, TX, [4]University of Texas Health Science Center at Houston, Houston, TX

OBJECTIVE: The "July Phenomenon" refers to the time of year when inexperienced physicians begin training and there is a concern for increase in adverse outcomes. We aimed to evaluate differences in composite of maternal hemorrhagic morbidity (CMHM) over four calendar quartiles to determine the putative impact of the "July Phenomenon".

STUDY DESIGN: Our retrospective cohort study included all singleton deliveries at an academic Level IV center from July 2020 to June 2021. A total of 4,151 deliveries were included and divided into four quartiles designed to follow one academic year**:** Quartile 1 (July to September, n=1073), Quartile 2 (October to December, n=1066), Quartile 3 (January to March, n=1011), and Quartile 4 (April to June, n=1001). The data was collected by trained clinicians. CMHM was defined as blood loss $\geq$ 1000 mL, use of uterotonics (excluding prophylactic oxytocin), mechanical tamponade, surgical techniques for atony, transfusion, venous thromboembolism, intensive care unit (ICU) admission, hysterectomy, or maternal death. CMHM in Quartiles 1, 2, and 3 were compared to Quartile 4 (when residents are most experienced) using multivariate Poisson regression with robust error variance, adjusted for variables identified in the univariate analysis.

RESULTS: Compared to Quartile 4, there was no significant difference in CMHM with Quartile 1 (aRR 1.01, 95% CI 0.86 − 1.2), Quartile 2 (aRR 0.95, 95% CI 0.8 − 1.12) or Quartile 3 (aRR 1.13, 95% CI 0.96 − 1.33) (Figure 1). Majority of the components of the composite investigated did not differ between the Quartiles, except in surgical techniques where there was a significant increase in Quartile 4. Admission to ICU was significantly lower in Quartile 2, however this was no longer significant when admissions for COVID were excluded.

CONCLUSION: There was no "July phenomenon" for obstetrical hemorrhagic morbidity at our institution. Whilst surgical techniques differ as residents get more experienced, most components of the composite remained unchanged during a year.



	Quartile 1	Quartile 2	Quartile 3	Quartile 4
*CMHH Rate	20.3% (218/1073)	19.6% (209/1066)	23.6% (239/1011)	21.3% (213/1001)
aRR†	1.01	0.95	1.13	1.00
95% CI	0.86 - 1.20	0.80 - 1.12	0.96 - 1.33	

Figure 1. CMHM in relationship to delivery quartile, with reference group as Quartile 4 when residents are most experienced.

* CMHH included blood loss ≥ 1000 mL, uterotonic use (excluding initial oxytocin), surgical techniques for atony (uterine artery ligation, B-lynch or uterine artery embolization), mechanical tamponade, transfusion, hysterectomy, DVT/PE, ICU admission or maternal death

† adjusted Risk Ratio - Adjusted for race/ethnicity, diabetes, hypertension, induction of labor, abnormal vital signs at admission, low hematocrit and prolonged oxytocin use

CI, confidence interval; DVT/PE, deep venous thrombosis / pulmonary embolism; ICU intensive care unit

924 Serum magnesium levels: does maternal weight matter?

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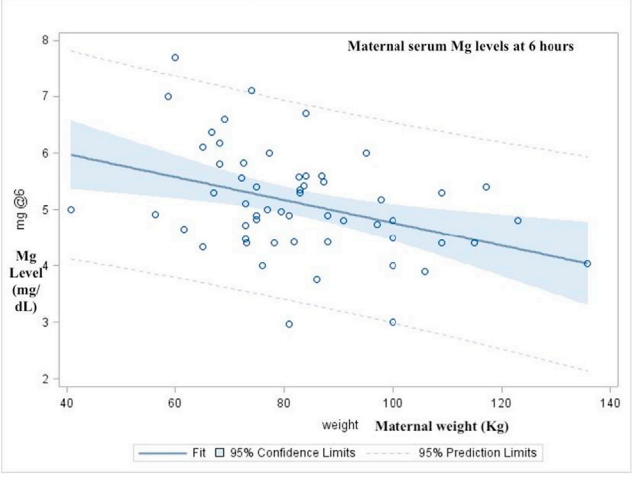
OBJECTIVE: Standard management of preeclampsia with severe features includes the administration of Magnesium Sulfate (Mg) for the prevention of eclamptic seizures. Most institutions employ a protocol that includes an intravenous loading dose of 4-6 g followed by continuous infusion of 2g/hour. The purpose of this study was to test the hypothesis that maternal serum concentration of Mg is inversely correlated with maternal weight.

STUDY DESIGN: This retrospective cohort study included women who received I/V Mg for preeclampsia between January 2017 and January 2022 and had a 6-hour Mg serum level determined before delivery. Patients were identified by the hospital pharmacy and their medical records were reviewed. Data reviewed included age, gestational age at presentation, blood pressure on admission, weight (kg), and Mg concentrations. Statistical analysis involved t-test, Pearson correlation, and linear and multiple regression.

RESULTS: 1036 records were reviewed, of these, 56 (5.4%) patients received at least 6 hours of Mg prior to delivery and had a 6-hour determination of Mg level. Mean (±SD) Mg level was 5.11+0.94 mg/dL. Maternal Mg level was inversely correlated with maternal weight (r=0.385; p=0.0034). Multiple regression adjusting for gestational age, systolic, and diastolic blood pressures did not alter this result (p=0.0184). Nineteen of the 56 patients (34%) had a Mg level < 4.8 mg/dL, considered sub-therapeutic. Mean weight of patients with sub-therapeutic and therapeutic Mg levels were 79.64+16.33 Kg vs. 89.45±18.99 Kg, respectively (p=0.025).

CONCLUSION: Antepartum Mg concentration is inversely correlated with maternal weight. Loading and maintenance doses of Mg may need to be adjusted based on maternal weight.



925 Risk factors for the need for repeated surgical intervention after a cesarean delivery

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OBJECTIVE: To determine risk factors for re-surgery following a cesarean delivery (CD).

STUDY DESIGN: A retrospective case-control study at a single tertiary university-affiliated medical center (2013-2023). Women who had a repeat surgery up to 6 weeks of the CD (re-surgery group) were compared to a control group of women with a CD without re-surgery in a 1:2 ratio. Controls were women who had a CD before and after each case in the re-surgery group. Maternal characteristics, obstetrical and surgical data were compared. Inclusion criteria were CD occurring ≥24 gestational weeks and opening of the fascia at the repeat surgery. CD performed at different centers and indications for repeat surgery unrelated to the primary surgery (appendicitis, etc.) were excluded. Logistic regression was used to adjust for potential confounders.

RESULTS: 1. Overall, 138,765 women delivered during the study period. Of them, 27,302 (19.7%) delivered by CD; and 101 (3.7/1,000) underwent re-surgery in the postpartum period.

2. 87/101 (86.2%) were operated by relaparotomy, and 14/101 (13.8%) by laparoscopy. The median time for re-operation was 27 hours (IQR 29-143 hours).

3. There were no significant differences between the groups regarding maternal age, body mass index, gravidity, parity, rate of previous CD, gestational diabetes mellitus, and gestational age at delivery (p > 0.05 for all).

4. There were significantly higher rates of multiple pregnancies (11.9% vs. 2.5%, p< 0.001), low molecular weight heparin (LMWH) use during pregnancy (9.9% vs. 2%,p=0.02), and hypertensive disorders of pregnancy (HDP) (13.9% vs. 4.5%,p=0.003) in the study compared to the control group.

5. In a multivariable logistic regression, multiple pregnancies, LMWH use, HDP, estimated blood loss at CD, and the use of a hemostatic dressing, were all found to be significant independent predictors of the need for re-operation following CD (Table).

CONCLUSION: Several pregnancy and intra-operative risk factors can be identified for the need for re-surgery following a CD, requiring appropriate diligent care and management.

Table - Multivariable analysis of factors associated with repeated surgery

Characteristic	Adjusted OR	95% Confidence Interval	p-value
LMWH during pregnancy	5.9	1.6-21.6	**0.007**
Multiple pregnancy	5.4	1.6-18.2	**0.024**
Hypertensive disorder of pregnancy	2.8	1.1-7.9	**0.049**
Preterm labor (<37 weeks)	1.1	0.5-2.3	0.81
Second stage CD	2.4	0.9-6.2	0.078
EBL	1.5	1.2-3.9	**0.035**
Duration of surgery	1.02	0.99-1.04	0.091
Intraabdominal adhesions	1.4	0.7-2.7	0.37
Use of a hemostatic dressing	2	1.03-3.9	**0.039**

LMWH – low molecular weight heparin; CD – cesarean delivery; EBL– estimated blood loss.

926 Psychological impact of medical termination of pregnancy: secondary analysis of the multicenter randomized trial DILATOP

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OBJECTIVE: To evaluate the psychological impact of medical termination of pregnancy (TOP) and to determine factors associated with severe psychological impact.

STUDY DESIGN: Secondary analysis of a multicenter (n= 10 centers) randomized controlled trial comparing the efficacy of cervical dilators inserted concurrently with misoprostol with that of misoprostol alone for women undergoing TOP between $15^{0/7}$ and $27^{6/7}$ weeks of gestation. Psychological impact was evaluated by the impact of event scale revised (IES-R) questionnaire self-administered 1 to 4 months after TOP. IES-R is a 22-items scale designed to assess subjective distress caused by traumatic events, validated for use in perinatal medicine. A score $^{3}33$ corresponds best to the diagnosis of PTSD and a score $^{3}37$ to severe psychological impact. Maternal and obstetrical characteristics associated with a score $\geq$37 were studied using mixed models. We present results for complete cases and after multiple imputation to account for selective dropouts and missing information at follow-up.

RESULTS: Between November 2017 and September 2019, 347 women were enrolled; 247 IES-R questionnaires were available and 219 fully completed. Median time between TOP and completion of the questionnaire was 7 weeks (IQR 4.9-13.3). The median IES-R score was 31 (IQR 22-42), 46% of women had a score ^{3} 33 and 37% ^{3} 37. After multivariable analysis, the only maternal factor associated with an IES-R ^{3}37 was occupation as a blue-collar worker or commercial employee compared to manager. Obstetric or labor-related characteristics as well as parity, gestational age over 22 weeks, use of cervical dilators, labor > 12h, pain or complications during delivery or post-partum were not associated with an IES-R ^{3}37. The results were similar after multiple imputation.

CONCLUSION: A high proportion of women experiencing medical TOP had a major psychological impact. The absence of vulnerability factors besides occupation, underlines the importance of psychological evaluation after TOP for all women to improve global care.

Table 1: Maternal, obstetric and labor-related characteristics associated with a severe psychological impact (IES-R ≥37) in women with medical TOP

	Univariate analysis	Multivariate analyses: Complete cases, N = 219	Multivariate analyses: Multiple imputation, N=347
	OR (95%CI)	ORa (95%CI)	ORa (95%CI)
Maternal age	n=241		
< 30 years	1.49 (0.76-2.91)	1.00 (0.45-2.25)	1.36 (0.64-2.91)
[30-35[	1.44 (0.77-2.67)	1.20 (0.59-2.45)	1.18 (0.62-2.22)
≥ 35 years	1 (Ref)	1 (Ref)	1 (Ref)
Nationality	n=236		
French	1 (Ref)	1 (Ref)	1 (Ref)
Foreign	1.15 (0.56-2.36)	1.08 (0.48-2.45)	0.63 (0.57-2.53)
Current or last occupation	n=225		
Managerial	1 (Ref)	1 (Ref)	1 (Ref)
Intermediate occupation, public or administrative employee, craftswoman, shopkeeper and farmer	1.82 (0.92-3.61)	1.77 (0.85-3.70)	1.92 (0.95-3.90)
Commercial, service, blue-collar and non-professional employees	2.37 (1.15-4.89)	2.25 (1.02-4.97)	2.25 (1.02-4.95)
Nulliparity	n=241		
Yes	1 (Ref)	1 (Ref)	1 (Ref)
No	1.32 (0.78-2.23)	1.68 (0.91-3.12)	1.52 (0.88-2.63)
Reason for medical TOP	n=240		
Chromosomal or genetic	1 (Ref)	1 (Ref)	1 (Ref)
Other (malformation, infection, IUGR, maternal pathology, oligohydramnios)	1.54 (0.91-2.62)	1.34 (0.67-2.69)	1.38 (0.73-2.63)
Cervical dilators	n=241		
Yes	1 (Ref)	1 (Ref)	1 (Ref)
No	1.07 (0.63-1.80)	1.17 (0.66-2.10)	1.01 (0.57-1.79)
Gestationnal age at delivery	n=241		
≥ 22 weeks of gestation	1 (Ref)	1 (Ref)	1 (Ref)
< 22 weeks of gestation	0.69 (0.41-1.17)	0.77 (0.40-1.48)	0.86 (0.47-1.60)

927 The impact of cup size on complications in vacuum-assisted deliveries: A retrospective case-control matching analysis

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OBJECTIVE: While previous research compared different Vacuum Assisted Delivery (VAD) devices (e.g. soft vs. rigid), scarcity of data exists regarding the association between vacuum cup size and perinatal complications.

We aimed to assess the association of vacuum cup size on maternal and neonatal morbidity in vacuum-assisted deliveries (VAD).

STUDY DESIGN: A retrospective cohort study at a single university-affiliated tertiary medical center (2011-2022). The metallic Malmström device, with cup sizes of 50 or 60 mm, was used for VAD. Cup size choice was based on physician preference and with both sizes an external force pressure of 550-600 mm Hg was used. Neonatal and maternal outcomes were compared between VAD using 50 vs 60 mm cup sizes. In order to ensure comparability between the groups, we conducted a case-control matching analysis with a 1:1 ratio based on age, BMI, analgesia, nulliparity, gestational age, baby weight, episiotomy, VAD indication, fetal station, and presentation.

RESULTS: 1. Overall, 4,703 women underwent VAD with a 50 mm Malmström cup, and 1,541 with a 60 mm cup.

2. The matching analysis included a total of 782 well-balanced cases in each group.

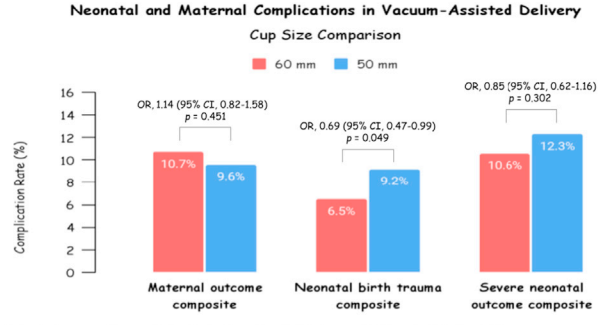
3. A 60mm cup was associated with a shorter mean interval from VAD initiation to delivery (4.31± 1.88 minutes vs 4.65±2.406 minutes, p=0.003) and reduced risk of cup detachment [OR 0.52 (0.31-0.89), p=0.015], with a comparable cesarean delivery rate compared to the 50mm cup (0.6% vs 0.9%); OR 0.71 [0.22-2.25], p=0.56.

4. Risk of neonatal birth trauma (brachial plexus injury, cephalohematoma, subgaleal hematoma or subdural hematoma) was higher in the 50mm group [Figure].

5. Composite severe neonatal outcome did not differ significantly between the groups [Figure].

6. Composite maternal outcome was similar between the groups [Figure]. However, the risk of perineal tears was lower in the 60 compared to the 50 mm group [306 (39.1%) vs 369 (47.2%), OR 0.72 (0.59-0.88), p=0.001].

CONCLUSION: A larger Malmström cup size (60 mm) during VAD is associated with a decreased risk of neonatal birth trauma compared to a 50 mm diameter.



928 Sexual dimorphism in chorion trophoblastic cells

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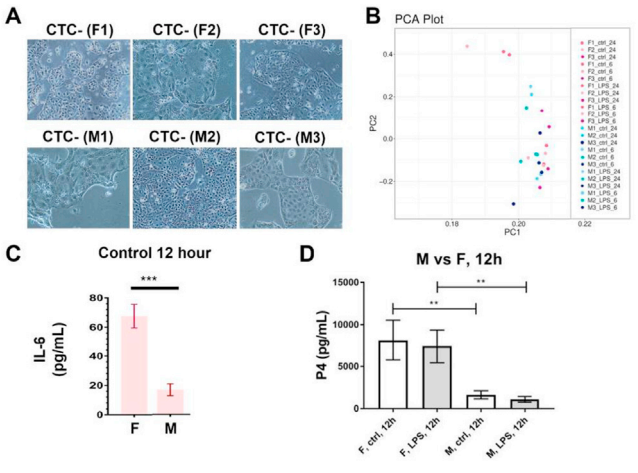
OBJECTIVE: Differences in clinical premature birth outcomes and intrauterine tissue inflammation have been observed between male (M) and female (F) neonates. These observations have been identified in placental trophoblast tissue, but sexual-level differences are unknown to occur within the fetal membrane trophoblast layer (chorion trophoblasts [CTC]). This study examined whether there is evidence for sex-based differences in gene expression and inflammatory marker expression in CTCs, and their differential response due to infectious stimuli, modeling infection-associated preterm birth.

STUDY DESIGN: CTC from six different patient-derived fetal membrane samples (three M and three F) (Fig. 1A) were cultured and divided into experimental and control groups. Lipopolysaccharide (LPS) was a proxy for infection, and CTC were stimulated for 6, 12, or 24H (hours). RNA from Cells were subjected to RNA-seq. Multiplex cytokine kits or ELISA detected secreted pro- and anti-inflammatory cytokines (IL-6, IL-8, TNFα, GM-CSF; IL-10), progesterone (P4), and soluble HLA-G in cell supernatants to determine inflammatory status and endocrine responses.

RESULTS: CTC-M & CTC-F showed sex, time, and stimulant-dependent differential gene expression profiles (Fig. 1B). Cytokine analysis demonstrated a significantly lower IL-6 production in control CTC-M than in CTC-F (Fig. 1C). No sex-dependent responses were observed in CTCs after LPS treatment regarding pro- or anti-inflammatory cytokines. CTC-M produced significantly lower P4 than CTC-F (Fig. 1D).

CONCLUSION: The theories of sexual dimorphism linked to placental inflammation do not extend to fetal membrane trophoblasts. This study supports current evidence that the chorion acts as a "great wall" which protects the fetus from external infection by being refractory to insults. Further examination into the weaknesses of the chorion barrier and redirection of study efforts that examine sex-dependent responses of fetal membranes is needed.



929 Low-dose aspirin usage during pregnancy: A retrospective structured electronic medical record data study

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OBJECTIVE: To examine the impact of reminder software to prescribe low-dose aspirin when indicated at the point-of-care on aspirin prescription in high-risk individuals.

STUDY DESIGN: This was a retrospective study of individuals who were eligible for low-dose aspirin during pregnancy according to ACOG guidelines from 2019 to 2023 in the State of Connecticut. Data were extracted from centers that used Dorsata Prenatal with its Care Plan technology within the athenahealth EMR. Dorsata Prenatal is a software that notifies physicians within their workflow when individuals are clinically eligible for low-dose aspirin. We limited the analysis to individuals who met ACOG criteria for low-dose aspirin. The primary outcome was the prescription of low-dose aspirin. The secondary outcomes were preterm delivery < 32 weeks, preterm delivery < 28 weeks, postpartum hemorrhage, cesarean delivery, eclampsia, gestational hypertension, preeclampsia, and low birthweight. Outcomes were compared between individuals whose physicians acknowledged the Care Plan within Dorsata Prenatal and those whose physicians did not acknowledge the Care Plan. Logistic regression was used to obtain crude odds ratio (cOR) with 95% confidence intervals.

RESULTS: Of 41963 individuals, 23258 had their Care Plan acknowledged and 18705 did not. Table 1 shows the cORs for each outcome. Compared to individuals whose Care Plan was not acknowledged, those with an acknowledged Care Plan had increased odds of being started on low-dose aspirin (cOR 5.79 [5.40-6.20]), cesarean delivery (cOR 1.07 [1.03-1.12]), and gestational hypertension (cOR 1.32 [1.16-1.49]), but had decreased odds of preterm delivery< 32 weeks (cOR 0.42 [0.39-0.46]), preterm delivery < 28 weeks (cOR 0.36 [0.33-0.40]), and postpartum hemorrhage (cOR 0.77 [0.65-0.92]).

CONCLUSION: Dorsata Prenatal Care Plan can enhance the prescription of low-dose aspirin for individuals who meet the criteria for low-dose aspirin.

Table 1. Comparison of care plan acknowledged with not acknowledged

	Acknowledged	Not Acknowledged	P-value	crude OR (95%CI)
N	23258	18705		
Aspirin	5857 (25.2)	1028 (5.5)	<0.001	5.79 (5.40-6.20)
Preterm delivery <32 weeks (n=23247/18636)	850 (3.7)	1528 (8.2)	<0.001	0.42 (0.39-0.46)
Preterm delivery <28 weeks (n=23247/18636)	633 (2.7)	1349 (7.2)	<0.001	0.36 (0.33-0.40)
Postpartum hemorrhage	246 (1.1)	256 (1.4)	<0.01	0.77 (0.65-0.92)
Cesarean (n=22256/16429)	8211 (36.9)	5792 (35.3)	<0.001	1.07 (1.03-1.12)
Eclampsia	4 (0.02)	2 (0.01)	0.58	1.61 (0.29-8.78)
GHTN	669 (2.9)	415 (2.2)	<0.001	1.32 (1.16-1.49)
Preeclampsia	254 (1.1)	179 (1.0)	0.17	1.14 (0.94-1.39)
Low birthweight (n=20382/15009)	1415 (6.9)	1046 (7.0)	0.92	1.00 (0.92-1.08)

930 The maternal implications of congenital malformations: A cross-sectional study

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OBJECTIVE: To evaluate relationships between congenital malformation types and adverse maternal outcomes.

STUDY DESIGN: This was a repeated cross-sectional analysis of US vital statistics Live Birth/Infant Death linked data from 2011 to 2020. All pregnancies at 20 weeks or greater were included. Our primary outcome was severe maternal morbidity (SMM) defined as any maternal intensive care unit admission, transfusion, uterine rupture, and hysterectomy. Secondary outcomes were cesarean delivery (CD), preeclampsia, and preterm delivery. Pregnancy outcomes were compared for each type of congenital malformation with the referent group of pregnancies without congenital malformation. Congenital malformations available in the dataset included spina bifida, congenital heart disease, diaphragmatic hernia, omphalocele, gastroschisis, limb defect, cleft lip/palate, chromosomal anomaly, and hypospadias. If a fetus had more than one malformation, it was classified as multiple malformation. Adjusted relative risks (aRR) with 99% confidence intervals were calculated using modified Poisson regression.

RESULTS: Of 34,747,260 pregnancies that were included in our study, 34,645,400 pregnancies had no congenital malformation and 101,860 had isolated or multiple congenital malformation. Outcomes are presented in Table 1. Compared to pregnancies without congenital malformation, all congenital malformations were associated with an increased risk of SMM except for gastroschisis and limb anomaly (range of aRR 1.60-2.66). All malformations were associated with an increased risk of CD and preterm delivery (range of aRR 1.14-2.36 and 1.64-7.91, respectively). Congenital heart disease, omphalocele, cleft lip/palate, chromosomal anomaly, hypospadias, and multiple malformation were associated with an increased risk of preeclampsia (range of aRR 1.24-1.63) and gastroschisis was associated with a decreased risk of preeclampsia (aRR 0.52).

CONCLUSION: The maternal implications of congenital malformation should be included in informed consent when making decisions regarding continuation of pregnancy.

Table 1. Maternal outcomes of congenital malformation

	SMM	Cesarean	Preeclampsia	Preterm delivery
No malformation (n=34645400)	156715 (0.5)	10594416 (30.6)	2099116 (6.1)	2711108 (7.8)
Spina Bifida (n=4645), n (%)	47 (1.0)	3463 (74.6)	261 (5.6)	1259 (27.1)
adjusted RR (99%CI)	2.14 (1.47-3.13)	2.36 (2.28-2.45)	0.93 (0.79-1.08)	3.41 (3.20-3.64)
Congenital heart disease (n=19650), n (%)	260 (1.3)	8332 (42.4)	1907 (9.8)	4279 (21.8)
adjusted RR (99%CI)	2.66 (2.27-3.11)	1.29 (1.27-1.32)	1.51 (1.43-1.60)	2.54 (2.45-2.63)
Diaphragmatic hernia (n=3956), n (%)	45 (1.1)	1652 (41.8)	251 (6.4)	881 (22.3)
adjusted RR (99%CI)	2.40 (1.63-3.52)	1.34 (1.28-1.41)	1.04 (0.89-1.21)	2.78 (2.57-3.01)
Omphalocele (n=2594), n (%)	40 (1.5)	1683 (64.9)	216 (8.4)	880 (33.9)
adjusted RR (99%CI)	3.19 (2.12-4.79)	2.01 (1.92-2.11)	1.26 (1.06-1.49)	4.10 (3.80-4.42)
Gastroschisis (n=8633), n (%)	43 (0.5)	4238 (49.1)	269 (3.1)	5236 (60.7)
adjusted RR (99%CI)	1.15 (0.77-1.72)	2.01 (1.95-2.07)	0.52 (0.44-0.60)	7.91 (7.71-8.10)
Limb (n=1019), n (%)	10 (1.0)	422 (41.5)	54 (5.3)	163 (16.0)
adjusted RR (99%CI)	1.72 (0.69-4.26)	1.35 (1.23-1.47)	0.91 (0.65-1.27)	1.96 (1.62-2.37)
Cleft lip/palate (n=23064), n (%)	174 (0.8)	8123 (35.2)	1729 (7.5)	3074 (13.3)
adjusted RR (99%CI)	1.60 (1.32-1.95)	1.14 (1.11-1.16)	1.25 (1.17-1.32)	1.64 (1.57-1.72)
Chromosome (n=4898), n (%)	42 (0.9)	2125 (43.4)	381 (7.8)	1562 (31.9)
adjusted RR (99%CI)	1.73 (1.16-2.58)	1.25 (1.20-1.31)	1.26 (1.11-1.43)	3.86 (3.65-4.08)
Hypospadias (n=19601), n (%)	199 (1.0)	7526 (38.4)	2050 (10.5)	2751 (14.0)
adjusted RR (99%CI)	2.20 (1.83-2.64)	1.21 (1.18-1.23)	1.63 (1.55-1.72)	1.77 (1.69-1.85)
Multiple malformation (n=13800), n (%)	144 (1.0)	6086 (44.1)	1058 (7.7)	4682 (33.9)
adjusted RR (99%CI)	2.05 (1.74-2.41)	1.27 (1.25-1.29)	1.24 (1.17-1.31)	4.02 (3.89-4.15)

Abbreviations: SMM (severe maternal morbidity); RR (relative risk)
Adjusted relative risks were controlled for age, race, parity, history of cesarean, insurance, infertility treatment, chronic hypertension, and pregestational diabetes.

931 Risk of cesarean delivery stratified by BMI at delivery

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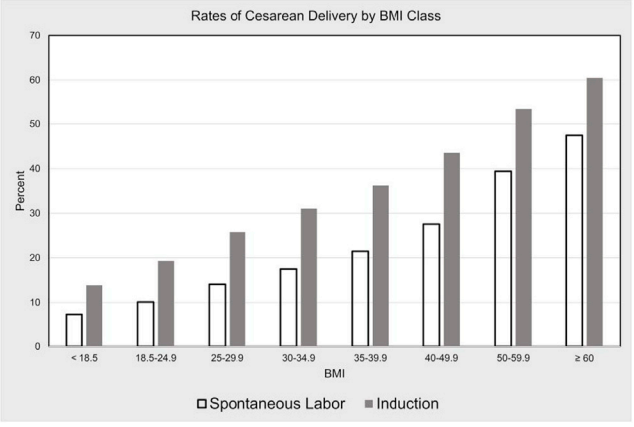
OBJECTIVE: Studies have shown that obesity increases overall risk of cesarean delivery (CD) in a dose dependent fashion, but are often underpowered to assess higher stratifications of body mass index (BMI), particularly in super obese women (BMI > 50). The objective of this study is to evaluate overall risk of CD in super obese women and the impact on maternal and neonatal outcomes.

STUDY DESIGN: This was a population based retrospective study of all nulliparous women who delivered in the United States in 2021. Patients were stratified by BMI category at delivery excluding patients undergoing cesarean without labor. The primary outcome was the overall rate of CD, which was further stratified among inductions versus spontaneous labor. Secondary outcomes included maternal (transfusion, hysterectomy, ICU admission) and neonatal (NICU admission, mechanical ventilation, surfactant administration) composite adverse outcomes. Poisson regression with robust error variance was used to generate adjusted risk ratios (aRR) for each study outcome using normal BMI (18.5-24.9) as the referent adjusting for confounders.

RESULTS: There were 1,147,941 nulliparous women included in the analysis with 5,820 patients with BMI 50-59.9 and 594 patients with BMI ≥ 60. There was an increasing rate of CD with increasing BMI at delivery (range 7.3%-60.5%) with the highest risk among induced (aRR 1.35, CI 1.31-1.39) and spontaneously laboring (aRR 1.35, CI 1.28-1.42) women with BMI > 60; Figure 1. Similarly, the highest rate of both the maternal (range 0.57-1.16%) and neonatal (range 9.3-19.5%) composite adverse outcomes were in the highest BMI categories. Adverse outcomes remained significant after adjustment for gestational age at delivery.

CONCLUSION: There is a substantial increased risk of CD as well as both adverse maternal and neonatal outcomes among nulliparous super obese women undergoing a labor trial. It is unknown whether these risks would be mitigated by elective cesarean delivery.



932 Publication rate of oral presentations at the society for maternal-fetal medicine annual meeting

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OBJECTIVE: To evaluate publication status for oral presentations at the Society for Maternal-Fetal Medicine (SMFM) annual meetings.

STUDY DESIGN: Data from the 2018 and 2019 SMFM annual meetings were evaluated. The data was publicly available via the American Journal of Obstetrics & Gynecology (AJOG) SMFM supplements. Included were all oral presentations at the annual meetings. Abstract titles and authors were queried on PubMed to evaluate the publication status.

RESULTS: Of 231 oral presentations, the publication rate was 73.6% (170/231). Among the 170 published presentations**:** 42.4% were published within the same year of presentation, 24.1% in the following year, 21.2% two years later, 11.8% within three to five years, and 0.6 % were published prior to the timing of the oral presentation. The top five journals of publications were**:** Am J Obstet Gynecol (22.4%), Obstet Gynecol (14.7%), Am J Perinatol (9.4%), Am J Obstet Gynecol MFM (5.9%), and Ultrasound Obstet Gynecol (4.1%). The remainder of the publications were published in 50 other journals.

CONCLUSION: Publication rate for oral presentations was high, with the majority being within the first two years from presentation. Timely manuscript publication is reassuring and valuable for prompt dissemination of research findings and advancing clinical practice within the high-risk pregnancy community.

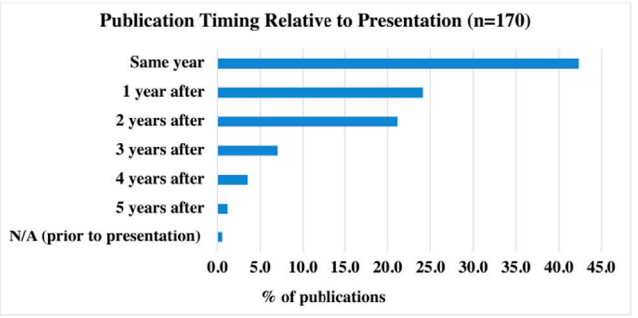

Figure 1. Publication timing relative to presentation

933 Policy change combined with clinical decision support improves equity and yield of L&D UDS testing

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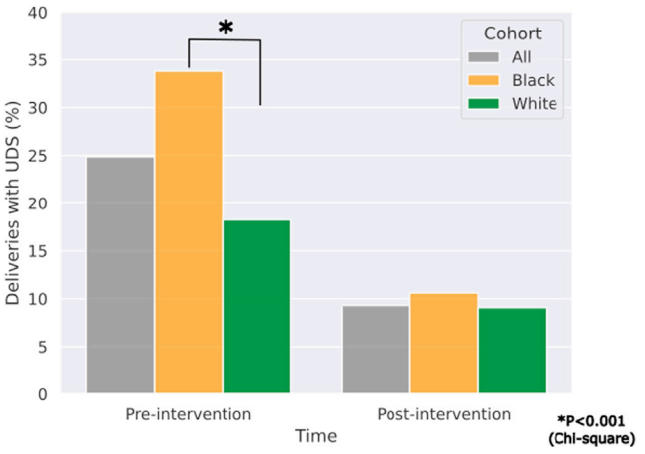
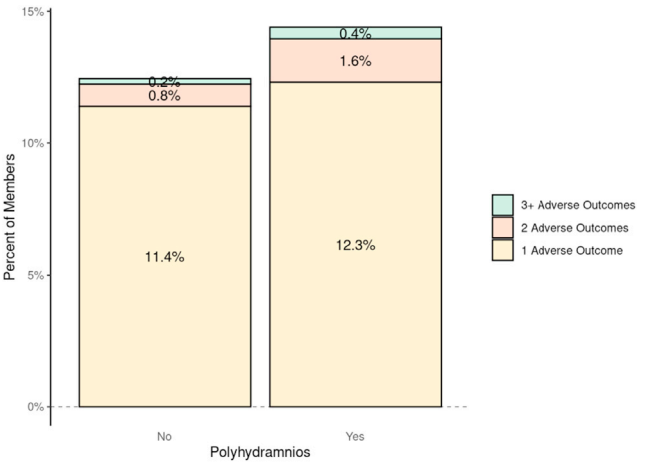
OBJECTIVE: An indication of isolated tetrahydrocannabinol (THC) use for urine drug screening (UDS) in labor and delivery units is a poor predictor of other substance exposure and leads to inequities in downstream harms (e.g. reporting to state child abuse hotline). In September 2022, the Labor and Delivery unit at an urban tertiary care center removed isolated THC use as an indication for UDS. Concurrently, an electronic health record (EHR)-based order question was implemented requiring providers to select an indication for testing. We sought to assess the impact of these changes on UDS ordering practices.

STUDY DESIGN: We performed a retrospective cohort study of all UDS results from an inpatient obstetric unit at an urban tertiary care center from June 2020-July 2023. Urine drug screening is performed based on verbal screening of all admitted patients. Statistical testing for comparing pre- vs. post-testing periods was performed using Pearson's chi-square.

RESULTS: 2056/8271 (24.9%) and 209/2247 (9.3%) of all deliveries in the pre- and post-implementation periods had UDS performed, respectively ($p < 0.001$). 1356/4013 (33.8%) and 665/3647 (18.2%) ($p < 0.001$) of deliveries in the pre-implementation period had UDS performed for Black and White patients, respectively, vs. 107/1008 (10.6%) and 97/1070 (9.1%) of deliveries in the post-implementation period ($p=0.32$). The rate of UDS results positive only for THC decreased from 512/2056 (24.9%) to 22/209 (10.5%) ($p < 0.001$) in the pre- vs. post-implementation periods.

CONCLUSION: Following the interventions, significantly fewer UDS's were performed overall and a race-based difference in the rate of UDS was significantly reduced. Additionally, a significant decrease was observed in the UDS positivity rate for non-THC substances in the pre- vs. post-intervention periods, suggesting that the removal of the isolated THC use order indication led to fewer THC-only positive UDS results. These results suggest that removal of isolated THC use as an indication and implementation of an indication order question can reduce low-yield UDS and reduce race-based UDS disparities.





934 Long-term childhood outcomes after pregnancy complicated by isolated polyhydramnios

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OBJECTIVE: While most cases of polyhydramnios are mild and of unknown etiology, some cases are indicative of underlying congenital anomalies or genetic syndromes. Antenatal counseling is compounded by the lack of long-term outcomes from children born after isolated polyhydramnios.

STUDY DESIGN: We performed a case-control study utilizing a blended database of linked pregnancy-to-pediatric medical records and insurance claims from 2014-2022 from a multi-state health insurance and delivery organization. Propensity score (PS) matching was performed based upon sex of the infant, the mothers' comorbidities (Charlson comorbidity index), and number of months of follow-up. Cases and controls were matched with replacement with a 1:1 ratio with preference given to exact matches. We excluded patients with diabetes. The primary exposure was isolated polyhydramnios. Long-term outcomes include fetal death, PICU admission, neurologic diagnosis, developmental delay, and therapy (speech, occupational, or physical). Demographics and individual outcomes were analyzed using Chi-squared tests, whereas the composite outcome was examined with Poisson regression.

RESULTS: From a total population of approximately 5 million individuals, we identified 3,182 pregnancies complicated by polyhydramnios. These were PS matched to 2,955 control pregnancies. There were no significant demographic differences between groups. Individually, polyhydramnios was a significant risk factor for PICU admission (2.7% vs 1.6%, OR 1.7 [95% CI 1.2-2.5]) and developmental delay (9.6% vs 8.0%, OR 1.2 [95% CI 1-1.5]). No other measured adverse outcomes were different. Polyhydramnios was significantly associated with increased rates of any adverse outcome as well as two adverse outcomes and three or more (see Figure 1).

CONCLUSION: Long-term childhood outcomes are higher for polyhydramnios-complicated pregnancies. Future research should study this association and the effects of polyhydramnios severity and prematurity on outcomes.

935 Retain products of conception following cesarean delivery: Characteristics and risk factors

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OBJECTIVE: Untreated Retained products of conception (RPOC) may cause bleeding, infection and intrauterine adhesions which may jeopardize the woman's fertility. Literature is scarce in addressing RPOC after Cesarean delivery (CD). In this study we aimed to clarify the risk factors and prevalence of PROC after CD.

STUDY DESIGN: We performed a retrospective cohort study at a single tertiary care center from 2010 to 2022. Enrolled women, delivered by CD and diagnosed with PROC confirmed by hysteroscopy. A control group of patients who had CD without RPOC was matched, in 1:4 ratio.

RESULTS: Sixty-six women out of 14631 CDs had a hysteroscopic diagnosis of RPOC; 295 controls were matched. Table 1 provides the maternal and pregnancy characteristics. RPOC following CD was related to older age (33.42±5.38 vs. 30.59±5.08, p< 0.001), higher BMI (35.42±3.20 vs. 29.5±3.49, p=0.01), IVF conception (16.7% vs. 7.1%, p=0.01) and was less common among nulliparous patients (39.4% vs. 71.9%, p< 0.001). In addition, gestational week at delivery was earlier (37.84±2.34 vs. 40.04±1.07, p< 0.001) and most CDs were elective (62.1%). Chorioamnionits was related to higher cases of RPOC (9.1% vs. 2.4%, p=0.008), although water break duration was similar (18.44±15.83 vs. 17.83±14.16, p=0.93).

CONCLUSION: Nulliparity, advanced maternal age and increased BMI are among risk factors increasing the probability of RPOC after CD delivery. This data can help gynecologists in postpartum follow-up.

Table 1. Comparison maternal and delivery characteristics of women with or without retained products of conception following Cesarean delivery

Variable	RPOC N=66	No RPOC N=295	P-Value
General Maternal Characteristics			
Age, years, mean +/- SD	33.42±5.38	30.59±5.08	**<0.001**
Body Mass Index, kg/m^2, mean +/- SD	35.42±3.20	29.5±3.49	**0.01**
In vitro fertilization, n (%)	11 (16.7)	21 (7.1)	**0.01**
Nulliparity, n (%)	26 (39.4)	212 (71.9)	**<0.001**
Delivery Characteristics			
Gestational age at delivery, weeks, mean +/- SD	37.58±2.34	40.04±1.07	**<0.001**
Induction of labor, n (%)	23 (34.8)	195 (66.1)	**<0.001**
Augmentation of labor, n (%)	23 (34.8)	141 (47.8)	0.06
Regional Anesthesia, n (%) General anesthesia	62 (93.9) 4 (6.1)	221 (74.9) 74 (25.1)	**<0.001**
CD indication: NRFHR Labor Arrest Elective CD	3 (4.5) 22 (33.3) 41 (62.1)	78 (26.4) 165 (55.9) 52 (17.6)	**<0.001**
Chorioamnionitis	6 (9.1)	7 (2.4)	**0.008**
Water break duration, hours, mean, +/- SD	18.44±15.83	17.83±14.16	0.93
Meconium, n (%)	2 (3.0)	30 (10.2)	0.07
PPH, n (%)	7 (10.6)	21 (7.1)	0.34
Birthweight, grams, mean, +/- SD	3314±647	3721±328	**<0.001**

SD, standard deviation; n, number. P < 0.05 was considered significant.

936 Testing transcriptional regulatory pathway in early-onset FGR using patient-specific human trophoblast stem cells

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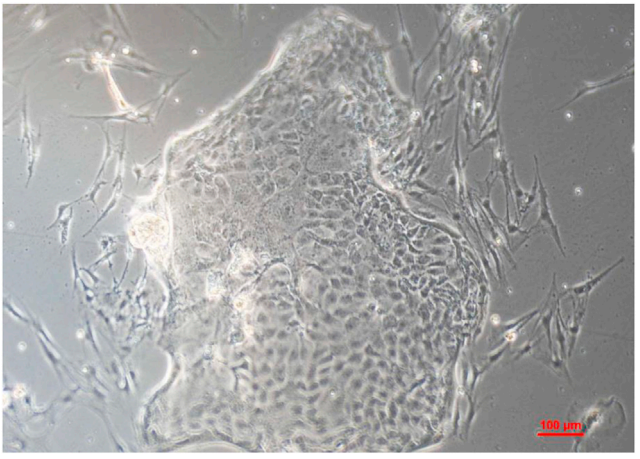
OBJECTIVE: Human Trophoblast stem cells (hTSC) are an excellent model system to understand trophoblast development during human pregnancy. However, most of previously studied hTSCs were established from 1st trimester placentas, which limits evaluation of mechanisms underlying development of early-onset FGR. We hypothesize that a defect in trophoblast progenitor self-renewal and differentiation can result in a pathologic pregnancy, such as FGR. Components of Hippo signaling pathway are essential for optimization of trophoblast progenitor self-renewal. Our objective was to establish patient-specific hTSCs from early-onset FGR placentas and controls to determine differences in expression in transcription factors and cofactors in the Hippo signaling pathway.

STUDY DESIGN: Patients were identified as early-onset FGR when diagnosis was prior to 32wks and had a typical pattern of progression resulting in preterm delivery. Excluded**:** Non-English/Spanish speaking, other fetal anomalies, multifetal gestation, declined participation. The controls delivered by c-section before labor, had no medical problems or fetal abnormalities.

Cytotrophoblasts (CTBs) were isolated from placentas and plated in stem media in a hypoxic chamber. Qualitative speed of growth of hTSC colonies was noted, comparing control to FGR. mRNAs were isolated from growing cells to determine expressions of Hippo signaling transcription factors, TEAD4/TEAD1 and cofactors YAP1/WWTR1.

RESULTS: CTBs of 8 early-onset FGR placentas were isolated to establish hTSC lines. FGR-hTSCs were slower growing compared to controls. Expression of TEAD4, which is an important regulator for CTB proliferation, was suppressed in several FGR-hTSCs.

CONCLUSION: Due to our successful establishment of hTSCs from early-onset FGR placentas, we have provided a novel way of understanding underlying mechanisms of FGR. TEAD4 expression is decreased in early-onset FGR placentas. In the future, WES will aid in discovery of specific mutations that may result in this abnormality along with other pathways affecting trophoblast development leading to early-onset FGR.



937 The rate of maternal comorbidities among different body mass index groups

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OBJECTIVE: The purpose of this study was to describe the association between body mass index (BMI) at delivery and the rates of different maternal comorbidities among obese pregnant individuals.

STUDY DESIGN: This is a retrospective cohort study of all singletons ≥14 weeks that were delivered between March 2020 and February 2022 at a single Level IV center. We categorized the cohort by different BMI classes**:** overweight (25−29.9 kg/m^2), class I/II (30-39.9 kg/m^2), class III (40-49.9 kg/m^2), and class IV ≥ 50 kg/m^2. The reference group was the overweight cohort. The rates of composite comorbidities (hypertensive disorder of pregnancy, diabetes, asthma, cardiac disease, mental illness, or venous thromboembolism (VTE)) were ascertained. Poisson regression was used to calculate adjusted relative risks for each comorbidity by class, adjusted for age given that age is most likely to influence rate of comorbidities.

RESULTS: Of 8,623 deliveries, 7618 (88.3%) met inclusion criteria. 29.2% were overweight (n=2221), 51.2% were class I/II (n =3900),16% were class III (n=1220), and 3.6% were class IV

(n=277). Compared to overweight, class I/II, III and IV were significantly more likely to have composite co-morbidities (aRR 1.37 (1.29-1.46), aRR 1.82 (1.70-1.95), and 2.18 (2.01-2.35), respectively.) After adjusting for maternal age, class IV obesity demonstrated statistically significant higher risk of hypertensive disorders (aRR 3.09, 95% CI 2.77 -3.45), diabetes (aRR 3.99, 95% CI 3.16-5.03), asthma (aRR 2.03, 95% CI 1.44-2.88), and mental illness (aRR 1.58, 95% CI 1.11-2.25) (Table 1.).

CONCLUSION: As BMI increases, the rate of several maternal comorbidities increases, with composite morbidity reaching 66% in class III individuals and 90% in Class IV individuals. Obese patients are an increasing constituent in contemporary obstetric populations and BMI alone does not accurately reflect the medical complexity and subsequent challenges in care. Given the increased risk of maternal comorbidities in Class IV obesity, frequent maternal surveillance should be considered for early detection and management of comorbidities.

Table 1: BMI and Risk of Co-morbidities

Outcomes	Group	Total	N	%	Unadjusted RR (95% CI)	Adjusted RR [a] (95% CI)
Composite of co-morbidities	BMI 25-29.9	2221	822	37.0	1.00	1.00
	BMI 30-39.9	3900	1961	50.3	1.36 (1.28-1.45)	**1.37 (1.29-1.46)**
	BMI 40-49.9	1220	813	66.6	1.81 (1.69-1.93)	**1.82 (1.70-1.95)**
	BMI ≥ 50	277	224	80.9	2.19 (2.03-2.37)	**2.18 (2.01-2.35)**
Hypertensive disorders [a]	BMI 25-29.9	2221	498	22.4	1.00	1.00
	BMI 30-39.9	3900	1367	35.1	1.56 (1.43-1.71)	**1.57 (1.44-1.72)**
	BMI 40-49.9	1220	638	52.3	2.33 (2.12-2.56)	**2.35 (2.14-2.59)**
	BMI ≥ 50	277	193	69.7	3.11 (2.78-3.47)	**3.09 (2.77-3.45)**
Diabetes mellitus [b]	BMI 25-29.9	2221	158	7.1	1.00	1.00
	BMI 30-39.9	3900	485	12.4	1.75 (1.47-2.08)	**1.76 (1.48-2.08)**
	BMI 40-49.9	1220	244	20.0	2.81 (2.33-3.39)	**2.84 (2.36-3.42)**
	BMI ≥ 50	277	84	30.3	4.26 (3.38-5.38)	**3.99 (3.16-5.03)**
Asthma	BMI 25-29.9	2221	140	6.3	1.00	1.00
	BMI 30-39.9	3900	300	7.7	1.22 (1.01-1.48)	1.22 (1.00-1.48)
	BMI 40-49.9	1220	136	11.1	1.77 (1.41-2.22)	**1.76 (1.41-2.21)**
	BMI ≥ 50	277	35	12.6	2.00 (1.41-2.84)	**2.03 (1.44-2.88)**
Cardiac disease [c]	BMI 25-29.9	2221	30	1.4	1.00	1.00
	BMI 30-39.9	3900	60	1.5	1.14 (0.74-1.76)	1.15 (0.74-1.78)
	BMI 40-49.9	1220	22	1.8	1.34 (0.77-2.30)	1.36 (0.78-2.35)
	BMI ≥ 50	277	8	2.9	2.14 (0.99-4.62)	2.02 (0.94-4.33)
Mental illness [d]	BMI 25-29.9	2221	167	7.5	1.00	1.00
	BMI 30-39.9	3900	335	8.6	1.14 (0.96-1.37)	1.15 (0.96-1.37)
	BMI 40-49.9	1220	137	11.2	1.49 (1.20-1.85)	**1.50 (1.21-1.87)**
	BMI ≥ 50	277	33	11.9	1.58 (1.11-2.25)	**1.58 (1.11-2.25)**
Venous thromboembolism	BMI 25-29.9	2221	10	0.5	1.00	1.00
	BMI 30-39.9	3900	35	0.9	1.99 (0.99-4.02)	2.01 (1.00-4.05)
	BMI 40-49.9	1220	11	0.9	2.00 (0.85-4.70)	2.03 (0.87-4.78)
	BMI ≥ 50	277	4	1.4	3.21 (1.01-10.16)	2.95 (0.93-9.35)

[a] Hypertensive disorders: chronic hypertension, gestational hypertension, and preeclampsia

[b] Diabetes: gestational and pre-gestational diabetes

[c] Cardiac disease: structural heart disease, ischemic cardiac disease, heart failure, and/or arrhythmias

[d] Mental Illness: depression, anxiety, bipolar, schizophrenia

938 The association of Social Vulnerability Index (SVI) with acuity of presentation to obstetric triage

Tracy Caroline Bank

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OBJECTIVE: To assess the association between CDC Social Vulnerability Index (SVI) with acuity of presentation to obstetric triage.

STUDY DESIGN: Secondary analysis of a retrospective cohort study of all triage visits occurring from 20 0/7 through 34 6/7 weeks' gestation on randomly selected dates from 1/1/2019 through 3/31/2019 at 34 hospitals across the US. Individuals enrolled with geocode and CDC SVI data available were eligible for analysis. The primary exposure was the CDC SVI with a higher number indicating greater vulnerability. The primary outcome was high acuity at presentation to triage, defined as preeclampsia with severe features (for those presenting with hypertensive disorders of pregnancy), cervical dilation >3 cm, or chorioamnionitis (for those presenting with threatened preterm labor or preterm premature rupture of membranes), or delivery within 48 hours of presenting to triage. Additional adverse maternal and neonatal outcomes were compared. All outcomes were also analyzed by the four themes within SVI. Baseline characteristics were compared using Cochran-Armitage or Jonckheere-Terpstra trend tests. Logistic and quantile regressions were used with the lowest SVI quartile (Q1) group as referent.

RESULTS: Among 2,666 individuals eligible for analysis, 554 (20.8%) were in SVI Q1, 672 (25.2%) in Q2, 649 (24.3%) in Q3, and 791 (29.7%) in Q4. Individuals with higher overall SVI scores were younger, had higher BMI, and were more likely to be multiparous, use tobacco, drugs, and live with co-morbidities. SVI quartiles were not associated with acute presentation to triage (Q1 reference; Q2 aOR 0.91, 95% CI 0.65-1.28; Q3 aOR 1.09, 95% CI 0.78-1.54; Q4 aOR 1.03, 95% CI 0.73-1.44) . Higher SVI was associated with an increased odds of receipt of a complete course of betamethasone and decreased odds of adverse respiratory outcomes (Table). There was no association between the individual themes of SVI and the primary outcome, or between SVI and acuity of different presenting concerns.

CONCLUSION: We found no association between SVI and acuity of presentation to triage.

Table. Maternal and Neonatal Outcomes by SVI Quartile

Outcomes	n / N (%) or Median (Q1-Q3)	OR (95% CI) or Difference (95% CI)	aOR (95% CI) or Adjusted Difference (95% CI)
Primary Outcome			
High acuity at presentation to triage			
Quartile 1	80 / 554 (14.4)	1.0 (Reference)	1.0 (Reference)
Quartile 2	81 / 672 (12.1)	0.81 (0.58 - 1.13)	0.91 (0.65 - 1.28)
Quartile 3	85 / 649 (13.1)	0.89 (0.64 - 1.24)	1.09 (0.78 - 1.54)
Quartile 4	95 / 791 (12.0)	0.81 (0.59 - 1.11)	1.03 (0.73 - 1.44)
Secondary Outcomes			
Time from triage to delivery (days)			
Quartile 1	46 (17 - 80) [n=553]	0 (Reference)	0 (Reference)
Quartile 2	50 (23 - 78) [n=671]	4 (-1 - 9)	2 (-4 - 8)
Quartile 3	44 (21 - 71) [n=649]	-2 (-7 - 3)	-4 (-10 - 2)
Quartile 4	44 (23 - 73) [n=791]	-2 (-7 - 3)	-4 (-9 - 2)
Preterm delivery less than 37 weeks			
Quartile 1	223 / 554 (40.3)	1.0 (Reference)	1.0 (Reference)
Quartile 2	248 / 672 (36.9)	0.87 (0.69 - 1.09)	0.93 (0.73 - 1.17)
Quartile 3	242 / 649 (37.3)	0.88 (0.70 - 1.11)	0.98 (0.77 - 1.25)
Quartile 4	309 / 791 (39.1)	0.95 (0.76 - 1.19)	1.14 (0.90 - 1.44)
Complete course of betamethasone for lung maturity			
Quartile 1	30 / 554 (5.4)	1.0 (Reference)	1.0 (Reference)
Quartile 2	35 / 672 (5.2)	0.96 (0.58 - 1.58)	1.10 (0.66 - 1.82)
Quartile 3	51 / 649 (7.9)	1.49 (0.93 - 2.37)	**1.85 (1.14 - 2.99)**
Quartile 4	48 / 791 (6.1)	1.13 (0.71 - 1.80)	1.49 (0.91 - 2.44)
Early preterm morbidity composite			
Quartile 1	26 / 573 (4.5)	1.0 (Reference)	1.0 (Reference)
Quartile 2	21 / 693 (3.0)	0.65 (0.36 - 1.19)	0.70 (0.38 - 1.28)
Quartile 3	33 / 675 (4.8)	1.05 (0.61 - 1.81)	1.19 (0.68 - 2.08)
Quartile 4	32 / 811 (3.9)	0.85 (0.49 - 1.46)	0.94 (0.54 - 1.66)
Respiratory Distress Syndrome or Transient Tachypnea of the Newborn			
Quartile 1	161 / 576 (28.0)	1.0 (Reference)	1.0 (Reference)
Quartile 2	160 / 700 (22.9)	0.76 (0.58 - 0.99)	0.79 (0.60 - 1.04)
Quartile 3	149 / 687 (21.7)	0.71 (0.54 - 0.92)	0.77 (0.58 - 1.02)
Quartile 4	160 / 818 (19.5)	0.62 (0.48 - 0.81)	**0.73 (0.55 - 0.96)**

Data are n / N (%), median (Q1 - Q3), or unless otherwise specified.
Early preterm morbidity composite = fetal or neonatal death, severe BPD (Grade 3), intraventricular hemorrhage (Grades 3-4), NEC (Bell 2A or greater), periventricular leukomalacia, retinopathy of prematurity (Stage III-V), proven sepsis (early and late) within 120 days of delivery

939 Stages of HPV Cervical Cancer Discerned by Integrated Host-viral Single-cell and Spatial Biology

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OBJECTIVE: Cervical cancer damages cervical integrity and may necessitate invasive surgical procedures that negatively impact the likelihood of future successful pregnancies. Over 99% of cervical cancer cases are associated with human papillomavirus (HPV). The temporal transition and spatial distribution of cellular subsets during cervical cancer progression provide valuable insights into HPV disease development. A recent study examined HPV-induced malignant transformation and immune remodeling with single-cell and spatial transcriptomics. However, viral gene expression was not directly assessed. Therefore, we hypothesized that host immune response programs successfully restrict, or fail to control, HPV gene expression in the cervix, ultimately correlating with cancer progression.

STUDY DESIGN: To address this hypothesis, we analyzed the single-cell and spatial transcriptomics data from HPV+ subjects with known clinical phenotypes (n= 9;) and aligned them to our custom HPV16 and human reference.

RESULTS: Out of the 88,743 total single-cell and spatial transcriptomes yielded 16 cell types and spatial niches, and we detected 4,710 transcriptomes with HPV gene expression (Fig. 1A). We identified 2,883 significant DEGs (Fig. 1B; $q< 0.05$) associated with controlling (28% of DEGs), or failing to control (72%), HPV. HPV gene expression correlated with high-grade intraepithelial lesions, specifically in a subset of epithelial cells. Host gene expression was significantly perturbed in a cervical cancer specimen and negatively correlated with HPV transcription (Fig. 1C). Restriction of HPV gene expression correlated with normal and cervical cancer phenotypes, and the gene signatures aligned with immune cell populations (Fig. 1D). Specifically, cervical cancer outcomes were associated with the B-to-plasma cell transition.

CONCLUSION: By integrative host-viral analyses, we identified gene signatures that may lead to potentially novel targets for therapeutic strategies combating HPV persistence and cervical cancer progression, which in turn may positively impact future pregnancies.

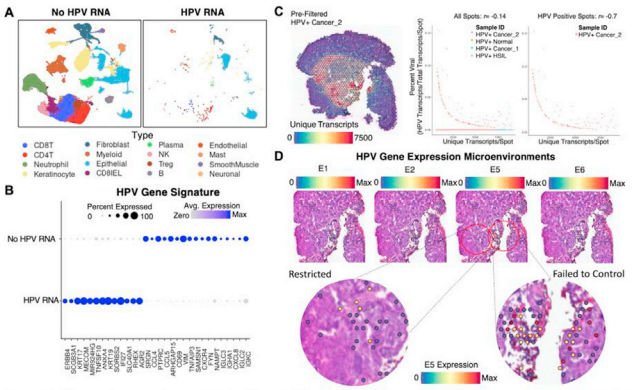

Figure 1. Microenvironments associated with restricting, or failing to control, HPV gene expression. A, UMAP split by HPV RNA detection labeled by single-cell type and spatial niche annotation. **B,** All transcriptomes were subject to differential expression analysis based on HPV gene expression status (positive for viral RNA or negative). Differential expression analyses identified 2,883 significant DEGs comparing transcriptomes with HPV RNA (72% of DEGs) or without (28%), including 1,580 DEGs that align to specific cell types. The top 30 markers of the HPV gene signatures are visualized by HPV status. **C,** Unique transcripts in the HPV+ Cancer_2 sample before applying standard QC filters removed 41% of the spatial transcriptomes. To determine if this was a biological or technical error, we correlated viral transcription with unique transcripts per spot in all 4,560 spatial transcriptomes or the 150 spots with virus, revealing a significant reduction in host gene expression in spots with viral transcription. **D,** Visualization of the 150 spots with HPV spatial gene expression detected. Insets zoom in on microenvironments where HPV gene expression was restricted, or the immune system presumably failed to viral gene expression.

940 Predictors of maternal morbidity among individuals at low-risk of postpartum hemorrhage

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OBJECTIVE: To identify risk factors for maternal morbidity among individuals categorized as low-risk for postpartum hemorrhage (PPH) according to ACOG Practice Bulletin (#183), a modification of the California Maternal Quality Care Collaborative (CMQCC) version 2 schema.

STUDY DESIGN: A case-control study of all singleton births between March 2020 and February 2022 at a single Level IV center. Individuals deemed at moderate or high risk for PPH according to the ACOG risk stratification and those with missing body-mass index (BMI) data were excluded. Cases were individuals who experienced maternal hemorrhagic morbidity, defined as a composite maternal hemorrhagic outcome (CMHO). Controls were individuals without the composite morbidity. Variables previously associated with maternal morbidity, not included in the ACOG stratification, were analyzed. Multivariable logistic regression was applied to identify factors independently associated with the outcome. The predictive values of the possible risk factors were assessed using a receiver operating characteristic (ROC) curve.

RESULTS: Of the 8,623 consecutive deliveries in the study period 3,465 (40%) met inclusion criteria, and among them 173 (5%) had a CHMO. Individuals with CHMO were older, had a higher BMI, and were more likely to be of Hispanic race/ethnicity, have diabetes mellitus, post-term pregnancy, and a large for gestational age newborn. In the multivariable analysis, all factors but diabetes remained significantly associated with the CHMO. The combined presence of any of these 3 risk factors was associated with a CHMO rate of 28% (13/46) and yielded a positive likelihood ratio of 7.50 (95% confidence interval [CI] 4.02-13.98; Table 1). The ROC curve generated an area under the curve of 0.63 (95% CI 0.62-0.65). Subgroup analyses of individuals that underwent either labor (3,022; 87%) or planned cesarean delivery (443; 13%) yielded similar results.

CONCLUSION: Among individuals identified with low-risk for PPH according to the ACOG risk stratification, several risk factors of maternal morbidity were identified, albeit of low predictive value.

Table 1. Composite maternal hemorrhagic outcome among parturients at low-risk

Risk factors [a]	All individuals (n)	CMHO [b] (n [%])	Sensitivity (95% CI)	Specificity (95% CI)	Positive LR (95% CI)	Negative LR (95% CI)
Total	3,465	173 (5.0)	--	--	--	--
None	1,821	60 (3.3)	--	--	--	--
At least one risk factor	1,644	113 (6.9)	65.3 (57.7-72.4)	53.5 (51.8-55.2)	1.40 (1.25-1.58)	0.65 (0.53-0.80)
At least two risk factors	374	51 (13.6)	29.5 (22.8-36.9)	90.2 (89.1-91.2)	3.00 (2.33-3.87)	0.78 (0.71-0.86)
At least three risk factors	46	13 (28.3)	7.5 (4.1-12.5)	99.0 (98.6-99.3)	7.50 (4.02-13.98)	0.93 (0.90-0.97)

CMHO, composite maternal hemorrhagic outcome; CI, confidence interval; LR, likelihood ratio.

[a] The possible risk factors included: maternal age ≥ 35 years, Hispanic race/ethnicity, body mass index at delivery ≥ 40 kg/m², post-term delivery ≥ 41.0 weeks, and large for gestational age (birthweight ≥ 90th percentile for gestational age, using nomogram published by Duryea EL et al.).

[b] The composite maternal hemorrhagic outcome included: blood loss ≥ 1000 mL, mechanical tamponade, use of surgical techniques (O'Leary, B-Lynch or uterine artery embolization) for atony, transfusion, venous thromboembolism, intensive-care unit admission, hysterectomy, or maternal death.

941 Single betamethasone dose for late prematurity and neonatal morbidity

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OBJECTIVE: Although the standard regimen for late preterm birth (LPTB) antenatal corticosteroids involves two doses of betamethasone given 24 hours apart, not all women remain pregnant long enough to receive a second dose. We sought to compare neonatal

morbidity among individuals at risk of LPTB following a single dose of betamethasone (BMZ) versus placebo.

STUDY DESIGN: We performed a secondary analysis of the ALPS trial (Gyamfi-Bannerman C. et al., NEJM; PMC4823164). All individuals enrolled in the parent trial that received a single dose of either BMZ or placebo were included. Individuals with randomization-to-delivery interval > 24 hours were excluded. Primary outcome was a composite of respiratory support at 72 h, including continuous positive airway pressure or high flow nasal cannula ≥ 2 h, oxygen with an inspired fraction of ≥ 30% for ≥ 4 h, or mechanical ventilation.

RESULTS: Of the 2,831 individuals in the parent trial, 1,083 (38%) met inclusion criteria; of them 539 (50%) received BMZ. The placebo and BMZ groups had similar clinical characteristics; rates of premature rupture of membranes (41% vs. 43%), spontaneous labor (50% vs. 50%), and cesarean delivery (18% vs. 17%) did not differ between groups. Age and race were balanced as well. Table 2 describes neonatal outcomes for the study population. Compared to placebo, the primary respiratory outcome was not lower among those who received a single BMZ dose (aRR 1.10, 95% CI 0.84-1.46). Furthermore, a single dose of BMZ was associated with neonatal hypothermia compared to placebo (aRR 1.55, 95% CI 1.07-2.26). Stratification by randomization-to-delivery intervals of 12-hour increments also showed no differences between groups.

CONCLUSION: In individuals with LPTB pregnancies who received betamethasone and delivered prior to a second dose, there were no differences in neonatal respiratory morbidities compared to placebo. Our analysis supports the concept that the optimal timing of benefit for BMZ is greater than 48 hours of administration.

Table – Neonatal outcomes.

Outcome	Placebo (N=544)	BMZ (N=539)	Adjusted RR [a] (95% CI)
Primary respiratory outcome [b]	14.7	15.6	1.10 (0.84-1.46)
CPAP / HFNC ≥ 2h	13.8	13.9	1.05 (0.79-1.41)
Inspired oxygen fraction ≥ 30% for ≥ 4 h	2.9	5.6	**1.98 (1.09-3.58)**
Mechanical ventilation	3.5	3.2	0.96 (0.50-1.83)
Severe respiratory complication [b,c]	12.1	12.1	1.05 (0.76-1.44)
CPAP / HFNC ≥ 12 continuous hours	10.8	10.4	1.01 (0.72-1.42)
Inspired oxygen fraction ≥ 30% for ≥ 24 h	2.0	2.2	1.11 (0.50-2.49)
Hypothermia (< 36.0 Celsius degrees)	7.5	11.3	**1.55 (1.07-2.26)**
Respiratory distress syndrome	5.9	8.2	1.46 (0.94-2.25)
NICU hospitalization	55.5	53.1	0.99 (0.90-1.10)

Data presented as %.

[a] Adjusted for gestational diabetes mellitus, gestational age at randomization < 35 weeks, and cesarean delivery.

[b] If occurred within the first 72 hours after birth.

[c] A severe respiratory complication was defined as any of the following: CPAP or high-flow nasal cannula for at least 12 hours, supplemental oxygen with a fraction of inspired oxygen of 0.30 or more for at least 24 hours, or mechanical ventilation.

CPAP, continuous positive airway pressure; HFNC, high flow nasal cannula; NICU, neonatal intensive care unit.

942 Periviable Outcomes stratified by Mode of Delivery

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OBJECTIVE: Periviable birth, defined by ACOG as delivery at 20 0/7 - 25 6/7 weeks is associated with high maternal and neonatal morbidity. Counseling regarding outcomes is typically based upon data from the Neonatal Outcome Trajectory Tool. We sought to obtain hospital specific data regarding outcomes stratified by mode of delivery (MOD) and gestational age (GA) to assist in counseling patients at risk of periviable birth.

STUDY DESIGN: Retrospective cohort study of all livebirths from 22 0/7- 25/ 6/7 at a single tertiary academic medical center, 2012-2021. The objective was to assess infant outcomes with periviable birth stratified by MOD and GA.

RESULTS: There were 207 periviable liveborn infants delivered during the study period. 144 (70%) delivered via cesarean and 63 (30%) by vaginal delivery with 98 infants surviving to discharge. Mean GA at delivery was 24 0/7 ± 0.8 weeks. Infants born by cesarean were less likely to survive to discharge (39.6% vs 65.1%, p=0.001; aRR 0.49, 95% CI 0.19-1.23). Multivariable regression estimating association between cesarean and survival was performed, adjusting for HTN disorders, birthweight, and indication for delivery. There was no significant association between cesarean section and survival. There were similar neonatal ICU lengths of stay (164 vs 187 days, p=0.329) and rates of neonatal morbidities including BPD, high grade IVH, cerebral palsy, and retinopathy of prematurity between delivery cohorts, however the rate of necrotizing enterocolitis following cesarean was lower (7.0 vs 22.5%, p=0.036) compared to vaginal delivery, see Table 1. There was high but similar rate of tracheostomy (28.1% vs 30.0%, p=1.0) and gastrostomy tube (36.8% vs 23.7%, p=0.260) placement in neonates delivered by cesarean and vaginal route respectively.

CONCLUSION: Within the study population, no statistically significant differences were observed for survival or postnatal complications between 22 0/7 and 25 6/7 weeks gestation based on MOD, other than a lower risk of necrotizing enterocolitis.

Neonatal interventions	**All (n=207)**	**Cesarean delivery (n=144)**	**Vaginal delivery (n=63)**	**p-value**
Discharged alive	98 (47.4)	57 (39.6)	41 (65.1)	0.001
Postnatal Outcomes	**All (n=98)**	**Cesarean Delivery (n=57)**	**Vaginal Delivery (n=41)**	**p-value**
NEC	13 (13.4)	4 (7.0)	9 (22.5)	0.036
Gastrostomy tube	30 (31.6)	21 (36.8)	9 (23.7)	0.260
Tracheostomy tube	28 (28.9)	16 (28.1)	12 (30.0)	1.000
Neonatal LOS (days)	174±111	164±95	187±131	0.329

943 Risk factors for surgical morbidity following unscheduled cesarean delivery

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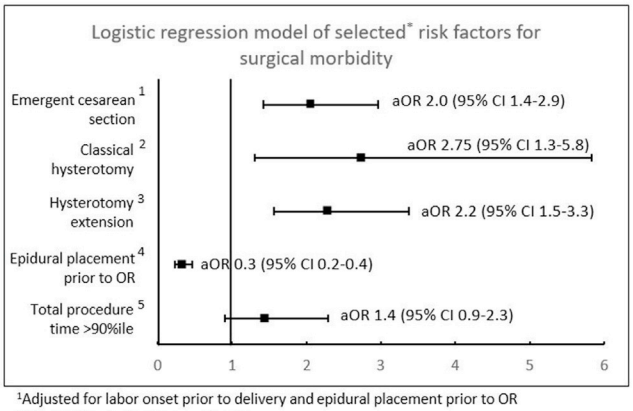
OBJECTIVE: Approximately one in three births in the United States is via cesarean delivery (CD). Unscheduled CD are associated with increased maternal morbidity. Our objective was to identify risk factors for maternal surgical morbidity at the time of unscheduled CD.

STUDY DESIGN: This is a case-control study of all patients delivering live, non-anomalous, singleton neonates by unscheduled CD at ≥37 weeks gestation from 2018-2021 at a single tertiary care center. Cases were patients with composite maternal surgical morbidity, defined as blood transfusion, intubation, postoperative ICU admission, bowel/bladder injury, wound complication requiring hospital encounter, and endomyometritis. Controls were patients who did not experience these measures of surgical morbidity. We compared baseline and

intraoperative characteristics between cases and controls using bivariate analyses and used multivariable logistic regression to identify factors independently associated with surgical morbidity.

RESULTS: Of 1025 patients who underwent unscheduled CD, 211 (20.1%) were cases complicated by serious surgical morbidity. In the regression model, emergent CD (aOR 2.06, CI 1.42-2.97), classical hysterotomy (aOR 2.75, CI 1.30-5.83), and hysterotomy extension (aOR 2.29, CI 1.56-3.38) were associated with surgical morbidity, while epidural placement prior to operating room (OR) transfer was associated with decreased morbidity (aOR 0.46, CI 0.34-0.63). Other factors including BMI, cesarean section history, comorbidities, labor characteristics (rupture of membranes, cervical dilation, and labor arrest) and operative times were not associated with surgical morbidity.

CONCLUSION: Emergent delivery, classical hysterotomy, and hysterotomy extension are risk factors for surgical morbidity associated with unscheduled CD. Neuraxial anesthesia placement prior to OR transfer is protective against maternal morbidity, identifying a potential opportunity to modify risk in patients at high risk of unscheduled CD.



[1]Adjusted for labor onset prior to delivery and epidural placement prior to OR
[2]Adjusted for hysterotomy extension
[3]Adjusted for second stage cesarean section
[4]Adjusted for labor, general anesthesia, emergent procedure
[5]Adjusted for classical hysterotomy and hysterotomy extension
*Other clinical factors including maternal BMI, cesarean section history, comorbidities, labor characteristics, and operative times were not associated with maternal morbidity

944 Physical activity during pregnancy. A step-by-step towards reduced rate of C-sections

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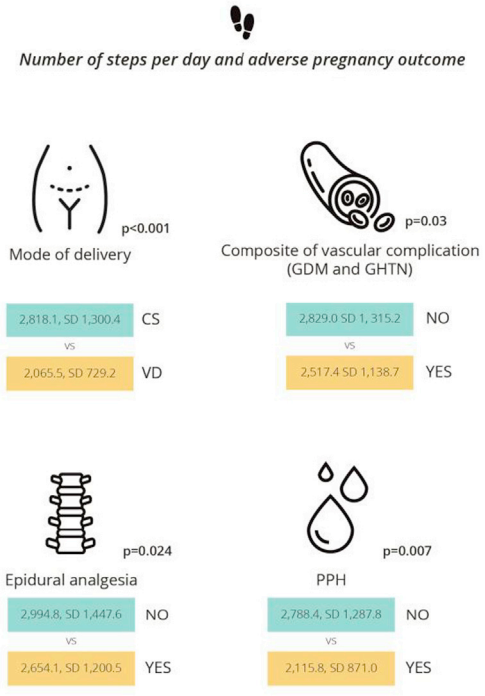
OBJECTIVE: This study explores the association between maternal physical activity, as indicated by the number of steps taken daily during pregnancy and adverse pregnancy outcomes.

STUDY DESIGN: A prospective observational study in a tertiary center (January-July 2023). Only women with singleton pregnancies attempting vaginal delivery were included. The number of steps taken during gestation (STDG) was measured using validated phone apps. Regression models and correlation tests investigated the association between the mean number of STDG and perinatal outcomes. Results were adjusted for age, parity, body mass index, medical and obstetric history. The primary outcome was mode of delivery. The secondary outcomes included adverse neonatal and maternal complications.

RESULTS: A total of 401 patients met the inclusion criteria. We observed a gradual decrease in maternal physical activity as pregnancy progressed (mean of 3,184, 2,700, and 2,152 daily steps in the first trimester, mid-pregnancy, and third-trimester, respectively). The overall incidence of intrapartum cesarean section (CS) was 10.5%. More active patients (higher mean daily steps during gestation) had a significantly lower incidence of CS (2,818.± 1,300.4 vs. 2,065.± 729.2 steps, p< 0.001). The area under the ROC curve, with a cut-off set at 2,093.5 daily steps, was 0.694 (95% CI, 0.615−0.773), resulting in a significant risk reduction in the CS rate (odd ratio of 0.22, 95% CI 0.104-0.465). More active patients also showed: 1. reduced composite outcome of gestational diabetes, gestational hypertension and pre-eclampsia; 2. epidural analgesia use; 3. and postpartum hemorrhage (figure 1). Preterm birth, labor induction, neonatal weight, and neonatal intensive care unit admission were not significantly affected.

CONCLUSION: Increased physical activity during pregnancy, as reflected by a higher STDG, significantly improves perinatal outcome, including decreased rates of C-section, gestational hypertension, gestational diabetes, epidural use, and postpartum hemorrhage. Maintaining an active lifestyle during pregnancy should be strongly encouraged.



The mean number of steps per day and pregnancy outcome are presented. SD, standard deviation; PPH, postpartum hemorrhage; GDM, gestational diabetes mellitus; GHTN, gestational hypertension; VD, vaginal delivery; CS, cesarean section.

945 The effect of COVID-19 pandemic on pregnancy outcomes – A Population-Based study

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OBJECTIVE: The COVID-19 pandemic affected the entire world, and numerous countries implemented various measures to reduce the

spread of the virus. Challenging times characterized by heightened stress levels, limited access to healthcare resources, and strained healthcare systems might lead to adverse pregnancy outcomes. We aimed to evaluate the impact of COVID-19 on the incidence of preterm birth and other adverse pregnancy outcomes.

STUDY DESIGN: A population-based, provincial-level, retrospective study of all individuals who gave birth in hospitals in Ontario, Canada, during January-December 2020. The comparator group included all individuals who delivered between January 2017 and December 2019. The primary outcomes were preterm birth (PTB) < 37 weeks of gestation. Additionally, we analyzed several secondary maternal outcomes, including PTB at different gestational ages, preeclampsia, HELLP syndrome, eclampsia, and perinatal morbidity. Secondary analysis was performed by geographical area (rural/urban), and annual quartiles.

RESULTS: Overall, 116,244 births were included in the study group, and 363,650 in the control group. Delivery during the pandemic was not found to be associated with PTB. Yet, it was associated with a higher risk for neonatal morbidity (aRR 1.06, CI 1.04-1.08) and gestational diabetes (aOR 1.07, 95% CI 1.05-1.10), and a lower risk for preeclampsia and eclampsia (aRR 0.90, 95% CI 0.86-0.95 and RR 0.68, 95% CI 0.53- 0.87, respectively) (Table). Secondary analysis by quartiles and geographical distribution did not yield any significant standardized differences.

CONCLUSION: The COVID pandemic was not associated with an increased risk of preterm birth, but it was associated with an increase in neonatal morbidity and gestational diabetes.

Table 1: Relative risk of selected outcomes before and after Jan 1st 2020

Outcome	Jan 2020-Dec 2020 (N=116,244)	Jan 2017-Dec 2019 (N=363,650)	Adjusted RR (95%-CI)*
PTB < 37 weeks	8,933 (7.57)	27,937 (7.57)	1.00 (0.98, 1.02)
PTB < 34 weeks	2,038 (1.73)	6,486 (1.76)	0.99 (0.94, 1.04)
PTB < 32 weeks	1,130 (0.96)	3,557 (0.96)	1.01 (0.94, 1.08)
PTB < 28 weeks	466 (0.39)	1,490 (0.40)	1.01 (0.91, 1.13)
PTB < 26 weeks	273 (0.23)	928 (0.25)	0.94 (0.82, 1.08)
Preeclampsia	1,740 (1.50)	5,506 (1.51)	0.90 (0.86, 0.95)
Preeclampsia<37 weeks	649 (0.56)	1,957 (0.54)	0.95 (0.88, 1.04)
Eclampsia	77 (0.07)	340 (0.09)	0.68 (0.53, 0.87)
HELLP syndrome	156 (0.13)	491 (0.14)	0.93 (0.78, 1.11)
GDM	11,090 (9.54)	31543 (8.67)	1.07 (1.05, 1.10)**
Neonatal morbidity***	13,747 (11.65)	40041 (10.85)	1.06 (1.04, 1.08)

*Adjusted for maternal age, nulliparity, pre-pregnancy BMI, smoking, pre-existing diabetes and pre-existing hypertension.

**Adjusted for maternal age, nulliparity, pre-pregnancy BMI, smoking and preexisting hypertension.

***Composite severe morbidity defined as any of the following: admission to neonatal intensive care unit (NICU) > 24 hours, 5-minutes Apgar score <5, respiratory distress syndrome or need for mechanical ventilation and hypoxic ischemic encephalopathy.

946 Single hypoglycemic value during oral glucose tolerance test

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OBJECTIVE: The American College of Obstetricians and Gynecologists (ACOG) defines Gestational Diabetes Mellitus (GDM) as ≥ 2 abnormal values during Oral Glucose Tolerance Test (OGTT) and suggests that 1 abnormal value may also be sufficient for diagnosis. Abnormal values are usually considered as hyperglycemia, while the significance of hypoglycemia remains uncertain. We sought to evaluate whether single hypoglycemic value during OGTT is comparable to a single hyperglycemic value.

STUDY DESIGN: This was a retrospective cohort study conducted in a single tertiary medical center during the years 2021-2022. We included patients with singleton pregnancies who had a single abnormal value, either high or low, during OGTT, with the 3 remaining values being normal. We compared birth outcomes between patients with a single hyperglycemic value (hyperglycemia group) and patients with a single hypoglycemic value (hypoglycemia group). Hypoglycemia was defined as plasma glucose ≤ 70 mg/dL at any value, while hyperglycemia was defined according to Carpenter and Coustan criteria. The primary outcome was the rate of small for gestational age (SGA) and large for gestational age (LGA) infants at delivery. Secondary outcomes included mode of delivery, postpartum hemorrhage (PPH), neonatal intensive care unit (NICU) admission, and length of hospital stay.

RESULTS: Three hundred and seventy-three patients were included in the analysis, 186 in the hypoglycemia group and 187 in the hyperglycemia group. The rate of SGA and LGA were comparable between the groups, and so was the mode of delivery. Hypoglycemia was associated with greater gestational age at delivery and higher mean birthweight. Other obstetric and neonatal outcomes including mode of delivery were similar. (Table 1).

CONCLUSION: A single hypoglycemic value during OGTT leads to similar rates of LGA and SGA, and could be considered equally abnormal as hyperglycemia.

Table 1 – Group Characteristics and Study Outcomes:

	Hypoglycemia group (N=186)	Hyperglycemia group (N=187)	P-value	OR (95% CI)
Maternal age			0.915	1 (1 - 1)
Mean (SD)	32.4 (4.96)	32.3 (5.05)		
Median [Min, Max]	32.0 [21.0, 52.0]	32.0 [22.0, 52.0]		
Gestational age (weeks)			0.025	1.2 (1 - 1.4)
Mean (SD)	39.3 (1.47)	39.0 (1.47)		
Median [Min, Max]	39.4 [28.1, 41.5]	39.1 [32.0, 42.4]		
Induction of labor	52 (28.0%)	53 (29.4%)	0.551	0.9 (0.5 - 1.4)
Normal GCT	33 (17.7%)	14 (7.5%)	0.002	3 (1.5 - 5.9)
GCT value			<0.001	1 (1 - 1)
Mean (SD)	141 (25.7)	156 (18.7)		
Median [Min, Max]	144 [48.0, 196]	157 [94.0, 197]		
GCT hyperglycemia	86 (46.2%)	112 (59.9%)	<0.001	0.3 (0.2 - 0.6)
SGA	3 (1.6%)	6 (3.2%)	0.502	0.5 (0.1 - 2)
LGA	35 (18.8%)	33 (17.6%)	0.79	1.1 (0.6 - 1.8)
Birth weight (grams)			0.007	1 (1 - 1)
Mean (SD)	3440 (423)	3310 (504)		
Median [Min, Max]	3480 [1270, 4230]	3280 [1900, 4860]		
Cesarean section	50 (26.9%)	61 (32.6%)	0.258	0.8 (0.5 - 1.2)
PPH	7 (3.8%)	13 (7.0%)	0.165	0.5 (0.2 - 1.3)
Shoulder dystocia	2 (1.1%)	4 (2.1%)	0.437	0.5 (0.1 - 2.6)
Admission to discharge (days)			<0.001	0.7 (0.6 - 0.8)
Mean (SD)	3.05 (1.05)	3.66 (1.65)		
Median [Min, Max]	2.94 [0.840, 9.76]	3.19 [1.38, 13.2]		
Delivery to discharge (days)			<0.001	0.6 (0.5 - 0.8)
Mean (SD)	2.60 (0.920)	3.14 (1.50)		
Median [Min, Max]	2.46 [0.800, 9.72]	2.75 [1.30, 12.1]		
NICU	2 (1.1%)	5 (2.7%)	0.45	0.4 (0.1 - 2.2)

Numbers are mean (SD), median or n (%).

Abbreviations: GCT – Glucose Challenge Test (50 grams), SGA – Small for Gestational Age, LGA – Large for Gestational Age, CS – Cesarean Section, PPH – Post Partum Hemorrhage, NICU – Neonatal Intensive Care Unit

947 Placental complications in patients with Mullerian anomalies

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OBJECTIVE: Mullerian anomalies are associated with adverse pregnancy outcomes and specifically preterm deliveries. However, scarce data exists regarding placental complications. This study aimed to determine whether women with Mullerian anomalies have a higher rate of placental complications.

STUDY DESIGN: A retrospective population-based cohort study was conducted comparing placental complications in women with and without Mullerian anomalies. We evaluated all deliveries that occurred between the years 1991 and 2021 at a tertiary medical center. Multiple gestations and chromosomal abnormalities were excluded. Multiple logistic regression models were used to control for confounding variables.

RESULTS: During the study period, 356,356 deliveries met inclusion criteria, 0.4% (n=1283) of whom were diagnosed with Mullerian anomalies. Placental complications, including placenta previa, placenta accreta, placental abruption, residua and also the need for blood transfusion were significantly more prevalent in women with Mullerian anomalies (Table). Using multiple logistic regression models, Mullerian anomalies were found as an independent risk factor for placenta previa (adjusted OR 1.82; 95% confidence interval(CI) , 1.12-2.97; p< 0.001), placenta accreta (adjusted OR 1.66 ; 95% CI, 1.01-2.74; p=0.004), abruption (adjusted OR 2.66 ; 95% CI, 1.84- 3.86; p< 0.001), residua (adjusted OR 1.43; 95%, (1.01- 2.03); p=0.002) and receiving blood transfusion (adjusted OR 1.47; 95% CI, 1.05-2.06; p< 0.001; Table), while controlling for maternal age and gestational age.

CONCLUSION: Mullerian anomalies are associated with placental complications. Women with Mullerian anomalies should receive meticulous care during pregnancy and delivery to address potential placental complications.

Table: Placental complications of women with and without Mullerian anomalies

Placental abnormality and adverse effect	Mullerian Anomalies n= 1283 (0.4%)	No Mullerian Anomalies n= 355073 (99.6%)	OR (95% CI)	Adjusted OR (95% CI)[a]
Placenta previa (N, %)	20 (1.6)	1446 (0.4)	3.87 (2.48-6.04)	1.82 (1.12-2.97)
Placenta accreta (N, %)	16 (1.2)	1967 (0.6)	2.27 (1.38-3.72)	1.66 (1.01-2.74)
Placental abruption (N, %)	36 (2.8)	1820 (0.5)	5.6 (4.01-7.83)	2.66 (1.84- 3.86)
Residua (N, %)	33 (2.6)	5262 (1.5)	1.76 (1.24-2.48)	1.43 (1.01- 2.03)
Blood transfusion (N, %)	37 (2.9)	5349 (1.5)	1.014 (1.01- 1.02)	1.47 (1.05-2.06)

[a] Adjusted for maternal age, and gestational age (in weeks).

948 Postpartum health-care utilization and blood pressure control by antihypertensive agent in hypertensive disorders of pregnancy

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OBJECTIVE: To evaluate rates of postpartum hospital readmission and emergency room (ER) utilization for individuals with a hypertensive disorder of pregnancy (HDP) after discharge on labetalol versus nifedipine XL.

STUDY DESIGN: We evaluated outcomes associated with antihypertensive at discharge in a cohort of postpartum individuals delivering from 4/2019-6/2023 at a single institution. Individuals were included who were diagnosed with hypertension (HTN) in pregnancy (including chronic HTN), were discharged on labetalol or nifedipine XL and were enrolled in our institution's remote blood pressure (BP) management program. Individuals were excluded if they were prescribed antihypertensives antenatally. We compared demographics, inpatient and outpatient BP and clinical outcomes between groups. The primary outcome was postpartum hospital readmission within 8 weeks of delivery. Multivariate logistic regression models adjusted for age, self-identified race, BMI and type of HTN.

RESULTS: 1775 individuals were included; 694 (39.1%) were discharged on labetalol and 1081 (60.9%) on nifedipine XL. Those discharged on labetalol had higher BMIs and higher rates of chronic HTN. Maximum postpartum outpatient systolic BPs were higher in those discharged on labetalol compared to nifedipine (BP 149±15 v 147±13, p=0.03); conversely, maximum diastolic BPs were lower for those on labetalol (BP 96±9 v 98±9, p=0.0002). Compared to individuals discharged on labetalol, those discharged on nifedipine were less likely to have a postpartum hospital readmission (7.3% v 4.3%, p=0.001). In multivariate logistic regression models, discharge on nifedipine was associated with an aOR 0.51 (95%CI 0.31-0.83) decreased odds of postpartum hospital readmission. These findings were similar when stratified by type of HDP (no chronic HTN: aOR 0.54 (95%CI 0.29-0.98); chronic HTN: aOR 0.46 (95%CI 0.20-1.06).

CONCLUSION: Despite minimal differences in peak postpartum BPs, discharge on nifedipine was associated with less postpartum hospital readmission following a HDP compared to discharge on labetalol, which was robust across type of HDP.

Table 1. Patient Characteristics by Antihypertensive Agent

	Labetalol (N=694)	Nifedipine XL (N=1081)	p-value
Age (yrs)	31 ± 6	30.8 ± 6	0.51
Primiparous (%)	352 (50.7%)	524 (48.5%)	0.36
Early pregnancy BMI (kg/m2)	29.4 [24.7, 36.7]	28 [23.3, 33.8]	0.001
Self-identified race			0.001
Caucasian	536 (77.2%)	687 (63.6%)	
Black	110 (15.9%)	323 (29.9%)	
Asian	22 (3.2%)	32 (3%)	
Other	26 (3.7%)	39 (3.6%)	
Insurance status			
Commercial	405 (58.4%)	569 (52.6%)	0.11
Medicaid/Medicare	280 (40.3%)	494 (45.7%)	
Self-Pay/Other	9 (1.3%)	18 (1.7%)	
Gestational diabetes (%)	80 (13.3%)	116 (10.6%)	0.60
Chronic hypertension (%)	219 (31.6%)	205 (19%)	<0.001
Mode of delivery (%)			
Spontaneous vaginal delivery	311 (44.8%)	541 (50%)	
Cesarean delivery	383 (55.2%)	540 (50%)	0.03
Mean pre-delivery inpatient systolic blood pressure (mmHg)	137 ± 9	137 ± 10	0.95
Mean pre-delivery inpatient diastolic blood pressure (mmHg)	83 ± 8	83 ± 9	0.26
Maximum post-delivery inpatient systolic blood pressure (mmHg)	166 ± 16	166 ± 14	0.63
Maximum post-delivery inpatient diastolic blood pressure (mmHg)	106 ± 12	108 ± 13	0.03
Hospital readmission postpartum	51 (7.3%)	46 (4.3%)	0.001
Emergency room visit postpartum	72 (10.4%)	119 (11%)	0.67

949 Pregnancy outcomes in people with spinal cord injury

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OBJECTIVE: To understand the obstetrical and neonatal outcomes of people with spinal cord injury (SCI).

STUDY DESIGN: This is part of an international observational questionnaire examining reproductive and urogenital health outcomes in people with SCI. It was developed with input from people with SCI, and distributed electronically in four languages in collaboration with social media and SCI organizations. Self-identified people over the age of 18 who were assigned female at birth were included. This study assessed key obstetrical and neonatal outcomes in this population. Descriptive analysis was used.

RESULTS: Responses were received from 33 countries; the recruitment rate was 85.4% (1056/1237) and the completion rate was 73.8% (780/1056). Of these, 216 people reported having 392 pregnancies following SCI, 5 of which were twin pregnancies. There were 265 live births, 3 stillbirths, 71 miscarriages, 38 terminations, 3 ectopics and 17 people who were currently pregnant. Of the pregnancies resulting in live births and stillbirths, there were 99 cesarean sections and 161 vaginal births, 3 did not report mode of delivery. Preterm birth (PTB) occurred in 64/263 (24.3%) of pregnancies ending in births. Bladder infections occurred in 80/263 (30.4%), kidney infection in 16/263 (6.1%), hospital admission in 44/263 (16.7%) and ICU admission in 5/263 (1.9%) of pregnancies ending in births. 39/263 (14.8%) pregnancies resulted in NICU admission.

CONCLUSION: This is the largest and most detailed assessment to date of pregnancy outcome in people with SCI. It supportsa previously reported concern for a risk of PTB in this population, as well as high incidence of bladder and kidney infections, and hospital admission. This information is of value to people with SCI who are contemplating pregnancy or are currently pregnant, and the physicians who care for them. Although the majority of pregnancies resulted in term, vaginal deliveries, this study suggests a need for future research into the causes of, and ways to prevent PTB and urologic infection in people with SCI, as well as possible links between these two outcomes.

950 Maternal and neonatal outcomes of implementation of a computer-based software for intrapartum glucose management

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OBJECTIVE: The objective of the present study was to determine whether rates of neonatal hypoglycemia and maternal glucose levels differed among patients managed with conventional insulin dose calculation versus Glucommander insulin management software.

STUDY DESIGN: Outcomes pre- and post-implementation of Glucommander were analyzed. Inclusion criteria included type 1, type 2, or gestational diabetes, prenatal care at our center after 26 weeks of gestation, and vaginal delivery. Maternal characteristics including age, body mass index, type of diabetes, and third trimester treatment were obtained. Percentages of values in euglycemic (100-140 mg/dL), target (70-110 mg/dL pre- / 100-140 mg/dL post-intervention), hypoglycemic (less than 70 mg/dL), and hyperglycemic (greater than 140 or 180 mg/dL) ranges were calculated. Neonatal data points used in analysis included gestational age at delivery, delivery weight, initial neonatal glucose reading, and neonatal intensive care admission. Analyses included t-test and Chi-square.

RESULTS: 108 pregnancies met inclusion criteria in pre-intervention group and 39 in post-intervention group. Summary of findings is presented in table 1. Total time in target glycemic range and rates of maternal hyperglycemia were similar between groups. Severe neonatal hypoglycemia was significantly less common among patients managed with Glucommander (p=0.034) with no difference in NICU admissions for hypoglycemia. In sub-analyses of pre-term and term deliveries, greater incidence of maternal hypoglycemia was observed among patients delivering after 37 weeks managed with conventional insulin drip (4.29 vs 0.99 %, p =0.005). In ANCOVA analysis accounting for gestational age, association between mode of insulin dosing and neonatal glucose remained significant.

CONCLUSION: Glucommander insulin management software shows similar time in target glucose range compared with conventional insulin drip dosing with lower rates of maternal hypoglycemia in term patients. Lower rates of neonatal hypoglycemia were noted with no difference in rates of neonatal intensive care admission due to low blood glucose.

951 Preeclampsia in patients with adult congenital heart disease

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OBJECTIVE: To determine the rate of hypertensive disorders of pregnancy (HDP) among women with adult congenital heart disease (ACHD).

STUDY DESIGN: This is a retrospective cohort study performed using the National Inpatient Sample Database from the Healthcare Cost

and Utilization Project from 2017-2019. ICD-10 codes were used to identify subjects with and without ACHD for comparison. Subjects with delivery encounters associated with their admission were included. Subjects were excluded if gestational age was unknown or < 20 weeks. 2,214,562 patients were included in the analysis, 2,409 (0.1%) of whom had ACHD. Baseline characteristics and the presence and type of HDP in the two groups were compared via t-tests, chi-squared analysis, and logistic regression analysis.

RESULTS: Those with ACHD were more likely to be younger, non-Hispanic white, obese, tobacco users, or to have diabetes or a hypertensive disorder. They were less likely to have public insurance and more likely to deliver at large, private, and urban teaching hospitals. ACHD was associated with increased rates of HDP; HDP affected 16.4% of subjects with ACHD vs. 12.0% of subjects without ($p< 0.001$). When stratifying by type of HDP, the difference between the two groups was only statistically significant for severe HDP − preeclampsia with severe features (3.2% vs. 2.3%, p=0.003), superimposed preeclampsia with severe features (2.7% vs. 1.0%, $p< 0.001$), and HELLP/eclampsia (0.9% vs. 0.3%, $p< 0.001$) − not for gestational hypertension or preeclampsia without severe features (6.8% vs 6.1%, p=0.177 & 1.9% vs 1.7%, p=0.411). In adjusted analysis, subjects with ACHD remained more likely than non-ACHD subjects to have any HDP (aOR 1.23, 95% CI 1.10-1.38), superimposed preeclampsia with severe features (aOR 1.77, 95% CI 1.33-2.37), and HELLP/eclampsia (aOR 2.46, 95% CI 1.60-3.79) compared to non-ACHD subjects.

CONCLUSION: Pregnant patients with ACHD have an increased risk for HDP and are specifically at higher risk for development of superimposed preeclampsia with severe features and HELLP/eclampsia compared to patients without ACHD.

Adult congenital heart subjects compared to non-ACHD subjects

	OR (95% CI)	aOR (95% CI)*
Any hypertensive disorder of pregnancy	**1.44 (1.29-1.60)**	**1.23 (1.10-1.38)**
Gestational hypertension	1.12 (0.95-1.31)	1.02 (0.87-1.21)
Preeclampsia without severe features	1.27 (0.91-1.77)	1.23 (0.87-1.74)
Preeclampsia with severe features	1.40 (1.12-1.76)	1.21 (0.95-1.53)
Superimposed preeclampsia	**2.78 (2.18-3.55)**	**1.77 (1.33-2.37)**
HELLP/eclampsia	**2.73 (1.79-4.15)**	**2.46 (1.60-3.79)**
Preeclampsia - unspecified	1.13 (0.84-1.51)	1.10 (0.81-1.48)

*Controlled for age, race/ethnicity, obesity, tobacco use, diabetes, chronic hypertension, asthma, anemia, insurance, zip code population and income, hospital size and ownership

952 The association of sociodemographic differences with clinical management following a diagnosis of short cervix

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OBJECTIVE: To evaluate the association of sociodemographic (SD) factors and related systemic bias with variation in clinical management following diagnosis of a short cervix.

STUDY DESIGN: Secondary analysis of a randomized trial in which singletons with a cervical length (CL) ≤ 20 mm were randomized to pessary vs. usual care. We assessed recommendations for vaginal progesterone (vag P), additional CL surveillance, pelvic rest, bedrest, and cerclage. Additional CL assessment was discouraged and cerclage allowed only for cervical dilation; activity modification and vag P were at provider discretion. SD factors were race and ethnicity, marital status, employment status, years of education, and type of insurance. Multivariable regression models examined the association between each SD factor and recommendation adjusting for other SD factors, CL at enrollment, clinical center, and treatment arm; odds ratios and 95% CI were determined.

RESULTS: Of the 446 patients (82% of 544 enrolled) with at least one post enrollment visit, 95.5% received vag P, 28% had additional CL assessment, 55.8% were on pelvic rest, 19.5% on activity restriction, and 7.4% had cerclage. The high rate of vag P usage precluded evaluation of association with SD factors. Non-Hispanic Black and Hispanic patients had lower odds of repeat CL assessment compared with Non-Hispanic White patients (aOR 0.47, 95% CI 0.24, 0.91; aOR 0.45, 95% CI 0.21, 0.99, respectively). No other SD factors were associated with repeat CL (Table 1). Patients with private insurance, but no other SD factor, had higher odds of pelvic rest recommendation (aOR 2.08, 95% CI 1.25, 3.45). None of the examined SD factors were associated with recommendations for bedrest or cerclage.

CONCLUSION: Non-Hispanic Black and Hispanic patients were less likely to have a repeat CL assessment following diagnosis of a short cervix and pelvic rest was more likely to be recommended to patients with private insurance. Variation in the frequency of these interventions raises questions about differences in intervention use based on race and ethnicity and insurance coverage.

Surveillance and sociodemographic factors in the management of patients with short cervical length

	Progesterone Use (n=426)	Repeat CL Ultrasound (n=125)		Pelvic Rest (n=249)		Bedrest (n=87)		Cerclage (n=33)	
	n (%)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)
Race and ethnicity									
Non-Hispanic White (n=98)	96 (98.0%)	36 (36.7)	ref	60 (61.2)	ref	19 (19.4)	ref	10 (10.2)	ref
Non-Hispanic Black (n=208)	193 (92.8%)	51 (24.5)	**0.47 (0.24, 0.91)**	106 (51.0)	0.74 (0.42, 1.29)	38 (18.3)	1.03 (0.52, 2.03)	11 (5.3)	0.58 (0.21, 1.60)
Hispanic (n=99)	96 (97.0%)	25 (25.3)	**0.45 (0.21, 0.99)**	57 (57.6)	0.80 (0.41, 1.56)	22 (22.2)	1.30 (0.58, 2.87)	7 (7.1)	0.96 (0.30, 3.06)
Asian/ American Indian/ Other/ not reported/unknown (n=41)	41 (100%)	13 (31.7)	0.62 (0.25, 1.54)	26 (63.4)	0.97 (0.43, 2.18)	8 (19.5)	0.94 (0.36, 2.48)	5 (12.2)	1.54 (0.44, 5.38)
Married / living with partner									
Yes (n=275)	264 (96.0%)	72 (26.2)	0.59 (0.33, 1.05)	163 (59.3)	1.08 (0.67, 1.72)	59 (21.5)	1.34 (0.74, 2.42)	23 (8.4)	0.86 (0.33, 2.24)
No (n=171)	162 (94.7%)	53 (31.0)	ref	86 (50.3)	ref	28 (16.4)	ref	10 (5.9)	ref
Employed									
Yes (n=300)	289 (96.3%)	81 (27.0)	0.93 (0.53, 1.62)	166 (55.3)	0.72 (0.45, 1.15)	62 (20.7)	1.12 (0.63, 2.02)	21 (7.0)	0.60 (0.25, 1.45)
No (n=146)	137 (93.8%)	44 (30.1)	ref	83 (56.9)	ref	25 (17.1)	ref	12 (8.2)	ref
More than 12 years of school									
Yes (n=277)	268 (96.8%)	71 (25.6)	0.74 (0.41, 1.34)	162 (58.5)	0.98 (0.60, 1.59)	61 (22.0)	1.62 (0.89, 2.96)	24 (8.7)	1.32 (0.49, 3.52)
No (n=169)	158 (93.5%)	54 (32.0)	ref	87 (51.5)	ref	26 (15.4)	ref	9 (5.3)	ref
Private insurance									
Yes (n=237)	229 (96.6%)	67 (28.3)	1.07 (0.58, 1.97)	150 (63.3)	**2.08 (1.25, 3.45)**	49 (20.7)	0.83 (0.45, 1.53)	22 (9.3)	1.43 (0.52, 3.92)
No (n=209)	197 (94.3%)	58 (27.8)	ref	95 (47.4)	ref	38 (18.2)	ref	11 (5.3)	ref

Models adjusted for race and ethnicity, marital status, employment, education, medical payment, cervical length at enrollment, clinical center, and treatment group.

953 Quantitative blood loss and hemorrhage risk in patients taking antepartum SSRI and aspirin

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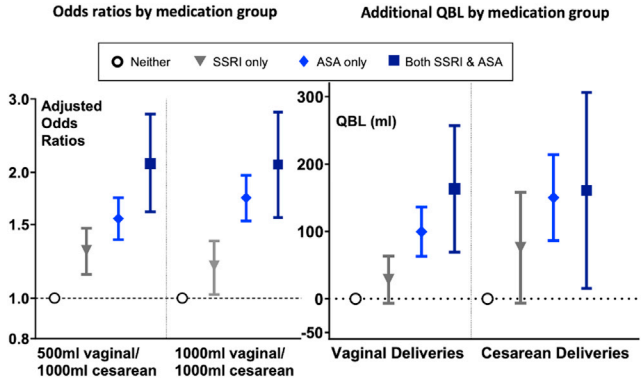
OBJECTIVE: Studies have shown taking an SSRI and an NSAID together increases the risk of bleeding events in other disciplines. The objective of this study was to investigate whether a similar relationship exists with SSRI and aspirin use and post-partum bleeding.

STUDY DESIGN: This was an IRB-approved retrospective chart review conducted at a single academic center. Data was abstracted from a total of 17,512 pregnancies between 2018 and 2023. Patients were characterized based on their medication use in pregnancy as documented in the electronic medical record.

RESULTS: Of these patients 1,283 took an SSRI alone, 1,541 took aspirin alone and 232 took both an SSRI and aspirin antepartum. Pre-delivery hemorrhage risk scores between groups showed high risk scores of: 26.5% neither medication, 28.7% SSRI only, 34.4% aspirin only, and 26.4% SSRI and aspirin. For patients with a vaginal delivery our analysis showed that patients taking an SSRI and aspirin

had the highest average quantitative blood loss (QBL) with a mean of 492 mL. This relationship remained in a model adjusting for maternal age, parity, and gestational age (p=0.001). This group also had highest QBL in those with cesarean delivery, with average QBL of 928.5 mL. This relationship remained significant in our adjusted analysis. In all delivery types, patients taking aspirin and SSRI were most likely group to have a QBL > 500 for vaginal delivery and >1000 for cesarean delivery, in both an adjusted and unadjusted model (rate 38.8%, adj OR 2.10, 1.61-2.76, p< 0.001). A similar result was seen when looking at QBL > 1000 for all delivery types (adj OR 2.09, 1.56-2.79, p< 0.001).

CONCLUSION: Patients taking an SSRI and aspirin in pregnancy had the highest average QBL, regardless of mode of delivery and were the most likely group to experience a post-partum hemorrhage in both unadjusted and adjusted models. Our study shows patients taking SSRI and aspirin may be at an increased likelihood of post-partum hemorrhage. Knowing this relationship can allow providers to appropriately counsel and monitor these patients during their delivery and in the post-partum period.



954 Second trimester fetal growth restriction and small for gestational age

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OBJECTIVE: Among individuals with fetal growth restriction (FGR) diagnosed in the mid second trimester (18-24 weeks), we assessed risk factors and associated outcomes with and without small for gestational (SGA).

STUDY DESIGN: This was a single center retrospective study (1/2018 – 2/2021) of singletons with FGR (estimated weight [EFW] and/or abdominal circumference [AC] < 10th percentile for gestational age, Hadlock) identified at 18 – 24 weeks' with reliable estimated delivery date. We compared maternal and pregnancy characteristics as well as outcomes in pregnancies that were SGA (< 10% birth weight, by Fenton) versus not SGA (10-99% birthweight). We excluded anomalous gestations and those without delivery outcomes. Primary outcome was a composite neonatal outcome including neonatal intensive care unit admission (NICU), respiratory distress syndrome, mechanical ventilation, continuous positive airway pressure, hypoglycemia or neonatal death prior to discharge. Secondary outcomes included other neonatal and maternal outcomes.

RESULTS: During the study period, 28,703 ultrasounds were performed between 18 – 24 weeks' gestation, with 398 (1.4%) singleton gestations diagnosed with FGR. 159 patients (39.9%) met all inclusion criteria. Of these, 78 (49.1%) were not SGA at delivery and 81 (50.9%) were SGA. Maternal characteristics were similar between groups. Those with SGA at delivery were more likely to have EFW ≤ 3rd percentile at diagnosis than those not SGA. The primary outcome occurred more frequently in those SGA at delivery (24.7% not SGA vs. 52.9% SGA, p < 0.001), likely driven by gestational age difference at delivery. Maternal hypertensive disorders of pregnancy occurred more frequently in those SGA (17.9% not SGA vs. 33.3% SGA; p=0.03).

CONCLUSION: 1 in 2 patients diagnosed with FGR at 18 – 24 weeks' gestation will be SGA at delivery. Fetuses diagnosed with FGR having an EFW ≤ 3rd percentile are more likely to be SGA at delivery. These pregnancies are also more likely to be associated with maternal hypertensive disorders of pregnancy.

Table. Fetal growth restriction in second trimester

Characteristic	Not small for gestational age (n = 78)	Small for gestational age (n= 81)	P value
Diagnostic Ultrasound Descriptors			
Gestational age at first diagnostic ultrasound	21.1 ± 1.43	20.9 ± 1.28	0.55
FGR by EFW <10% at diagnosis	50 (86.2)	85 (83.3)	0.82
FGR by EFW ≤ 3% at diagnosis	21 (27.3)	45 (55.6)	**<0.001**
FGR by AC <10% at diagnosis	24 (41.4)	48 (47.1)	0.51
FGR by both EFW and AC at diagnosis	16 (27.6)	33 (32.4)	0.60
Abnormal Doppler (UA, MCA or CPR) at diagnosis [a]	8 (16.3)	16 (30.2)	0.10
Delivery Characteristics			
Gestational age at delivery	37.5 ± 3.6	34.4 ± 5.4	**<0.001**
Preterm Delivery < 37 weeks	13 (16.7)	32 (39.5)	**0.002**
Preterm Delivery < 34 weeks	8 (10.3)	24 (29.6)	**0.003**
Intrauterine fetal demise	1 (1.3)	13 (16.0)	**0.001**
Neonatal and Maternal Outcomes			
Birthweight, grams	2752.8 ± 731	1781.9 ± 859	**<0.001**
Composite neonatal outcome	19 (24.7)	36 (52.9)	**<0.001**
NICU admission	16 (20.8)	32 (47.1)	**0.001**
Respiratory distress syndrome	7 (9.1)	10 (14.7)	0.31
Mechanical ventilation	5 (6.5)	8 (11.8)	0.38
Continuous positive airway pressure	9 (11.7)	11 (16.2)	0.48
Hypoglycemia	10 (13.0)	15 (22.1)	0.19
Neonatal death before discharge	1 (1.3)	2 (2.9)	0.60
NICU length of stay (days)	39.3 ± 65.8	33.4 ± 69.1	0.79
Hypertensive disorders of pregnancy[b]	14 (17.9)	27 (33.3)	**0.03**

Data reported in mean ± standard deviation or n (%) unless otherwise specified
Bolded if significant
FGR, fetal growth restriction; EFW, estimated fetal weight; AC, abdominal circumference; UA, umbilical artery; MCA, middle cerebral artery; CPR, cerebroplacental ratio; NICU, neonatal intensive care unit
[a]Doppler velocimetry not done at diagnosis for 57 patients
[b]Hypertensive disorders of pregnancy include gestational hypertension, preeclampsia with or without severe features, superimposed preeclampsia with or without severe features, and eclampsia

955 Second trimester fetal growth restriction with estimated fetal weight 3rd percentile or less

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OBJECTIVE: Among individuals with fetal growth restriction (FGR) diagnosed in the mid second trimester (18-24 weeks), we assessed risk factors and associated outcomes with estimated fetal weight (EFW) 3rd percentile or less versus 4 - 9th percentile at diagnosis.

STUDY DESIGN: This was a single center retrospective study (2018 - 2021) of singletons with FGR (estimated weight [EFW] and/or abdominal circumference [AC] < 10th percentile for gestational age, Hadlock) identified at 18 – 24 weeks' with reliable estimated delivery date. We compared maternal and pregnancy characteristics as well as outcomes in pregnancies that were EFW ≤ 3rd percentile at initial diagnosis versus 4 - 9th percentile. We excluded anomalous gestations and those without delivery outcomes. Primary outcome was small for gestational age (SGA, birthweight < 10th percentile, Fenton) with secondary outcomes including other neonatal and maternal outcomes.

RESULTS: During the study period, 28,703 ultrasounds were performed between 18 – 24 weeks' gestation, with 398 (1.4%) singleton gestations diagnosed with FGR. 160 patients (40.2%) met all inclusion criteria. Of these, 93 (58.1%) were EFW 4 - 9th percentile and 67 (41.9%) were EFW ≤ 3rd percentile. Maternal characteristics were similar between groups. Those with EFW ≤ 3rd percentile were more likely to meet criteria for FGR by AC and EFW than those with EFW 4 - 9th percentile (Table). The primary outcome of SGA was more likely in those with EFW ≤ 3rd percentile (38.7% EFW 4-9th % vs. 61.5% EFW ≤ 3rd %,Table). All intrauterine fetal demises occurred in those with EFW ≤ 3rd percentile. Maternal hypertensive disorders of pregnancy were similar between groups (Table).

CONCLUSION: Six in 10 fetuses with EFW ≤ 3rd percentile at mid-trimester ultrasound will be SGA and are at higher risk of intrauterine fetal demise than those meeting criteria for FGR with EFW 4 - 9th percentile.

Table. Fetal growth restriction in the second trimester by estimated fetal weight

Characteristic	EFW 4 – 9th % (n = 93)	EFW ≤ 3rd % (n= 67)	P value
Diagnostic Ultrasound Descriptors			
Gestational age at first diagnostic ultrasound	21.0 ± 1.32	21.1 ± 1.43	0.35
FGR by AC <10% at diagnosis	30 (32.3)	42 (62.7)	**<0.0001**
FGR by both EFW and AC at diagnosis	15 (16.1)	42 (62.7)	**<0.001**
Abnormal Doppler (UA, MCA or CPR) at diagnosis[a]	11 (18.0)	13 (30.2)	0.17
Delivery Characteristics			
Gestational age at delivery	37.3 ± 3.46	33.7 ± 6.0	**<0.001**
Preterm Delivery < 37 weeks	16 (17.2)	30 (44.8)	**<0.001**
Preterm Delivery < 34 weeks	9 (9.7)	24 (35.8)	**<0.001**
Intrauterine fetal demise	0 (0)	15 (22.4)	**<0.001**
Neonatal and Maternal Outcomes			
Birthweight, grams	2544.44 ± 722	1855 ± 1049	**<0.001**
Small for gestational age	36 (38.7)	32 (61.5)	**<0.001**
NICU admission	25 (26.9)	23 (44.2)	**0.04**
NICU length of stay	38.52 ± 66.17	31.17 ± 70.05	0.69
Respiratory distress syndrome	8 (8.6)	9 (17.3)	0.18
Mechanical ventilation	8 (8.6)	5 (9.6)	1.00
Continuous positive airway pressure	12 (12.9)	8 (15.4)	0.80
Hypoglycemia	13 (14.0)	12 (23.1)	0.18
Neonatal death before discharge	1 (1.1)	2 (3.8)	0.29
Hypertensive disorders of pregnancy[b]	22 (22.7)	23 (36.5)	0.06

Data reported in mean ± standard deviation or n (%) unless otherwise specified
Bolded if significant
EFW, estimated fetal weight; FGR, fetal growth restriction; AC, abdominal circumference; UA, umbilical artery; MCA, middle cerebral artery; CPR, cerebroplacental ratio; NICU, neonatal intensive care unit
[a] Doppler studies not done at diagnosis for 58 patients
[b] Hypertensive disorders of pregnancy include gestational hypertension, preeclampsia with or without severe features, superimposed preeclampsia with or without severe features, and eclampsia

956 The impact of cut-off values on the prevalence of short cervical length in pregnancy

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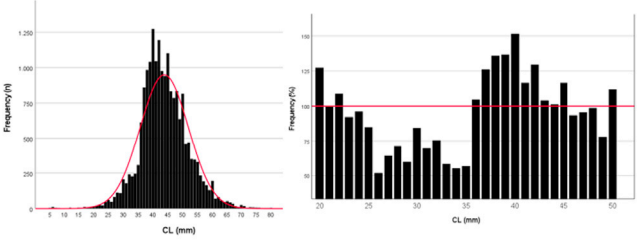
OBJECTIVE: Previous literature demonstrated that the use of a cut-off value may manipulate the distribution of cervical length(CL) measurements and introduce potential selection bias. Therefore, the objective of this study is to assess the distribution of CL using a cut off value for a short CL of ≤35mm.

STUDY DESIGN: This is a secondary analysis of the Quadruple P (QP) Screen study; a prospective cohort study that included low-risk women with singleton pregnancies undergoing fetal assessment at 18-22 weeks of gestation with a CL measurement. Women with a short cervix, defined as ≤35mm, were subsequently counseled for the QP trial; a multicenter randomized controlled trial that compared vaginal progesterone and cervical pessary in the prevention of preterm birth in women with a short cervix.

In this present study, normal distributions for CL were simulated based on mean and standard deviation (SD) of the original data. The Kolmogorov-Smirnov test was used to evaluate the distribution of the CL measurements.

RESULTS: The total cohort included 19.364 women who underwent CL measurement, with a total mean CL of 43.8mm (±8.1 SD). A total of 2031(10.5%) women had short cervix of ≤35mm. The observed distribution of all CL measurements was not normally distributed(P < 0.001; Figure 1A). When comparing the data to the simulated normal distribution, a decrease in the distribution of CL measurements was seen within the range of 26-35 mm. Conversely, CL measurements at ≤25 mm showed an increase compared to the normal distribution (Figure 1B).

CONCLUSION: In line with previous literature, we did find the use of a cut-off value for a short CL influences the CL distribution. The increase in CL measurements at ≤25mm appears to be influenced by the cut-off value for treatment with progestogens, while the measurements ≤35mm is influenced by the cut-off value for study eligibility. This study highlights the risk of selection bias and importance of measuring CL with caution when essential decisions are depending on a specific cut-off value for the CL.



A Distribution of cervical length (CL) measurement in total cohort (n=19.364) compared to simulated normal distribution (red line).

B. Number of cervical length(CL) measurements as a percentage of number of simulated CL measurements (red line).

957 The impact of gestational weight gain on total labor length among patients with obesity

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OBJECTIVE: Excessive gestational weight gain (GWG) and pre-pregnancy obesity are associated with decreased rates of spontaneous labor and increased cesarean birth. Current Institute of Medicine (IOM) guidelines establish a single recommendation for GWG in patients with obesity of all classes. We sought to assess the impact of increasing GWG on labor length and time from rupture of membranes (ROM) to vaginal delivery in patients with pre-pregnancy obesity undergoing induction of labor.

STUDY DESIGN: This retrospective cohort study included nulliparous, term, singleton, vertex presentation patients that underwent induction of labor at our institution between January 2020-May 2021 and had a vaginal delivery. Patients with pre-pregnancy BMI < 30 and who delivered via cesarean were excluded. GWG was calculated based on difference between pre-pregnancy weight and weight at delivery admission. Outcomes included total labor length (i.e., time of initial induction agent to delivery time) and ROM time (i.e., time of ROM to delivery). Univariable and multivariable linear regression models tested for the impact of severity of maternal obesity, gestational weight gain, and maternal age on mean differences in total labor length and ROM time.

RESULTS: Pre-pregnancy class of obesity was not a significant predictor of total labor length or ROM time. Conversely, increasing GWG was associated with increased total labor length in both adjusted and unadjusted models (Table 1). Increasing maternal age was also associated with increased labor length time in both models. GWG was not a significant predictor of ROM time when adjusting for other variables in the model. Models controlled for gestational age at delivery and neonatal birth weight.

CONCLUSION: Our data indicate that increasing GWG is a risk factor for longer labor inductions in the obese population. Class of obesity did not impact labor outcomes, reinforcing current IOM guidelines for patients with BMI > 30. These data also inform patient counseling on impact of GWG on labor timing. Future work should aim to create standardized induction protocols for patients with obesity.

Table 1. Mean differences in total labor length (in minutes) and time with ruptured membranes (in minutes) by maternal age, gestational weight gain, and class of obesity in patients with successful vaginal deliveries.

	N=240	Mean Difference in Total labor length (minutes)		Mean Difference in Time with Ruptured Membranes (minutes)	
	Mean (SD; min,max)	Unadjusted Mean difference (95% CI)	Adjusted** Mean difference (95% CI)	Unadjusted Mean difference (95% CI)	Adjusted** Mean difference (95% CI)
Age (years)	25.7 (5.7; 14,47)	13.4 (1.7-25.1)*	17.9 (6.4-29.4)*	6.7 (-1.5-15.0)	9.2 (1.3-17.1)*
GWG (lbs)	27.9 (18.7; -14,90)	3.9 (.4-7.5)*	4.7 (1.1-8.3)*	1.8 (-.7-4.3)	1.9 (-.6-4.4)
Pre-pregnancy BMI Categories ***					
Obese I	134 (55.8%)	-7.7 (-181.2-165.8)	-42.7 (-220.1-134.8)	-22.5 (-143.9-98.9)	-74.4 (-196.1-47.3)
Obese II	58 (24.2%)	111.0 (-90.2-312.3)	117.7 (-78.4-313.8)	39.6 (-101.2-180.4)	43.2 (-91.3-177.7)
Obese III	48 (20.0%)	ref	ref	ref	ref

*p<.05;

**Model controlled gestational age (weeks) and newborn weight (grams), which were not independent, statistically significant predictors of total labor length or time with ruptured membranes;

*** Pre-pregnancy BMI Categories: Obese I = Pre-pregnancy BMI ≥30-34.9, Obese II = Pre-pregnancy BMI ≥ 35-39.9, Obese III = Pre-pregnancy BMI ≥ 40

958 Pre-cerclage amniotic fluid glucose levels, white blood cell count and pregnancy outcomes

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OBJECTIVE: Exam-indicated cerclage (EC) is an important treatment for cervical insufficiency, with the goal of preventing preterm birth (PTB). Given the risk of intra-amniotic infection (IAI) with cervical dilation, amniocentesis may be considered prior to EC to rule out IAI. In addition to bacterial culture, commonly tested amniotic fluid components include white blood cell count (WBC) and glucose. However, the utility of these tests in predicting pregnancy outcomes has not been demonstrated.

STUDY DESIGN: A retrospective cohort study was conducted at a single academic center from 2015-2023. Patients undergoing amniocentesis prior to EC were identified. Multiples and patients with incomplete delivery data were excluded. Amniotic fluid was sent for gram stain, culture, WBC and glucose levels. Patients with positive culture did not proceed to cerclage. The primary outcome was gestational age (GA) at delivery. Spearman correlation was used to assess for correlation between amniotic fluid WBC or glucose and the primary outcome. WBC (< 20, ≥ 20) and glucose (≤ 14, > 14) were also analyzed categorically by t-test or Wilcoxon rank sum test.

RESULTS: 155 patients underwent EC. Of those, 77 proceeded with amniocentesis prior to EC. Median GA at diagnosis was 21.0 weeks (IQR 19.9-21.9). Median cervical dilation was 1.0cm (IQR 0.5-1.0). 21 patients (30.4%) had prolapsing membranes and 45 (61.6%) had intra-amniotic debris present prior to EC. Median amniotic WBC was 5.0 x10^3/uL (IQR 2.0-14.2) and mean glucose 36.5 mg/dL (SD 13.0). The median GA at delivery was 37.1 weeks (IQR 29.9-39.0). No correlation was found between either WBC (ρ=0.04, p=0.70) or glucose (ρ=-0.13, p=0.26) and GA at delivery. Assessed by group, patients with glucose ≤ 14 delivered later (p=0.03) than glucose > 14 (Table 1), though there was a limited number of patients in the ≤ 14 group.

CONCLUSION: In patients receiving EC, there is no statistically significant correlation between either amniotic WBC or glucose level and GA at delivery. In patients receiving cerclage, WBC and glucose may be of limited clinical utility in predicting pregnancy outcome.

Table 1. Amniotic fluid WBC and glucose level and gestational age at delivery

	WBC < 20 N = 59	WBC ≥ 20 N = 17	p	Glucose ≤ 14 N = 2	Glucose > 14 N = 75	p
Gestational Age at Delivery Median (IQR)	37.0 (29.1 - 39.0)	37.7 (35.1 - 38.9)	0.75	40.3 (40.0 - 40.6)	37.1 (29.5 - 39.0)	0.03

959 The association between cervical cerclage and offspring long-term neurological morbidity among twin pregnancies

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OBJECTIVE: The body of evidence does not support the efficacy of routine cerclage in multiple gestations, but it may be useful in patients with a history of cervical insufficiency or a short cervix.

Preterm delivery, commonly associated with twin pregnancies, was found to be linked to long-term neurologic impairment in the offspring. We aimed to study the association between twin pregnancies with and without cervical cerclage and the risk for offspring long-term neurological morbidity.

STUDY DESIGN: A population-based retrospective cohort study was conducted, comparing the long-term neurological morbidity among twins born after pregnancies with and without cervical cerclage, between the years 1991-2021 in a tertiary medical center. The study groups were followed until 18 years of age for neurological-related morbidity. Data for the diagnosis of neurological morbidity of the offspring was extracted from community-based clinics and hospitalization records. A Kaplan-Meier survival curve was used to compare cumulative incidence, and multivariable Cox proportional hazard model was used to adjust for confounders.

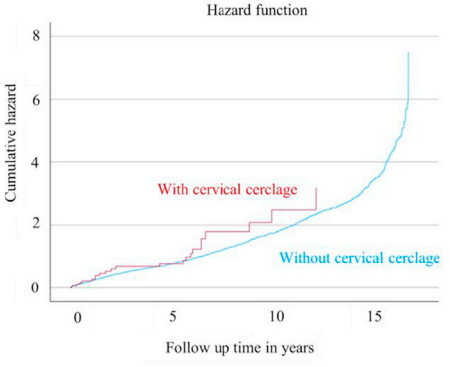
RESULTS: The study included 11,986 twins in which 180 (1.5%) were born in pregnancies with cervical cerclage. Being born after pregnancy with cerclage was not significantly associated with higher risk for neurological morbidity of the offspring (15.3% vs. 13.3% p=0.471, Table). Likewise, the cumulative incidence of long-term neurological morbidity was not significantly higher among twins born after pregnancies with cerclage (Kaplan-Meier survival curve, Log rank p=0.435, Figure). In the Cox proportional hazard regression model, after adjusting for gestational age at birth, being born after a pregnancy with cervical cerclage was not associated with long-term neurological morbidity (adjusted HR 1.16, 95% CI 0.77-1.73, p=0.467, Table).

CONCLUSION: Twins who are born after cerclage placement were not found to be in higher risk for long-term neurological morbidity.

The association between cervical cerclage and offspring long-term neurological morbidity among twin pregnancies; univariable analysis, Kaplan-Meier survival curve and Cox proportional hazard regression model

	Cervical cerclage (n=180) n (%)	Without cervical cerclage (n=11,806) n (%)	OR (95% CI)	P value	Adjusted HR* (95% CI)	P value*
Childhood neurological disease	24 (13.3%)	1,804 (15.3%)	0.85 (0.55-1.31)	0.471	1.16 (0.77-1.73)	0.467

*Adjusted for gestational age



960 Sonographic predictors of mirror syndrome in cases of hydrops fetalis

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OBJECTIVE: Mirror syndrome (MS), is a rare life-threatening condition in which a pregnant person develops edema, "mirroring" that of their hydropic fetus. Data is limited with less than 120 cases of MS described in the literature. This study sought to determine sonographic predictors for development of MS in cases of hydrops fetalis (HF).

STUDY DESIGN: Retrospective cohort study of participants with HF at our center from 2012-2023. Participant history, pregnancy outcome, and ultrasound data were obtained. MS was defined clinically as worsening edema in combination with new-onset hypertension, lab abnormality (proteinuria, anemia, thrombocytopenia, elevated liver enzymes) or symptoms (headache, visual changes or dyspnea secondary to pulmonary edema). All participants were classified as having a cardiogenic or non-cardiogenic etiology for HF, defined as presence of high cardiac output pathophysiology and evidence of cardiovascular compromise. Bivariate analyses were performed comparing those with and without MS, and logistic regression was used to evaluate the association of affected fetal fluid compartments, placental thickness ($\geq$ 4 cm in second or $\geq$ 6 cm in third trimester) and etiology of HF in those who developed MS.

RESULTS: Among 201 cases of HF, MS was diagnosed in 22/201 (10.9%). HF due to a cardiogenic etiology was more common in MS, 15/22 (68.2%) compared to HF without MS, 60/179 (33.5%, p=0.002). Of those with cardiogenic etiology for hydrops, 15/60 (20%) developed MS versus 7/119 (5.6%) who did not. Both pericardial effusion and placental thickening concurrently remained significantly associated with MS after adjusting for cardiogenic etiology and elevated blood pressure at time of diagnosis, aOR [95% CI]=43.8 [5.5-348.9], p=< 0.01.

CONCLUSION: The presence of both fetal pericardial effusion and placental thickening concurrently on ultrasound were significantly associated with the development of MS. Those with HF due to a cardiogenic etiology were nearly four times as likely to be complicated with MS, suggesting a potential common pathophysiology between fetal cardiovascular compromise and MS.

Table 1. Maternal demographics and rate of mirror syndrome in participants with hydrops fetalis, classified by etiology and fetal compartment.

	Mirror Syndrome (n=22)	No Mirror Syndrome (n=179)	*p* value
Maternal Demographics			
Maternal age (years)	33 [26-33]	33 [19-33]	0.43
Maternal race (white)	18/22 (81.8)	141/179 (78.8)	0.74
Nullipara	10/22 (45.5)	68/179 (38)	0.50
Maternal obesity	8/22 (36.4)	46/179 (25.7)	0.29
GA at diagnosis of hydrops	25.2 [18.3-32.7]	27.1 [10-38]	0.40
Chronic hypertension	4/22 (18.2)	9/179 (5)	**0.02**
Cardiovascular disease	1/22 (4.5)	3/179 (1.7)	0.36
Chronic pulmonary disease	1/22 (4.5)	16/179 (8.9)	0.48
Diabetes	0/22 (0)	17/179 (9.5)	0.13
Thyroid disease	4/22 (18.2)	8/179 (4.5)	**0.01**
Elevated blood pressure	15/22 (68.2)	11/179 (6.1)	**<0.01**
Preeclampsia	14/22 (63.6)	12/179 (6.8)	**<0.01**
Etiology of Hydrops Fetalis			
Cardiogenic	15/22 (68.2)	60/179 (33.5)	**0.002**
Fetal Compartment Affected			
Pericardial effusion	15/22 (68.2)	70/179 (39.1)	**<0.01**
Ascites	18/22 (81.8)	129/179 (72.1)	0.33
Skin edema	17/22 (77.3)	113/179 (63.1)	0.19
Polyhydramnios	7/22 (31.8)	61/179 (34.1)	0.83
Placental thickening	9/22 (40.9)	12/179 (6.7)	**<0.01**
Pleural effusion	12/22 (54.5)	97/179 (54.2)	0.97
Cystic hygroma	4/22 (18.2)	15/179 (8.4)	0.14
Pericardial effusion + Placental thickening	6/22 (27.3)	3/179 (1.7)	**<0.01**

Data reported as n(%). Minimum and maximum reported as n [ ]. Significance denoted by **bold** type.

961 Predictive value of neutrophil-lymphocyte ratio for intraamniotic infection in preterm premature rupture of membranes

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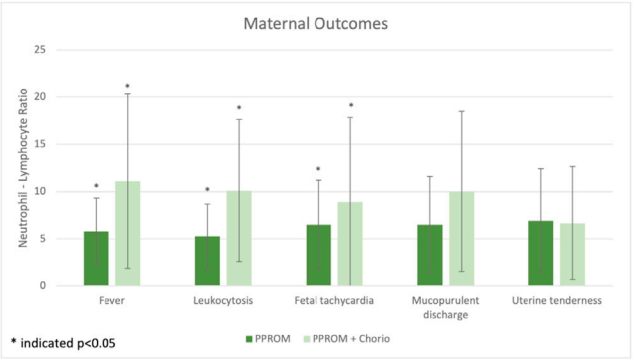
OBJECTIVE: The purpose of our study is to assess whether an elevated neutrophil-lymphocyte ratio (NLR) is associated with intraamniotic infection (Triple I) in patients with preterm premature rupture of membranes (PPROM) and subsequent adverse neonatal outcomes.

STUDY DESIGN: We conducted a retrospective cohort study focused on women diagnosed with PPROM before 34 weeks, with or without Triple I based on ICD-10 codes at a tertiary US hospital. The NLR was calculated from complete blood counts obtained prior to delivery. Triple I was defined as maternal temperature ≥39.0°C or 38.0−38.9°C accompanied by at least one additional clinical risk factor such as maternal leukocytosis, fetal tachycardia, mucopurulent discharge, or uterine tenderness. Fetal outcomes included respiratory distress syndrome, bronchopulmonary dysplasia, necrotizing enterocolitis, intraventricular hemorrhage, sepsis, and mortality. T-test was used to determine the association between NLR and intraamniotic infection and neonatal outcomes.

RESULTS: One hundred and thirty-three women were diagnosed with PPROM. Forty-six out of the 133 (34.6%) women were diagnosed with Triple I at the time of delivery. Patients diagnosed with triple I had higher mean NLR compared to PPROM patients without triple I *[p=0.026]*. Patients with fever had a significantly elevated NLR when compared to patients without fever *[mean: 11.1 vs 5.8, SD: 1.9 vs 0.4, p< 0.001]*. A similar trend was observed with maternal leukocytosis *[10.1 vs 5.3, 1.2 vs 0.4, p< 0.001]* and fetal tachycardia *[8.9 vs 6.5, 2.2 vs 0.5, p=0.111]*. However, an elevated NLR was not associated with mucopurulent discharge, uterine tenderness, or adverse neonatal outcomes in this population when controlled for gestational age.

CONCLUSION: Patients with PPROM and an elevated NLR have an increased risk of Triple I and should be closely monitored for symptoms. However, the NLR did not have any predictive value of adverse neonatal outcomes in this population.



962 Social determinants of health impact the development of new-onset postpartum hypertension

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OBJECTIVE: Hypertension (HTN) that is diagnosed postpartum (ppHTN) is understudied. Although more commonly diagnosed in women with hypertensive disorders of pregnancy (HDP), it can occur de novo postpartum (PP). There are no guidelines for BP surveillance after normotensive pregnancies; therefore, data on the incidence and risk factors for new-onset ppHTN is limited. We aimed to prospectively examine incidence and risk factors for ppHTN, and the impact of social determinants of health (SDoH).

STUDY DESIGN: We performed a secondary analysis of participants without chronic HTN or HDP (n=244) from the coronaVirus Impact on Birth Equity (VIBE) Study, which enrolled patients in 2022 from four hospitals in Philadelphia and New York City. Participants reported PP BP on a text-messaging platform for 90 days and provided demographic and SDoH information via survey. The primary outcome was Stage 1 or Stage 2 ppHTN defined as ≥2 BP ≥130/80 or receiving new medications or diagnosis of HTN within 12 weeks PP. We examined SDoH measures and their impact on ppHTN diagnosis including rent/food insecurity, housing status, education, gendered racial microaggressions during obstetric care, postpartum visit attendance, neighborhood racial-economic segregation, language, race, ethnicity, and nativity. Multivariable logistic regression was used to adjust for BMI, parity and age.

RESULTS: 71 (29.1%) participants met criteria for Stage 1 ppHTN, 5 (2.1%) met criteria for Stage 2 ppHTN, and 3 (1.2%) received new medication or diagnosis for HTN. Those in highly segregated neighborhoods were more likely to develop ppHTN compared to those in less segregated neighborhoods (unadjusted OR: 1.97, 95% CI: 1.07, 3.73). This finding was sustained after adjusting for BMI, parity, age, and all other SDoH (aOR: 2.21, 95% CI: 1.06, 4.64). The only other risk factor identified was BMI (aOR: 1.09, 95% CI: 1.04, 1.15).

CONCLUSION: In a diverse low-risk population, 32.4% of participants developed new-onset ppHTN. Higher BMI and living in highly segregated neighborhoods were significantly associated with the development of new-onset ppHTN.

Table 1. Multivariable logistic regression of SDoH and the development of postpartum stage I or II HTN.

	Unadjusted OR (95% CI)	Adjusted OR (95% CI)[a]
Social Determinants of Health		
Food Insecurity (High vs. low)	0.78 (0.35, 1.70)	0.86 (0.28, 2.61)
Rent Insecurity (high vs. low)	0.71 (0.35, 1.4)	0.78 (0.29, 2.09)
Housing Status		
Own	1.84 (0.79, 4.28)	1.58 (0.58, 4.32)
Do not currently have housing	1.08 (0.39, 2.95)	0.86 (0.28, 2.59)
Prefer not to answer	3.45 (1.31, 9.08)	3.98 (1.33, 11.93)
Rent	Reference	
Education Level		
Less than high school	0.63 (0.32, 1.22)	0.54 (0.23, 1.27)
High school or GED	1.56 (0.74, 3.28)	1.20 (0.48, 2.99)
Some college or above	Reference	
GRMOS (any vs. none)	1.19 (0.68, 2.08)	0.97 (0.51, 1.83)
Attendance at routine 6-week postpartum visit within hospital system		
No or unknown	0.94 (0.52, 1.71)	1.09 (0.54, 2.20)
Yes	Reference	
Language (Spanish vs. English)	0.44 (0.24, 0.84)	0.80 (0.26, 2.49)
Racial/economic segregation (High vs. Low)	1.97 (1.04, 3.72)	2.21 (1.06, 4.64)
Nativity (Foreign-born vs. US-born)	0.65 (0.38, 1.12)	0.95 (0.43, 2.11)
Race and ethnicity		
Black (non-Hispanic)	1.99 (1.07, 3.73)	1.02 (0.38, 2.76)
Asian (non-Hispanic)	1.00 (0.80, 4.55)	1.76 (0.49, 6.31)
Other, including multiple races/don't know/prefer not to answer	1.95 (0.79, 4.81)	1.48 (0.45, 4.82)
Hispanic/Latina	Reference	
Medical Characteristics		
BMI (continuous)	1.09 (1.05, 1.14)	1.09 (1.04, 1.15)
Maternal age (continuous)	1.01 (0.96, 1.05)	0.99 (0.93, 1.05)
Parity (Multiparous vs. Nulliparous)	0.91 (0.49, 1.70)	1.16 (0.58, 2.55)

a. Adjusted for BMI, parity, nativity, age, and mutually adjusting for all other SDOH factors (Food insecurity, rent insecurity, housing status, education level, GRMOS, attendance at 6-week postpartum visit, language, racial/economic segregation, race and ethnicity)

963 The impact of patient experiences and perceptions of pregnancy risk on postpartum follow up patterns

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OBJECTIVE: A significant proportion of severe maternal morbidity (SMM) occurs after delivery, but postpartum follow-up is challenged by low patient engagement. This study evaluated whether subjective perceptions of pregnancy risk and/or actual experiences of adverse outcomes impacts participation in postpartum follow up.

STUDY DESIGN: This prospective observational study at an urban, academic hospital enrolled a convenience sample of 500 consecutive postpartum patients (6-11/2022). Prior to postpartum discharge, we evaluated patients' perceptions of their own antenatal risk and experience of peripartum complication (via a survey using Likert scales) and compared these to risks and outcomes derived from the EHR (including obstetric co-morbidity index and SMM). The primary outcome was attendance at any visit with an obstetric provider within 6 weeks of delivery.

RESULTS: 501 patients participated [(60.7% Black, 6.5% Hispanic, median age 31 (IQR 26-34) median gestational age at delivery 39 wks (IQR 38-39)]. 40.6% delivered by cesarean and median obstetric co-morbidity index (OB-CMI) was 1 (IQR 0-3); 11.6% with high-risk score $\geq$ 6). 8 patients experienced SMM without transfusion [CDC definition] and 30 had a postpartum hemorrhage. 288 patients (57.5%) attended any visit within 6 weeks postpartum, 80.6% of which were 3-6 weeks postpartum and 64% virtual. There were no differences in attendance of a 6-week postpartum visit based on OB-CMI, incidence of SMM, or subjective descriptions of risk or pregnancy complications (Table).

CONCLUSION: Neither perceived risk nor actual complications impacted participation in postpartum care, suggesting that under-appreciation of pregnancy-related risk is not a primary driver of postpartum visit attendance. Efforts to optimize postpartum care delivery should target other factors that may contribute to suboptimal follow up, with specific focus on high-risk patients, to prevent morbidity over the extended postpartum period.

Table. Association of Patient OB-CMI score, Experience of SMM, and Perceptions of Risk Level and Personal Pregnancy Complications with Routine 6-Week Postpartum Follow Up

N (%)[a]	No 6-Week Postpartum Follow Up *N = 208*	6-Week Postpartum Follow Up *N = 288*	P-value
OB-CMI* score ≥ 6	21 (36.2)	37 (63.8)	0.35
Severe maternal morbidity (SMM) without transfusion**	3 (37.5)	5 (62.5)	0.80
Broader SMM definition*	16 (40.0)	24 (60.0)	0.80
Subjective "high risk pregnancy"+	61 (39.1)	95 (60.9)	0.39
Subjective "typical pregnancy"+	144 (44.6)	179 (55.4)	0.10
Subjective "pregnancy complications" +	70 (38.3)	113 (61.7)	0.20
Subjective "more complications than other people I know"+	36 (43.4)	47 (56.6)	0.77
Subjective "unexpected complications" +	76 (40.4)	112 (59.6)	0.59
Subjective "high volume of communication with doctors or ED/triage visits during pregnancy"+	41 (44.6)	51 (55.4)	0.57
Subjective "negative birth experience based on complications" ++	21 (38.2)	34 (61.8)	0.55
Subjective "complications put me at risk for a future pregnancy"+	44 (44.4)	55 (55.6)	0.57
Subjective "complications in my pregnancy would impact decision about having another pregnancy" ++	39 (41.9)	54 (58.1)	1.00
Subjective "complications in my pregnancy put me at risk for long-term health problems" +	17 (41.5)	24 (58.5)	0.95

[a] All percentages are row percentages
*Easter SR, Bateman BT, Sweeney VH, Manganaro K, Lassey SC, Gagne JJ, Robinson JN. A comorbidity-based screening tool to predict severe maternal morbidity at the time of delivery. Am J Obstet Gynecol. 2019 Sep;221(3):271.e1-271.e10. doi: 10.1016/j.ajog.2019.06.025. Epub 2019 Jun 20. PMID: 31229427.
**https://www.cdc.gov/reproductivehealth/maternalinfanthealth/smm/severe-morbidity-ICD.htm
*Broader SMM definition inclusive also of postpartum hemorrhage, endometritis, wound infection, transfusion, and re-operation
+Based on "top box" responses on the Likert scale (Agree or Strongly Agree)
++ Based on binary yes/no response

964 Pessary versus progesterone in singleton pregnant women with a short cervix: a randomized controlled trial

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OBJECTIVE: In women with a singleton pregnancy and a short cervical length (CL), cervical pessary and vaginal progesterone are both used in preterm birth (PTB) prevention. We performed a head-to-head comparison between these two treatments.

STUDY DESIGN: We conducted a multi-center, randomized clinical trial (NCT04300322) at three hospitals in Vietnam. Asymptomatic women with a singleton pregnancy and a CL $\leq$ 25mm (at 16-22 weeks) were randomized (1:1 ratio) to receive either an Arabin® cervical pessary or 200-mg vaginal progesterone daily. Primary outcome was PTB $<$ 37 weeks of any cause. Secondary outcomes were maternal and neonatal complications. We planned to recruit 804 women to assess a 10% absolute risk reduction in PTB $<$ 37 weeks (alpha-error 0.05, power 80%, 5% lost to follow-up). Analysis was by intention-to-treat. In view of the potential harm of pessary on

perinatal mortality and PTB < 28 weeks reported recently in two trials (NTR 4414; NCT02901626), our study was halted in June 2023.

RESULTS: Between May 2020 and May 2023, we randomized 301 women to pessary (N=150) and progesterone (N=151). Seven women withdrew consent and 13 were lost to follow-up, resulting in 281 women available from analysis (Arabin group N=139; progesterone group N=142). The primary outcome PTB < 37 weeks rate occurred in15.1% in the pessary group versus 14.1% in the progesterone group (RR 1.1, 95%CI 0.61 to 1.9). PTB < 28 weeks and perinatal death rates were almost doubled in the pessary group, although these differences did not reach statistical significance(7.9% versus 4.2%, RR 1.9, 95%CI 0.71 to 4.9 and 4.3% versus 2.8%, RR 1.5, 95%CI 0.44 to 5.3; respectively). Other secondary outcomes are presented in the Table.

CONCLUSION: In women with a singleton pregnancy and a CL ≤ 25 mm, pessary was not superior over progesterone in the PTB prevention and might increase the risk of perinatal death and PTB < 28 weeks.

	Arabin (*N=139*)	Progesterone (*N=142*)	Relative Risk (95% CI)	p-value
Primary outcome				
Preterm birth < 37 weeks, n(%)	21 (15.1)	20 (14.1)	1.1 [0.61;1.9]	0.81
Secondary outcomes				
Miscarriage, n(%)	0 (0)	2 (1.4)	-	-
Preterm birth < 34 weeks, n(%)	15 (10.8)	11 (7.8)	1.4 [0.66;2.9]	0.39
Preterm birth < 28 weeks, n(%)	11 (7.9)	6 (4.2)	1.9 [0.71;4.9]	0.21
Gestational age at delivery, mean (SD), weeks	37.1 (4.3)	37.5 (3.43)	-	0.41
Time from randomization to delivery, median (Q1;Q3), days	137 [118;150]	140 [124;153]	-	0.14
Onset of labor, n(%)	75 (53.6)	77 (55)	0.98 [0.79;1.2]	0.86
Mode of delivery, n(%)			0.99 [0.72;1.4]	0.94
C-section	90 (64.7)	90 (64.3)		
Vaginal delivery	49 (35.3)	50 (35.7)		
Maternal side effects				
Vaginal discharge, n(%)	35 (25)	7 (4.9)	5.1 [2.4;11]	< 0.001
Vaginal itching, n(%)	0 (0)	1 (0.7)	-	-
Vaginitis, n(%)	0 (0)	0 (0)	-	-
Vaginal discomfort, n(%)	0 (0)	0 (0)	-	-
Vaginal pain, n(%)	0 (0)	0 (0)	-	-
Necrosis or rupture of the cervix, n(%)	0 (0)	0 (0)	-	-
Pessary repositioning, n(%)	2 (1.5)	-	-	-
Perinatal outcomes				
Stillbirth <=28 weeks	3 (2.2%)	1 (0.7%)	3.06 [0.3;29.1]	0.4
Stillbirth >28 weeks, n(%)	0 (0)	0 (0)	-	-
Neonatal death <=28 weeks, n(%)	3 (2.1)	3 (2.1)	1 [0.21;5]	0.98
Neonatal death >28 weeks, n(%)	0 (0)	0 (0)	-	-
Perinatal death, n(%)[2]	6 (4.3)	4 (2.8)	1.5 [0.44;5.3]	0.52
Live birth, n(%)	136 (97.8)	139 (97.9)	1 [0.97;1]	0.98
Birth weight, mean (SD), g	2927 (732)	2984 (602)	-	0.48
Birth weight < 1500 g, n(%)	9 (6.4)	6 (4.2)	1.5 [0.56;4.2]	0.42
Birth weight < 2500 g, n(%)	20 (14.2)	16 (11.3)	1.3 [0.69;2.4]	0.44
5-min Apgar score, median (Q1;Q3)	9.00 [9.00;9.00]	9.00 [9.00;9.00]	-	0.43
5-min Apgar score < 7, n(%)	1 (0.7)	0 (0)	-	-
Admission to NICU, n (%)	19 (13.8)	18 (12.7)	1.1 [0.6;2]	0.79
Length of admission to NICU, median (Q1;Q3), days	7.00 [2.50;37.5]	9.50 [6.75;16.5]	-	0.52
Death before discharge, n(%)	0 (0)	1 (0.7)	-	-
Neonatal morbidity				
Respiratory distress syndrome, n(%)	15 (10.9)	13 (9.2)	1.2 [0.59;2.4]	0.64
Intraventricular haemorrhage, n(%)	1 (0.7)	0 (0)	-	-
Necrotizing enterocolitis, n(%)	2 (1.5)	0 (0)	-	-
Proven sepsis, n(%)	5 (3.6)	5 (3.6)	1 [0.3;3.5]	0.97
Composite of poor perinatal outcomes, n(%)	18 (12.9)	17 (12)	1.1 [0.58;2]	0.81

965 Predictive youtube video characteristics as indicators for adherence to accurate water birth guidelines

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OBJECTIVE: The accessibility of YouTube videos has made it a popular platform for seeking and sharing pregnancy advice, especially experiences related to "natural" delivery methods like water births. Therefore, it is important to understand which characteristics amassed more views as well as explore the relationship between characteristics and accuracy of information. We aim to assess what components of water birth YouTube videos are predictive of more accurate content with evidence based American College of Obstetricians and Gynecologists (ACOG) guidelines.

STUDY DESIGN: A YouTube search on "water birth" was conducted on 3/9/2023 with a new profile and private browser using the filter "most viewed". The first 100 videos were selected using a strict inclusion criteria, and video characteristics were recorded. Video views ranged from 457,296 to 78,035,874. Reviewers scored videos in accordance with published guidelines using the "ACOG Water Birth Rubric." Chi-square goodness-of-fit and independence tests were performed to assess significance of differences between groups.

RESULTS: Out of 96 videos,13.1% from North America were scored as accurate, versus 15% from other continents (p = 0.575). Only 14.4% of videos from personal channels were accurate, despite comprising 71.8% of all videos in the top 100. All videos from doulas and midwives scored neutral, and there were no videos from healthcare professionals with advanced degrees. Commercial videos had the highest amount of accurate videos at 16.6%. Videos with a supportive figure in the thumbnail had significantly less videos graded as inaccurate (3.5%) compared to those without (18%, p = 0.0003).

CONCLUSION: Patients use YouTube videos as a resource for pregnancy information, particularly for alternative birthing practices. North America has some of the most popular videos and personal channels that often deviate from ACOG guidelines. Our findings highlight an urgent need for healthcare professionals to guide patients towards evidence-based resources, especially for alternative birth practices, and contribute accurate and informative content on such platforms.

966 Seasonality and the causes of spontaneous preterm birth

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OBJECTIVE: The objective of this study was to investigate the relationship between the four seasons in the northern hemisphere and spontaneous preterm birth (SPB).

STUDY DESIGN: The retrospective study was performed between January 2009 and December 2021. The data of all electronic medical records were retrospectively reviewed in Konkuk University Medical Center, Seoul, Korea. Average temperature and humidity data were obtained from Korea Meteorological Administrations. We excluded the data from women with multi-fetal gestations, pre-eclampsia, gestational hypertension, oligohydramnios, polyhydramnios, GDM, any fetal anomalies, and medico-surgical illnesses that can cause preterm birth. The four seasons are defined as follows: spring (March, April, and May), summer (June, July, and August), fall (September, October, and November), and winter (December, January, and February). The SPB was defined as a fetus born before 36 weeks and 6 days of gestation. SPBs were grouped by the causes of preterm birth: incompetent internal os of the cervix (IIOC), spontaneous preterm labor (PTL), and preterm premature rupture of membranes (PPROM).

RESULTS: The SPB rate in relation to IIOC was highest in the summer and lowest in the fall. SPB incidence due to PTL was higher in the fall and winter. SPB incidence due to preterm premature rupture of membranes was highest in spring and summer.

CONCLUSION: The rate of SPB, by considering the etiologies, had different patterns based on the season. Therefore further studies related to seasonal patterns should consider the etiologies of SPB. The unique seasonal characteristics of the region are closed related to the pregnancy outcome of pregnant women, and further studies are required to help improve pregnancy prognosis.

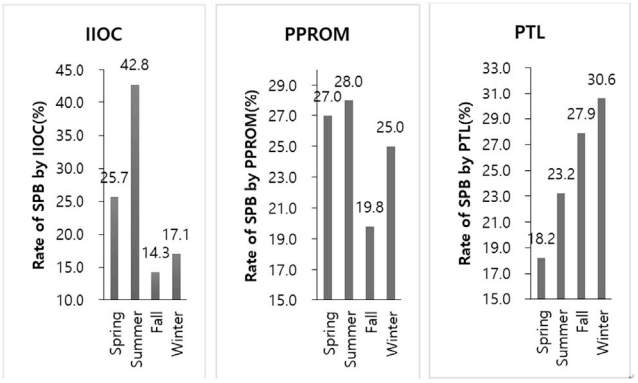
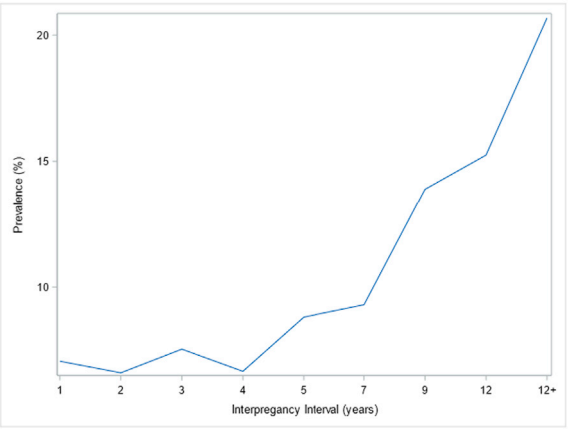


Figure 1 : Rate of cesarean delivery in patients with a prior vaginal delivery across increasing interpregnancy intervals



967 The risk for cesarean delivery after prior successful vaginal delivery according to interpregnancy interval

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OBJECTIVE: A history of vaginal delivery is the strongest predictor of future successful vaginal delivery. However, prolonged interpregnancy intervals may reduce the likelihood of success. We sought to determine the pregnancy interval at which the rate of cesarean delivery (CD) in the setting of a prior successful vaginal delivery approaches that of a nulliparous patient.

STUDY DESIGN: We performed a retrospective cohort study between 10/01/2007-12/31/2022. We included those with a successful vaginal delivery and a subsequent delivery-both of which needed to have occurred within our health system. We excluded those with a history of or planned CD, as well as any deliveries complicated by being multifetal or preterm. The primary outcome was the interpregnancy interval at which the rate of CD was similar to that of nulliparous patients. Within this time frame, there were 19,551 nulliparous patients with an overall CD rate of 26.4%. Interpregnancy intervals were grouped by years 1 to 12 and over. The risk of CD was adjusted for age and BMI of the subsequent pregnancy. Frequencies and percentages were used to describe categorical variables. The Cochran-Armitage test of trend was used to assess the rate of CD as the interpregnancy interval increased; the Kruskal Wallis Test was used for continuous variables. P-values <0.05 were considered significant.

RESULTS: 20,331 multiparous patients were included with an interpregnancy interval that ranged from 0.08 years to 22.6 years. The overall CD rate was 8.0%. There was a significant rise in the rate of CD as the interpregnancy interval increased from approximately 7% from years 1-4 to up to 21% at greater than 12 years, $p< 0.01$ (Figure 1).

CONCLUSION: As the interpregnancy interval increases past 4 years, there is a significant rise in the rate of CD; however, even at an interval of 12 years, this rate does not exceed that of a nulliparous patient.

968 Post-Partum Hemorrhage Morbidity Among Obese versus Non-Obese Individuals

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OBJECTIVE: Obesity in pregnancy has been an unclear risk factor for postpartum hemorrhage (PPH) risk stratification, and ACOG Obesity in Pregnancy (#230) suggests that body mass index (BMI) $\geq$40 kg/m^2 is a risk factor for atonic PPH only in vaginal deliveries. This study aimed to determine the effect of BMI $\geq$30 kg/m^2 on PPH.

STUDY DESIGN: This retrospective cohort study was conducted on all singletons $\geq$14 weeks with recorded BMI who delivered at a Level IV center for two consecutive years. The exposure group was subcategorized into BMI 30-39 and BMI $\geq$ 40 kg/m^2, with a planned subgroup looking at route of delivery. Data was collected by clinicians, and the composite maternal hemorrhagic outcome (CMHO) was defined as: blood loss $\geq$ 1000 mL, interventions for atony including use of uterotonics (excluding prophylactic oxytocin), mechanical tamponade, surgical intervention, venous thromboembolism, admission to the intensive care unit, hysterectomy, or maternal death. Adjusted relative risks (aRR) with 95% confidence intervals (CI) were calculated using multivariate Poisson regression with robust error variance.

RESULTS: Of 8,623 deliveries in the study period, 8,340 (96.7%) met inclusion criteria, with 2943 (35%) having BMI $<$ 30.0, 3,900 (46%) had a BMI of 30-39.9 kg/m^2, and 1497 (17%) had a BMI of $\geq$40 kg/m^2. CHMO was increased for BMI 30-39.9 (aRR 1.19, 95% CI 1.08-1.31) and $\geq$40.0 (aRR 1.22, 95% CI 1.09-1.38) (Table 1), largely due to increased risk of blood loss $\geq$ 1,000 mL (BMI 30-39.9: aRR 1.45, 95% CI 1.1901.75, BMI $\geq$40: aRR 1.67, 95% CI 1.35-2.07) and uterotonic use (BMI 30-39.9: aRR 1.24, 95% CI 1.11-1.4, BMI $\geq$40: aRR 1.37, 95% CI 1.04-1.59). A subgroup analysis of obese individuals and route of delivery noted that cesarean delivery compared to vaginal delivery among BMI 30-39.9 had an increased risk of CMHO in BMI 30-39.9 (aRR 1.61, 95% CI 1.41-1.85), but had no effect on BMI $\geq$40 (aRR 1.05, 95% CI 0.85-1.30).

CONCLUSION: Obese parturient had a higher risk of hemorrhage related morbidity compared to non-obese patients, with implications for counseling, risk stratification, and intervention trials

Table 1: Composite and Individual Maternal Hemorrhagic Outcomes

		BMI < 30 kg/m² (N=2,943)	BMI 30.0 - 39.9 kg/m² (N=3,900)	BMI ≥ 40 kg/m² (N=1,497)
Composite Maternal Hemorrhagic Outcome	n (%)	542 (18.4%)	866 (22.2%)	375 (25.1%)
	aRR* (95% CI)	REF	**1.19 (1.08-1.31)**	**1.22 (1.09-1.38)**
EBL or QBL ≥1000 mL	n (%)	141 (4.8%)	300 (7.7%)	166 (11.1%)
	aRR* (95% CI)	REF	**1.45 (1.19-1.75)**	**1.67 (1.35-2.07)**
Uterotonic use	n (%)	392 (13.3%)	622 (15.9%)	259 (17.3%)
	aRR* (95% CI)	REF	**1.24 (1.11-1.40)**	**1.37 (1.04-1.59)**
Mechanical Tamponade	n (%)	10 (0.3%)	17 (0.4%)	10 (0.7%)
	aRR* (95% CI)	REF	1.43 (0.65-3.14)	2.06 (0.84-5.06)
Surgical Technique**	n (%)	21 (0.7%)	48 (1.2%)	18 (1.2%)
	aRR* (95% CI)	REF	1.38 (0.83-2.30)	1.00 (0.54-1.88)
Transfusion	n (%)	128 (4.3%)	151 (3.9%)	52 (3.5%)
	aRR* (95% CI)	REF	0.82 (0.64-1.04)	**0.58 (0.42-0.81**
Hysterectomy	n (%)	13 (0.4%)	20 (0.5%)	10 (0.7%)
	aRR* (95% CI)	REF	1.11 (0.56-2.24)	0.98 (0.43-2.24)
VTE	n (%)	5 (0.2%)	5 (0.1%)	2 (0.1%)
	aRR* (95% CI)	REF	0.82 (0.23-2.85)	0.63 (0.12-3.26)
Admission to ICU	n (%)	20 (0.7%)	28 (0.7%)	14 (0.7%)
	aRR* (95% CI)	REF	1.10 (0.62-1.94)	1.05 (0.53-2.07)
Maternal death	n (%)	0 (0%)	2 (0.1%)	1 (0.1%)
	aRR* (95% CI)	REF	x (x)	x (x)

*Adjusted for age, race, marital status, smoking status, nulliparity, gestational age, and route of delivery

**O' Leary, B 'Lynch, Uterine Artery Embolization

BMI body mass index at delivery, aRR adjusted risk ratio, VTE venous thromboembolism, ICU intensive care unit

969 Prediction of adverse neonatal outcomes at the start of the second stage of labor

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OBJECTIVE: To develop a risk stratification for unexpected adverse neonatal outcomes at the start of the second stage of labor.

STUDY DESIGN: This is a retrospective cohort study of individuals at term who reached the second stage or labor and delivered at two hospitals between July 1, 2016, and June 30, 2020. The outcome was unexpected newborn complication, modeled after the Joint Commission metric. Predictor variables included only information that would be known at the start of the second stage, including maternal history, pregnancy characteristics, vital signs, and patterns observed in the nursing documentation of the fetal heart rate tracing (full list below Table). Data were divided into a training and testing sets. Multiple machine-learning variable selection techniques were compared, in addition to standard logistic regression modeling. Discrimination and calibration were assessed between models in the testing set. In the final model (chosen after comparing discrimination and considering parsimony), sensitivity, specificity, negative and positive predictive values were calculated for those in the top 10% and 5% of predicted probabilities in the testing set to better assess model performance.

RESULTS: 19,091 patients were included: 12,994 (68%) in the training and 6,097 (32%) in the testing sets. The prevalence of the outcome in both groups was 4.3%. Random forest, extreme gradient boosting, and Latent Dirichlet Allocation modeling approaches did not result in improved discrimination compared to the logistic regression model. The overall discrimination (AUC 0.65 (95%CI 0.62-0.69)) and calibration were poor, attributed to the rarity of the outcome. However, when examining performance among individuals predicted to be at the highest risk, the model identified patients with >2-3x increased risk of adverse neonatal outcomes.

CONCLUSION: A model constructed using information available at the start of the second stage can be used stratify patient risk for adverse neonatal events. Future work should focus on how this information could be presented and used in clinical practice to improve neonatal outcomes.

Performance of a Prediction Model of Adverse Neonatal Outcomes at the Start of the Second Stage of Labor

Model Characteristic	Predicted High Risk (Top 10%)	Predicted Very High Risk (Top 5%)
Sensitivity	28.3%	18.1%
Specificity	90.3%	95.5%
Positive Predictive Value	11.5%	15.2%
Negative Predictive Value	96.6%	96.3%

Logistic regression prediction model included the following terms:

1) Fetal heart rate tracing: number of observations of absent variability, presence of late decelerations, presence of variable decelerations, presence of minimal variability, presence of fetal tachycardia
2) Maternal characteristics: age, gestational age, BMI, height, hypertension, diabetes, obesity, prior vaginal deliveries, anxiety
3) Labor characteristics: length of labor, use of oxytocin, artificial rupture of membranes, epidural, provider type, presence of blood or meconium-stained amniotic fluid, number of exams, rate of dilation, station at start of second stage, max temperature

970 The effectiveness of a CD bundle with vaginal preparation, Cefazolin and Azithromycin in reducing infections

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OBJECTIVE: Recent data suggest that vaginal preparation and adjunctive macrolide administration reduce the risk of infectious morbidity in non-elective cesarean deliveries (CD). We aimed to evaluate the effectiveness of a CD bundle including preoperative vaginal preparation, Cefazolin and Azithromycin administration, as compared to Cefazoline alone, in reducing post-operative infections in CD performed in the second stage of labor.

STUDY DESIGN: As of August 2016, our departmental treatment protocol for prevention of infectious morbidity in second stage CD has been replaced from preoperatively IV 2g Cefazolin alone, to preoperatively IV 2g Cefazolin, IV 500 mg Azithromycin and vaginal preparation (vaginal wash with povidone-iodine). The medical records of all women who underwent CD during the second stage of labor were reviewed, comparing two time periods: 01.2014-08.2016 (control group, Cefazoline alone) and 11.2016-1.2021 (CD bundle group). Obstetric characteristics, post-op infections and neonatal outcomes were compared between the groups. Composite infectious morbidity was defined as the occurrence of one or more of the following: endometritis, surgical site infection (SSI), abscess, urinary tract infection and post-partum fever.

RESULTS: The CD bundle group (n=331) group had lower rates of endometritis, SSI, and composite infectious morbidity compared to the control group (1.2% vs 4.8%, p=0.03; 3.0% vs 7.1%, p=0.049, 6.9% vs 14.3%, p=0.014, respectively). Neonatal outcomes did not

differ between groups. Multivariable regression analysis adjusted for confounders revealed that the CD bundle reduced the risk for the composite infection outcome, with an adjusted OR of 0.30, (95% CI 0.09-0.92).

CONCLUSION: In second stage CD, the addition of preoperative Azithromycin and vaginal preparation to Cefazolin, is efficacious in reducing post-operative infections.

Table 1: Multivariable logistic regression analysis for the composite infection outcome

Variable	adjusted Odds Ratio	95% Confidence Interval	P-value
CD bundle compared to Cefazolin alone	0.30	0.09-0.92	0.036
Maternal age	0.97	0.87-1.08	0.600
Nulliparity	1.00	0.17-5.89	0.998
Gestational hypertensive disorders	0.98	0.10-9.54	0.985
Diabetes Mellitus[a]	0.88	0.16-4.78	0.884
Obesity (BMI>30 kg/m^2)	0.81	0.20-3.30	0.773
Time from rupture of membranes to delivery	0.97	0.88-1.07	0.531
Maternal anemia[b]	0.84	0.16-4.38	0.831
GBS carrier	0.55	0.10-2.93	0.485
Epidural anesthesia (compared to general anesthesia)	1.11	0.33-3.88	0.866

Factors included in the multivariable regression model were independent variables found significantly different between groups in the univariate analysis or thought to have a possible effect on infections rate. Results are reported as adjusted odds ratios and 95% confidence intervals.

[a]Diabetes mellitus includes pregestational and gestational diabetes

[b]Maternal anemia was defined as hemoglobin < 10 g/dL at admission

971 Race and quantitative blood loss in postpartum hemorrhage

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OBJECTIVE: Black patients are at a higher risk of morbidity and mortality from postpartum hemorrhage (PPH) than White patients in pregnancy. Inadequate estimation of blood loss (EBL) has been suggested as one possible contributing factor which could be mitigated with the adoption of quantitative blood loss (QBL). This study examined whether the transition from EBL to QBL impacted disparities in the magnitude of PPH. We hypothesized that the magnitude of PPH in Black patients with QBL would be higher, reflecting an underassessment with EBL.

STUDY DESIGN: A retrospective cohort study of pregnant patients with documented PPH during delivery at a tertiary safety-net hospital between 2019-2021; QBL was formally implemented at the institution in April 2020. PPH was defined as > 1000mL for C-sections and > 500mL for vaginal deliveries. Patients with chorioamnionitis, macrosomia, multiple gestation, treatment with magnesium, or other diagnoses that influence blood loss were excluded. Included patients underwent chart review for demographic information and documented blood loss. Wilcox rank sum testing and transformation of the outcome variable via natural logarithms with subsequent t-testing were performed comparing EBL to QBL for Black and White patients.

RESULTS: 429 patients were included. 192 patients delivered via C-section (50% Black) and 237 delivered vaginally (43% Black). When comparing QBL to EBL there was a statistically significant increase in average blood loss for C-sections in all patients. The difference was greater in Black (+167mL,p=0.004) versus white patients (+46mL,p=0.004). There was no statistically significant increase in average blood loss for spontaneous vaginal deliveries in Black (+34mL,p=0.5) or White women (-137mL,p=0.2).

CONCLUSION: While EBL tended to underestimate blood loss during C-sections for all patients, the difference was greater for Black patients. Objective tools such as QBL may impact disparities by reducing the potential for individual bias in patient assessment and should continue to be an important tool in PPH bundles of care.

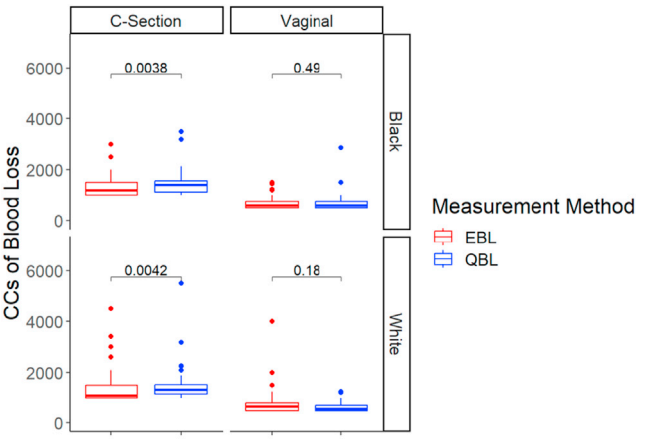

Figure 1. Estimated vs. quantitative blood loss stratified by race and delivery method.

972 Prolonged antepartum admission as an independent risk factor for perinatal depression in patients with PPROM

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OBJECTIVE: The objective is to assess antepartum length of stay (LOS) as an independent risk factor for postpartum depression (PPD). Preterm premature rupture of membranes (PPROM) is a known risk factor for PPD- little is known about the effects of prolonged hospitalization on maternal mental health, a widely practiced part of management in this population. If a relationship exists between prolonged hospitalization and PPD, providers may more easily identify patients at risk and offer interventions to improve maternal and neonatal outcomes.

STUDY DESIGN: This is a retrospective cohort study of patients admitted to a single hospital for PPROM from January 2018 to March 2023. Patients were stratified based on antepartum LOS and Edinburgh Postnatal Depression (EPDS) score in the immediate postpartum period were compared. Chart review collected data regarding comorbid maternal and neonatal complications. The following exclusion criteria were used**:** delivery at non-viable gestational age (less than 22 weeks 0 days for this study), beyond 34 weeks 0 days, and fetal demise. We used descriptive and inferential statistics to characterize the population and determine if a relationship exists between prolonged hospitalization and EPDS score in the postpartum period.

RESULTS: 168 patients were eligible for review. Average antepartum LOS was 9 days, average EPDS score was 5.1. Incidence of stay 7 days or greater was 43.4% and 21% of patients had EPDS score greater than 9, indicating moderate to severe symptoms. There was no

significant difference in the incidence of EPDS greater or equal to 9 based on LOS more than 7 days. (OR 0.79, 95% CI 0.37-1.69).

CONCLUSION: This study doesn't suggest a statistically significant relationship between prolonged LOS and EPDS score. Analysis shows prolonged LOS may be protective against depression, a direct opposition to the original hypothesis. Investigators reason this could be due to better neonatal outcomes associated with longer latency periods and delivery at later gestational ages. More studies reviewing larger samples are needed to fully assess this patient population.

973 Placental gene expression: histologic evidence of maternal vascular malperfusion and small for gestational age newborns

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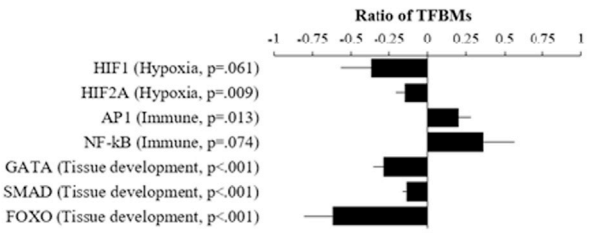
OBJECTIVE: Placental maternal vascular malperfusion (MVM) is a common pathologic histologic finding associated with adverse birth outcomes, including increased risk of delivering a small for gestational age (SGA, < 10% for GA) newborn. Measuring placental gene expression is an innovative approach to evaluate pathways that may increase SGA risk. We investigated differently expressed genes in MVM placentas from newborns with and without SGA.

STUDY DESIGN: This is a secondary analysis of a prospective randomized controlled trial of a racially diverse, low-income sample. Placentas were collected at delivery. A trained perinatal pathologist conducted histologic placental evaluations. Our sample included placentas with ≥1 MVM lesion. Placental genome-wide mRNA profiles were analyzed to identify transcripts showing >1.5-fold differential expression in SGA vs non-SGA newborns, controlling for potential confounders, including GA at delivery, hypertension, newborn sex, race/ethnicity, smoking, and first prenatal BMI. TELiS analyzed transcription factor activity.

RESULTS: Of 700 placentas assessed, 195 exhibited MVM. Among these, 32 (16.4%) delivered an SGA newborn. Bioinformatic analyses for participants with SGA newborns showed elevated activity of key pro-inflammatory signaling pathways (AP1↑15%, p=.013; NF-kB↑29%, p=.074) and unexpected reductions in hypoxia-signaling pathways (HIF1↓23%, p=.061; HIF2A↓10%, p=.009) (Figure 1). Exploratory results showed reduced activity of gene regulation pathways involved in tissue differentiation (GATA↑18%, p< .001; SMAD ↑9%, p< .001; FOXO↑35%, p< .001).

CONCLUSION: Participants with MVM lesions that delivered SGA newborns showed increased inflammatory pathway activity, decreased tissue differentiation and development pathway activity, and an unexpected decrease in hypoxia-associated pathways. These results suggest that inflammation and dysregulated tissue development may play a more prominent role than hypoxia in MVM associated with SGA newborns.

Figure 1. Differential Transcription Factor Activity in Placentas with Maternal Vascular Malperfusion that gave birth to a Small for Gestational Age newborn



X axis is the log2 ratio of transcription factor-binding motifs (TFBMs) in core promoter sequences of differentially expressed genes in those who gave birth to a small for gestational age newborn as compared to those who gave birth to an appropriate for gestational age newborn (reference), among those with placental maternal vascular malperfusion. Error bars reflect standard error.

974 Racial Trends in Opioid Use Disorder (OUD) at Delivery Hospitalization in the U.S. (2010-2020)

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OBJECTIVE: Data are lacking on OUD racial and ethnic disparities in pregnancy. We evaluated trends in OUD by race and ethnicity at delivery.

STUDY DESIGN: Retrospective cohort study of U.S. delivery hospitalizations with OUD using data from the National Inpatient Sample. ICD9-10 codes were used to identify OUD diagnoses. OUD rates between racial groups (Asian and Pacific Islander; API; American Indian; AI; non-Hispanic Black; NHB, Hispanic, and non-Hispanic White; NHW) were compared from 2010-2020. The OUD annual percent change (APC) was determined by Joinpoint regression. Adjusted RR of OUD by region (Northeast; NE, Midwest; MW, South, and West) were discerned using the lowest risk region as the referent group.

RESULTS: From 2010-2020, there were 272,610 (0.80%) delivery hospitalizations with OUD in the U.S. OUD rates increased significantly among AI (APC 23.2, CI 18.2-43.9; 2010-2017), NHW (APC 15.2, CI 13.0-18.3; 2010-2016), and NHB (APC, 15.0, CI 9.9-32.6; 2010-2017) groups before stabilizing (Figure). OUD rates increased linearly for API (APC 21.5, CI 17.8-27.6) and Hispanic (APC 11.7, CI 10.5-13.2) groups (2010-2020).

Region of lowest aRR for OUD was determined for each racial group (NHW; West, NHB, Hispanic, and AI; South, API; NE). NHW OUD risk was highest in the NE (aRR 2.1 CI 2.0-2.2) and South (aRR 1.2 CI 1.1-1.3) and similar in the MW and West. NHB OUD risk was increased in the West (aRR 2.2 CI 1.3-1.7), MW (aRR 2.1 CI 1.8-2.4) and NE (aRR 1.5 CI 1.3-1.7) compared to the South. Hispanic OUD risk was increased in the West (aRR 1.2 CI 1.0-1.3) but similar in the MW, NE, and South. AI OUD risk was higher in the MW (aRR 1.83 CI 1.5-2.5) and West (aRR 1.8 CI 1.5-2.1) and similar in the NE and South. API OUD risk was higher in the South (aRR 1.9 CI 1.3-2.6), MW (aRR 1.6 CI 1.1-2.4), and West (aRR 1.5 CI 1.1-2.1) relative to the NE.

CONCLUSION: Rate of OUD peaked among NHW and AI delivery hospitalizations, however it continues to rise among NHB, Hispanic, and API populations with significant regional variation.

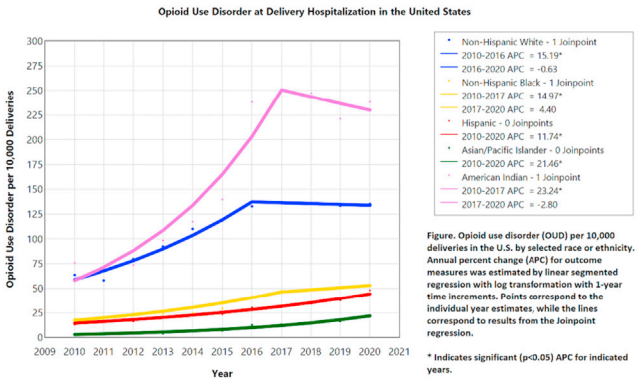

Figure. Opioid use disorder (OUD) per 10,000 deliveries in the U.S. by selected race or ethnicity. Annual percent change (APC) for outcome measures was estimated by linear segmented regression with log transformation with 1-year time increments. Points correspond to the individual year estimates, while the lines correspond to results from the Joinpoint regression.

* Indicates significant (p<0.05) APC for indicated years.

975 Racial Trends in Severe Maternal Morbidity Among Parturients With Opioid use disorder in the U.S.

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OBJECTIVE: Opioid use disorder (OUD) is an epidemic in the U.S. and associated with increased risk for severe maternal morbidity (SMM). We evaluated temporal trends and associated risk of SMM among delivery hospitalizations with OUD by race and ethnicity in the U.S. from 2010 to 2020.

STUDY DESIGN: Retrospective cohort study of U.S. delivery hospitalizations utilizing discharge data from the Healthcare Cost and Utilization Project National Inpatient Sample. ICD9-10 codes were used to identify OUD and SMM diagnoses. The primary aim was to compare the rate of SMM among those with OUD over a 10-year period (2010 vs 2020) by racial group (non-Hispanic White; NHW, non-Hispanic Black; NHB, and Hispanic). The annual percent change (APC) in SMM was determined by Joinpoint regression analysis. The adjusted RR of SMM among those with OUD by racial group was determined through multivariate regression analysis adjusting for co-existing risk factors.

RESULTS: From 2010-2020, delivery hospitalizations with OUD accounted for 272,610 (0.8%) births in the U.S. The rate of SMM per 10,000 delivery hospitalizations with OUD significantly increased in NHW (135 to 243; APC 5.9 CI 4.2-8.0) and NHB (385 to 720; APC 9.6 CI 4.3-19.5) parturients (Figure). There was no significant difference observed in the Hispanic parturients (APC 3.8 CI -4.3-16.4).

As compared to the NHW group with OUD, the NHB group with OUD had an increased risk of SMM (aRR 2.3, CI 1.9-2.7). This was not observed among the Hispanic group (aRR 1.1, CI 0.9-1.4) after adjusting for demographic and comorbidity differences. When directly compared to NHB, Hispanic deliveries had a lower risk of SMM (aRR 0.5 CI 0.4-0.6).

CONCLUSION: The rate of SMM at delivery hospitalization has significantly increased among NHB and NHW people with OUD, with SMM increasing disproportionately faster and higher among NHB people. This research can help guide future studies and initiatives on reducing and addressing disparities in maternal screening and delivery of care among those with OUD.

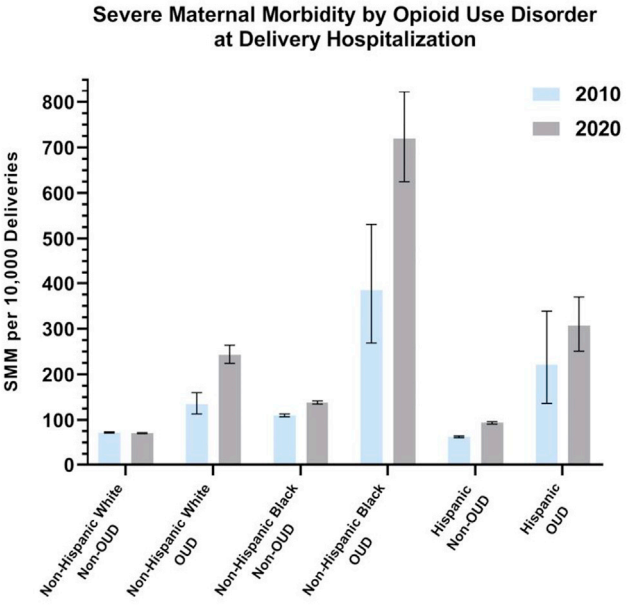

Figure. Severe maternal morbidity (SMM) rate with corresponding 95% CI (per 10,000 deliveries) among non-Hispanic White, non-Hispanic Black, and Hispanic groups with opioid use disorder (OUD) in the U.S. in 2010 compared to 2020. SMM rates of deliveries without OUD by race and ethnicity included for comparison. SMM ICD-9 and ICD-10 diagnosis codes as defined by the Center for Disease Control and Prevention. Transfusion codes were excluded from this analysis to minimize overestimation of SMM.

976 Pregnancy related extracellular vesicles induce breast cancer cell migration and proliferation

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OBJECTIVE: Pregnancy-associated breast cancer (PABC) is associated with an aggressive disease and shorter survival, indicating that pregnancy itself may promote cancer progression through unidentified mechanisms.

Extracellular vesicle (EVs) are lipid membrane vesicles involved in both tumor progression and modulation of the immune system in cancer as well as induction of angiogenesis in pregnancy. EVs may support cancer growth by inducing immunosuppression and creating a conducive pre-cancerous niche.

Placental EVs compose ~10% of the EV population in pregnant women. The placenta and malignant tumors share several properties, including a high rate of tissue proliferation, invasion, angiogenesis, and immune modulation. We propose a model whereby EVs that normally mediate placental-maternal crosstalk can also promote the aggressive nature of PABC. The study aimed to explore the effects of pregnancy-related EVs on breast cancer cell growth.

STUDY DESIGN: EVs obtained from placental human villous trophoblast cells (HVT) and EVs obtained from plasma of healthy pregnant (HP) and non-pregnant (NP) women were isolated and incubated with target cells. The effects of placental HVT-EVs or pregnancy related EVs on breast cancer cell lines MCF7, luminal (ER+, PR+) and MDA-231, triple negative aggressive cell lines and their related cancer stem cells (CSC), isolated by FACS sorting of ALDH+CD24-CD44+ cells, were compared to the response of a benign cell line, MCF10a. The effects of EVs on cell proliferation and migration were assessed.

RESULTS: Co-culture of placental EVs (HVT-EVs or HP-EVs) with BC cell lines increased migration of MCF7 cells, MDA-231 cells and their related cancer stem cells compared to NP-EVs or untreated wells (Figure 1).

MCF7 CSC and MDA-231 CSC show increased proliferation in XTT tests when exposed to HVT EVs or HP EVs compared to exposure to NP EVs or no EVs. This response was not evident in MCF10a benign breast cancer cells.

CONCLUSION: Pregnancy related extracellular vesicles may contribute to the aggressive nature of pregnancy-associated breast cancer.

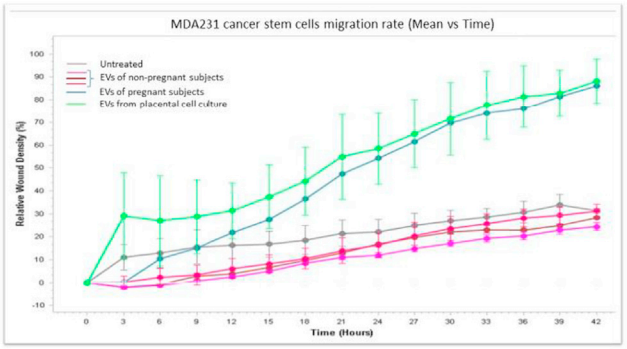

Figure 1: Placental EVs accelerate MDA231 Cancer Stem Cells (ALDH+CD44+CD24-) migration- scratch model. Cells were seeded on a 96 well plate. Scratches were performed in each well, and EV pellets of: 3 non-pregnant subjects (pink lines), pregnant subject (blue line) and placental cells (green line) were added and compared to untreated wells (gray line). The wells were photographed every 3 hours during 42 hours using Incucyte platform. Cell migration and area occupation percentage by migratory cells were calculated.

977 Severe maternal morbidity and 5-year transplant rejection in pregnant patients with history of solid-organ transplant

Kristin C. Darwin, Shridda Nayak, Arthur J. Vaught, Marika Toscano

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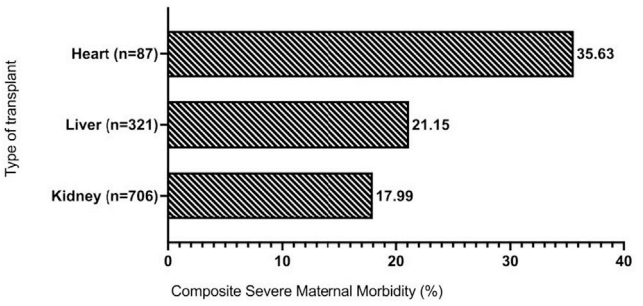
OBJECTIVE: To determine rates of severe maternal morbidity (SMM) and 5-year transplant rejection in pregnant patients with history of kidney, liver, or heart transplant.

STUDY DESIGN: This descriptive study was conducted using the TriNetX Diamond Network, a health research network with data from 92 health care organizations from inception in 2009-8/2023. Patients aged 12-55 years were included if they received a single solid organ transplant prior to pregnancy and had no prior history of transplant rejection. SMM was defined using Centers for Disease Control (CDC) ICD-10 codes for 21 indicators of SMM. The primary outcome was composite SMM. Secondary outcomes included rates of individual indicators of SMM and transplant rejection over time.

RESULTS: A total of 706 kidney, 321 liver, and 87 heart transplant recipients met inclusion criteria. Mean age at index was 31.8, 28.7, and 32.2 years for kidney, liver and heart transplant recipients, respectively. Baseline rates of comorbidities were different between cohorts (chronic hypertension: 52%, 16%, and 30% and diabetes mellitus: 14%, 8%, and 13% for kidney, liver, and heart, respectively). Rates of composite SMM were greatest for heart transplant recipients (35.63%), with morbidity most often from pulmonary edema/acute heart failure (26.43% (n=23)). This was followed by kidney transplant recipients (composite SMM: 17.99%), with acute renal failure occurring in 10.91% (n=77). Liver transplant recipients had the lowest composite SMM (12.15%). Rates of solid organ transplant rejection progressively increased at 1-, 2-, and 5-years post-delivery for all cohorts. Solid organ transplant rejection at 5-years was highest for heart transplant recipients (14.94%), followed by kidney (11.48%), and liver (7.48%).

CONCLUSION: Patients with history of heart transplant had highest composite SMM and highest rates of transplant rejection 5-years post-delivery. The potential impact of pregnancy on long-term outcomes in cardiac transplantation should be further explored.

Figure 1. Rates of composite severe maternal morbidity by type of solid organ transplant



978 Severe maternal morbidity and adverse pregnancy outcomes in patients with history of kidney transplant

Kristin C. Darwin, Shridda Nayak, Arthur J. Vaught, Marika Toscano

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OBJECTIVE: To determine the odds of severe maternal morbidity (SMM) in patients with a pre-pregnancy history of kidney transplant.

STUDY DESIGN: This study was conducted using the TriNetX Diamond Network, a health research network with data from 92 health care organizations from inception in 2009-8/2023. Pregnant patients aged 12-55 years with pre-pregnancy history of kidney transplant and no history of transplant rejection/other transplant complication were compared to those without a history of kidney transplant. Primary outcome was composite SMM defined using Centers for Disease Control ICD-10 codes. Individual indicators of SMM and other adverse pregnancy outcomes (preeclampsia, postpartum hemorrhage, cesarean delivery, and spontaneous preterm delivery) were investigated as secondary outcomes. The TriNetX platform was used to run 1:1 propensity score matching and logistic regression. Variables included in propensity score matching were age, race, ethnicity, chronic hypertension, history of heart disease, diabetes mellitus, and obesity.

RESULTS: After propensity score matching, there were 706 individuals included in each cohort (Table). Patients with history of kidney transplant had higher odds of composite SMM (OR 4.62, 95% CI 3.09-6.92), acute renal failure (OR 8.52, 95% CI 4.37-16.61), sepsis (OR 2.77, 95% CI 1.33-5.76), spontaneous preterm delivery (OR 1.86, 95% CI 1.20-2.89), and preeclampsia (OR 2.32, 95% CI 1.51-3.57). When acute renal failure was removed from composite SMM, there were still increased odds of SMM in the renal transplant group (OR 2.59, 95% CI 1.68-3.99). There was no significant difference between groups in odds of cardiac arrest/ventricular fibrillation (OR 1.17, 95% CI 0.54-2.55), blood transfusion (OR 1.72, 95% CI 0.78-3.78), cesarean section (OR 1, 95% CI 0.81-1.24), or postpartum hemorrhage (OR 1.64, 95% CI 0.90-2.98).

CONCLUSION: Patients with a history of kidney transplant have increased odds of composite SMM, primarily driven by increased odds of acute renal failure.

Table: Cohort comparison before and after propensity score matching

	Before matching			After matching		
	No transplant history	History of kidney transplant	p-value	No transplant history	History of kidney transplant	p-value
Number of patients	9,679,835	706	--	706	706	--
Age, mean (SD)	28.7 (6.27)	31.8 (6.58)	<0.01	31.7 (6.54)	31.8 (6.58)	0.87
Race, n (%)						
White	1,375,548 (14.21)	116 (16.43)	0.09	117 (16.57)	116 (16.43)	0.94
Black	314,661 (3.25)	40 (5.67)	<0.01	40 (5.67)	40 (5.67)	1.00
Asian	47,156 (0.49)	10 (1.42)	<0.01	10 (1.41)	10 (1.41)	1.00
Unknown	7,942,470 (82.05)	541 (76.63)	<0.01	540 (76.48)	541 (76.62)	0.95
Ethnicity, n (%)						
Hispanic	326,829 (3.38)	42 (5.95)	<0.01	19 (2.69)	42 (5.94)	<0.01
Non-Hispanic	1,694,360 (17.50)	162 (22.95)	<0.01	161 (22.80)	162 (22.95)	0.95
Unknown	7,658,646 (79.12)	502 (71.11)	<0.01	526 (74.50)	502 (71.12)	0.15
Co-morbidities, n (%)						
Chronic hypertension	289,242 (2.99)	366 (51.84)	<0.01	366 (51.84)	366 (51.84)	1.00
Heart disease	176,798 (1.83)	73 (10.34)	<0.01	78 (11.05)	73 (10.34)	0.67
Diabetes mellitus	173,314 (1.79)	99 (14.02)	<0.01	96 (13.70)	99 (14.02)	0.82
Obesity	390,120 (4.03)	81 (11.47)	<0.01	81 (11.47)	81 (11.47)	1.00

979 Severe maternal morbidity and adverse pregnancy outcomes in patients with isolated obesity

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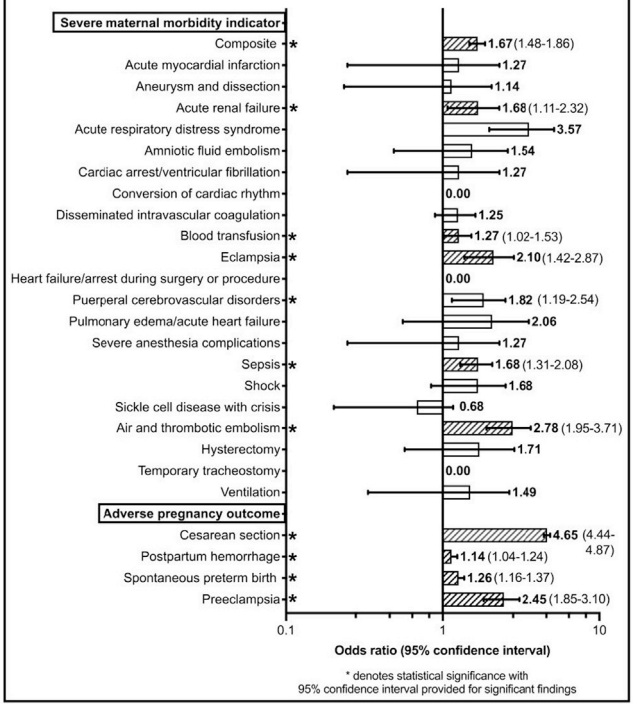
OBJECTIVE: Pregnancy outcomes of people with obesity but without other significant pre-pregnancy comorbidity are not well characterized. The objective of this study was to determine rates of severe maternal morbidity (SMM) and adverse pregnancy outcomes in patients with isolated obesity.

STUDY DESIGN: This study was conducted using the TriNetX Diamond Network, a research network comprising data from 92 health care organizations, from inception in 2009-8/2023. Patients 12-55 years with isolated obesity (body mass index (BMI) greater than or equal to 30 kg/m2 and without other comorbidity) at least one year before delivery encounter were compared to non-obese patients (BMI less than 30 kg/m2). Patients were excluded from both cohorts for any history of hypertension, diabetes mellitus, hyperlipidemia, bariatric surgery, heart disease, prior cesarean section (C/S), multiple gestation, or systemic lupus erythematosus. The primary outcome was composite severe maternal morbidity (SMM), defined using Centers for Disease Control ICD-10 codes. Individual indicators of SMM and adverse pregnancy outcomes (C/S, postpartum hemorrhage, spontaneous preterm birth, preeclampsia) were secondary outcomes. The TriNetX platform was used to perform 1:1 propensity score matching (age, race, ethnicity) and logistic regression. Comorbid conditions were not used to match, as patients with significant comorbidity had been already excluded from the cohort.

RESULTS: After propensity score matching, 46,862 individuals of similar age, race, and ethnicity were included in each cohort. Compared to a healthy, non-obese cohort, pregnant patients with isolated obesity had significantly increased odds of composite SMM. Obese patients also had significantly increased odds of renal failure, blood transfusion, preeclampsia, eclampsia, cerebrovascular disorders (e.g., stroke), sepsis, embolism, C/S, postpartum hemorrhage, and spontaneous preterm birth (Figure).

CONCLUSION: Pregnant patients with isolated obesity are more likely to experience SMM and adverse pregnancy outcomes compared to non-obese, healthy patients.

Figure: Odds of severe maternal morbidity or adverse pregnancy outcome of healthy obese patients compared to healthy non-obese patients



980 Prevention of Obstetric Hemorrhage in Moderate and High Risk Patients: Addition of Prophylactic Misoprostol

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OBJECTIVE: We sought to evaluate the impact of dual pharmacologic prophylaxis with oxytocin and misoprostol for patients at moderate or high risk for postpartum hemorrhage (PPH) on PPH rates, quantitative blood loss (QBL) amounts, and morbidities.

STUDY DESIGN: A quality improvement initiative was undertaken including the addition of buccal misoprostol prophylaxis immediately after delivery for all patients with moderate or high risk for hemorrhage during pre-birth PPH risk assessment, 200 micrograms for moderate risk and 400 micrograms for high risk. 'Oxytocin only' prophylaxis was administered 6/2021 to 4/2022 and 'dual agent' prophylaxis was given 4/2022 to 3/2023. Inclusion criteria: deliveries $\geq$ 20 weeks' gestation with moderate or high-risk pre-birth PPH risk assessment. Exclusion criteria: missing QBL, gestational age $<$ 20 weeks or low PPH risk. The primary outcome was QBL at delivery and total postpartum blood loss (PPBL). Secondary outcomes were PPH rate ($\geq$ 1000 ml) and composite morbidity including hysterectomy, unanticipated surgical intervention, uterine artery embolization, coagulopathy, acidemia (pH $\leq$ 7.35), hypothermia (Temp $\leq$ 36.0), intubation $>$ 24 hours, transfusion of $\geq$ 4u RBC, ICU

admission. Demographic, QBL and morbidity data were captured electronically with morbidities confirmed by chart review.

RESULTS: With dual agent prophylaxis, multiple linear regression analysis showed significantly less QBL at delivery and total PPBL within 24 hours in those having cesarean delivery (Table) and logistic regression analysis showed a significant reduction in composite morbidity (Table).

CONCLUSION: Dual agent prophylaxis with oxytocin and misoprostol immediately after delivery was associated with a significant reduction in PPH rates and composite morbidity in patients undergoing cesarean birth. Prospective studies are warranted to assess replicability and safety.

Adjusted logistic regression analysis for postpartum hemorrhage rate and composite morbidity between time periods and adjusted linear regression analysis stratified by mode of delivery for quantitative blood loss at delivery and quantitative total postpartum blood loss within 24 hours

Logistic regression						
Outcome	Adjusted OR (95% CI)[a]		P value			
PPH rate	0.87 (0.72, 1.06)		0.16			
Composite morbidity	0.32 (0.14, 0.71)		0.005			
Multiple linear regression						
Outcomes	**Total (n=4397)[b]**		**Vaginal (n=2714)[b]**		**Cesarean (n=1683)[b]**	
	β for predictor of time period (95% CI)	**P value**	**β for predictor of time period (95% CI)**	**P value**	**β for predictor of time period (95% CI)**	**P value**
Log-transformed PPBL	-0.02 (-0.07, 0.03)	0.46	0.02 (-0.05, 0.08)	0.58	-0.11 (-0.16, -0.06)	<0.0001
			P for interaction = 0.0097[c]			
Log-transformed QBL	-0.02 (-0.07, 0.03)	0.48	0.01 (-0.05, 0.08)	0.66	-0.10 (-0.15, -0.06)	<0.0001
			P for interaction = 0.0188[c]			

'Oxytocin only' time period is the reference group for both logistic and linear regression analyses.

[a]Adjusted variables for logistic regression: age, BMI, gestational age, race, and insurance status.

[b]Adjusted variables for multiple linear regression: age, BMI, gestational age, race, and insurance status.

[c]Adjusted variables in interaction analyses: age, BMI, gestational age, race, insurance status, delivery method, and an interaction term between time period and delivery method.

β evaluates difference between time periods; the negative result indicates a decrease for the dual prophylaxis time period.

PPBL=total postpartum blood loss within 24 hours. QBL=quantitative blood loss at delivery

982 Maternal and neonatal outcomes associated with route of progesterone administration in frozen embryo transfers

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OBJECTIVE: To determine if the route of progesterone administration in medicated single euploid frozen embryo transfers (FET) affects the incidence of adverse maternal and neonatal outcomes.

STUDY DESIGN: This was a retrospective cohort of all patients who underwent a single euploid FET at a single IVF center resulting in delivery at one of seven hospitals within a large academic health system in New York from January 2020-July 2023. For patients with more than one pregnancy during the study period, only the first was included for analysis. Patients with multiple gestation pregnancies and those who delivered at less than 23 weeks of gestation were excluded. Patients were divided into three groups based on route of progesterone administration: intramuscular progesterone only (IM), vaginal progesterone only (Vag), and combination of IM and Vag progesterone (IM+Vag). Demographic information, clinical characteristics and pregnancy outcomes were obtained. Maternal and neonatal outcomes were compared between the three groups using ANOVA with $p < .05$ considered significant.

RESULTS: A total of 335 patients were included in the study (Table): 234 IM, 74 Vag, 27 IM+Vag. The patients in all groups were mostly non-Hispanic white, >35 years old, overweight, married, and English speaking. There were no differences in maternal or neonatal outcomes between the three groups.

CONCLUSION: The route of progesterone administration in pregnancies achieved via FET is not associated with adverse maternal or neonatal outcomes. Vaginal progesterone may be considered to minimize discomfort for patients undergoing fertility treatment. Larger prospective studies are still warranted.

Table: Maternal and neonatal outcomes by route of progesterone administration

Characteristics	IM (n=234)	Vag (n=74)	IM+Vag (n=27)	P value
Maternal Outcomes				
Preeclampsia with severe features	17 (7.3)	3 (4.1)	5 (18.5)	0.05
Gestational diabetes	18 (7.7)	1 (1.4)	0 (0.00)	0.05
Neonatal Outcomes				
Birthweight, grams	3298 (±526)	3375 (±551)	3384 (±617)	0.92
Low birth weight	15 (6.4)	2 (2.70)	2 (7.41)	0.45
Small for gestational age	15 (6.4)	5 (6.76)	0 (0.00)	0.39
APGAR at 1 minute	8.19 (±1.35)	8.22 (±1.25)	8.33 (±1.44)	0.87
APGAR at 5 minutes	8.83 (±0.49)	8.89 (±0.31)	8.78 (±0.64)	0.50
NICU admission	36(15.4)	8(10.8)	5(18.5)	0.52
Preterm birth	21(9.0)	3(4.1)	4(14.8)	0.19

Data are n (%) or mean ± standard deviation.

983 Maternal characteristics associated with delivery versus expectant management when presenting with term decreased fetal movement

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OBJECTIVE: To compare maternal characteristics among patients presenting to triage with decreased fetal movement (DFM) at term who were either admitted for delivery within 24 hours, between 24-48 hours, or after 48 hours.

STUDY DESIGN: This was a retrospective cohort study of patients with singleton gestations delivering at a large hospital system from 2013-2023. Using electronic medical records, patients presenting with the chief complaint of DFM at ≥37 weeks gestation were identified. Using timestamps, latency between DFM presentation and delivery admission was calculated. Patients were grouped into 3 categories: 1) < 24 hours, 2) 24-48 hours, 3) >48 hours. For patients who presented with DFM more than once beyond 37 weeks, the presentation most proximal to delivery was used to calculate time to admission. Comparisons across the categorical measure of time to admission were performed using chi-square tests and multinomial logistic regression, where delivery admission >48 hours is the referent category.

RESULTS: Of the 2,015 patients, 193 (9.6%) were admitted for delivery at < 24 hours, 131 (6.5%) between 24-48 hours, and 1,691 (83.9%) at >48 hours. Patients with non-commercial insurance, Black non-Hispanic or Hispanic, BMI ≥30 at delivery, non-English speaking, with chronic hypertension or hypertensive disorders of pregnancy or with pregestational diabetes were significantly more likely to be admitted >48hours than within 24 hours or within 24-48 hours. Conversely, patients who conceived via IVF were more likely to be admitted within 24 hours than within 24-48 hours or after 48 hours. Following adjustment, non-commercial insurance was

associated with reduced odds of admission < 24 hours, aOR=0.47 (95% CI 0.30-0.71) and reduced odds of admission 24-48 hours, aOR=0.20 (95%CI 0.12-0.32).

CONCLUSION: Among patients presenting with DFM to triage at term, there are significant sociodemographic and clinical variations between those admitted < 24 hours, 24-48 hours, and >48 hours. Even after adjustment, non-commercial insurance was significantly associated with decreased likelihood of admission prior to 48 hours.

Table 1: Maternal characteristics among patients presenting to triage with DFM at term who were admitted for delivery within 24 hours, between 24-48 hours, or after 48 hours

Patient characteristics	Delivery admission within 24h (n=193)	Delivery admission 24-48h (n=131)	Delivery admission >48h (n=1691)	p-value
Insurance status				
Public, self-pay, other	51 (26.4)	20 (15.3)	805 (47.6)	<0.01
Age >35 years	56 (29.0)	34 (26.0)	389 (23.0)	0.15
Nulliparous	88 (45.6)	56 (43.1)	803 (47.7)	0.54
Race/ethnicity				
Hispanic	46 (23.8)	36 (27.5)	514 (30.4)	<0.01
Non-Hispanic Black	19 (9.8)	9 (6.9)	267 (15.8)	
Non-Hispanic Other	26 (13.5)	17 (13.0)	180 (10.6)	
Non-Hispanic White	102 (52.9)	69 (52.7)	730 (43.2)	
Unpartnered status	48 (24.9)	24 (18.3)	643 (38.0)	<0.01
Non-English primary language	19 (9.8)	12 (9.2)	251 (14.8)	0.04
BMI ≥30 at delivery	100 (51.8)	72 (55.4)	1093 (64.9)	<0.01
Chronic hypertension or HDP	16 (8.3)	19 (14.5)	297 (17.6)	<0.01
Pregestational diabetes	1 (0.5)	1 (0.8)	55 (3.3)	0.03
Gestational diabetes	14 (7.3)	9 (6.9)	134 (7.9)	0.87
Anxiety or depression	42 (21.8)	29 (22.1)	436 (25.8)	0.34
Smoking in pregnancy	9 (4.7)	3 (2.3)	116 (6.9)	0.07
Substance use	8 (4.2)	3 (2.3)	91 (5.4)	0.25
IVF conception	15 (7.8)	7 (5.3)	65 (3.8)	0.03
Female infant sex	98 (50.8)	70 (53.4)	861 (50.9)	0.85
Fetal growth restriction	11 (5.7)	12 (9.2)	146 (8.6)	0.36

Data are presented as n (%)

BMI=body mass index; HDP=hypertensive disorders of pregnancy which includes gestational hypertension, preeclampsia with or without severe features, eclampsia, and hemolysis, elevated liver enzymes and low platelets; IVF=in vitro fertilization

984 Rate of clinically significant red blood cell antibody seroconversion in pregnancy

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OBJECTIVE: To determine the rate of clinically significant red blood cell (RBC) antibody seroconversion in pregnancy.

STUDY DESIGN: This is a retrospective cohort study of all pregnant patients who delivered at a large multi-hospital system from 2016-2023. In this system, a type and screen is obtained at entry to prenatal care, at time of admission for delivery, prior to administration of Rh(D) immune globulin (RhIG), or as clinically indicated. Patients with missing RBC antibody screen at delivery or no record of type and screen at entry to prenatal care were excluded. All other patients with a positive screen at delivery were categorized as passively immunized due to RhIG, alloimmunized (antibody previously identified during the pregnancy), or seroconverted (antibody not previously identified in the pregnancy). Antibodies were described as clinically significant if associated with hemolytic disease of the fetus and newborn (HDFN) to any degree per ACOG Practice Bulletin 192.

RESULTS: There were 58,912 pregnant individuals with 71,384 eligible deliveries in the time period. 66,615 (93.3%) deliveries had negative RBC antibody screen at delivery and 4,176 (5.9%) deliveries had a positive antibody screen only due to passive immunity from RhIG. Of the remaining 593 (0.8%) deliveries, 351 (0.5%) had clinically significant antibodies associated with HDFN, and among those, 168 (0.2%) seroconverted in pregnancy. 148 (88.1%) of these seroconverted deliveries were Rh positive and 20 (11.9%) of them were Rh negative. The most common antibodies newly acquired in pregnancy were anti-E, anti-c, anti-JkA, anti-C, anti-C, anti-M, and anti-Kell (Figure).

CONCLUSION: Development of new clinically significant RBC antibody in pregnancy occurred at a rate of 0.2% in this large cohort study. Routine third trimester assessment of maternal antibody status may not be indicated due to low likelihood for new clinically significant seroconversion.

Figure: Count of new RBC antibodies developed in pregnancy among seroconverted patients (Some pregnancies were associated with development of multiple new antibodies)

Anti-E	59	Anti-Kell	10	Anti-LuA	2
Anti-c	29	Anti-S	10	Anti-KpA	1
Anti-JkA	27	Anti-JkB	7	Anti-N	1
Anti-D	17	Anti-e	4	Anti-V	1
Anti-C	16	Anti-FyA	4	Anti-U	1
Anti-M	11	Anti-FyB	2		

985 Magnetic resonance imaging predicts severe placenta accreta spectrum (PAS) resulting in hysterectomy

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OBJECTIVE: Recent guidelines have identified magnetic resonance (MR) placenta accreta spectrum (PAS) markers. The purpose of this study is to evaluate these markers ability to predict need for cesarean hysterectomy due to PAS.

STUDY DESIGN: This was a single-center retrospective study of pregnancies referred with suspected PAS between September 2019-February 2023. MR reports were prospectively interpreted by two investigators, and MR parameters were extracted from the clinical reports, blinded to clinical outcomes. Medical records were reviewed to determine surgical outcomes, and patients were grouped according to the outcome of hysterectomy. Patient demographics were compared between those who required hysterectomy and those that did not using T-tests and Fisher's Exact test. Univariate logistic regression models and area under the receiver operating characteristics curve (AUC) for MRI variables were generated.

RESULTS: Of 82 pregnant patients with suspicion for PAS and available MR scan, 41 (50%) required cesarean hysterectomy for PAS. No differences in age, race, or gestational age at MR were found (Table 1A). Eleven MR parameters were significantly predictive of the outcome of hysterectomy, with greatest dimension of invasion by MR and radiologist impression the most predictive (Table 1B).

CONCLUSION: MR parameters correlate to severe PAS requiring cesarean hysterectomy, especially greatest dimension of invasion, radiologist impression of invasion, and placental heterogeneity. Further studies with standardized MR reporting of PAS are needed to compare the predictive value to ultrasound, develop an MRI predictive index for severe PAS, and ultimately automate these processes for reproducibility.

Table 1. (A) Demographic characteristics of the suspected PAS study cohort undergoing magnetic resonance imaging (MRI). (B) AUC values of PAS MRI parameters for predicting hysterectomy in pregnant individuals with suspected placenta accreta spectrum.

(A)

Characteristic	Hysterectomy (n = 41)	No hysterectomy (n = 41)	P value
Age at delivery (years)	33.6±5.6	33.0±5.7	0.653
Race/ethnicity			1.0
Black	9	7	
Hispanic	30	32	
White	2	2	
Gestational age at MRI	31.5±4.9	33.1±2.0	0.065
Number of prior cesarean deliveries	2.3±1.0	2.1±1.3	0.344

(B)

PAS MRI Parameters	AUC*	Lower Limit	Upper Limit
Radiologist impression of invasion degree	0.938	0.892	0.984
Greatest dimension of invasion by MRI	0.933	0.884	0.984
Placenta heterogeneity	0.897	0.832	0.963
Bulge size	0.804	0.716	0.877
Number of invasion locations	0.791	0.719	0.863
Bulge number	0.797	0.716	0.877
Bulge presence	0.793	0.711	0.874
Presence of bridging vessels	0.695	0.599	0.792
Size of T2 dark area	0.684	0.569	0.800
Involvement of bladder serosal interface	0.683	0.600	0.766
Placenta previa	0.671	0.567	0.775

*All AUC values were significant (p<0.05)

986 Prospective validation of a Vital-sign augmented Peripartum Risk Stratification Model to predict severe maternal morbidity

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OBJECTIVE: To build and validate an equitable Vital-sign augmented Peripartum Risk Stratification Model (VPRSM) in the electronic medical record (EMR) to identify in real-time patients at highest risk for severe maternal morbidity (SMM) during delivery admission.

STUDY DESIGN: Using deliveries/terminations from 1/1/13-10/31/20, CDC-defined SMM were identified by ICD9/10 codes, audited and time-stamped using pre-specified diagnostic criteria. Patients with SMM prior to/on admission were excluded. Demographic and clinical (including laboratory and vital sign) data informed the model. One variable from highly correlated pairs (Pearson's r $\geq$0.6) and those without a univariable signal were removed and logistic regression conducted. VPRSM was built on a discrete time-framework and ran continuously behind the scenes in the EMR (7/21/22-12/26/22) for prospective validation. Area under the receiver operating characteristic curve (AUC) was calculated 1 hour before a SMM (for patients with SMM) or at a randomly chosen time point for those without. SMM was characterized as Composite (any SMM), Minor (transfusion < 3 units of blood) and Major (transfusion $\geq$3 units or any non-transfusion SMM). Model data and equity were analyzed by race/ethnicity with White as reference. Fairness metrics were calculated. False Negative Rate (FNR) was chosen to define fairness, with a tolerance of 1.3 times smaller or larger than reference.

RESULTS: 39,521 patients were included of which 2,940 comprised the prospective cohort (Table). The AUC 1 hour before an event was 0.84 (95%CI: 0.80-0.88) for Composite, 0.87 (95%CI: 0.81-0.93) for Major and 0.83 (95%CI: 0.78-0.88) for Minor SMM. Hispanic and Black met fairness criterion. Asian and Other both had FNR lower than White (better performance) but fell outside the tolerance range (Table).

CONCLUSION: VPRSM is a highly predictive equity-based model that incorporates real-time vital sign data to identify patients at highest risk for SMM during delivery admission.

Table. Demographics, clinical characteristics, severe maternal morbidity outcomes and fairness metrics among race/ethnic groups in the prospective validation cohort

	Overall n=2,940	Black n=242	Asian n=327	White n=1,116	Hispanic n=734	Other n=521	p-value
Demographics							
Age	32.00 (28.0, 36.0)	31.0 (25.0, 35.0)	32.0 (29.0, 36.0)	33.0 (30.0, 36.0)	29.0 (25.0, 34.0)	32.0 (28.0, 35.0)	<0.001
Clinical characteristics							
Gestational Age	39.14 (38.1, 39.9)	39.0 (37.4, 39.6)	39.0 (38.1, 39.6)	39.1 (38.3, 39.9)	39.0 (38.0, 39.7)	39.1 (38.4, 39.9)	<0.001
BMI	30.78 (27.4, 35.2)	33.3 (28.5, 38.8)	29.4 (26.6, 33.0)	29.8 (26.9, 34.4)	32.6 (28.9, 37.1)	30.8 (27.3, 35.1)	<0.001
Asthma	178 (6.1)	25 (10.3)	13 (3.9)	82 (7.4)	36 (4.9)	22 (4.2)	0.001
Bleeding disorder	94 (3.2)	15 (6.2)	8 (2.5)	44 (3.9)	13 (1.8)	14 (2.7)	0.005
Cardiac disorder	21 (0.7)	3 (1.2)	3 (0.9)	10 (0.9)	3 (0.4)	2 (0.4)	0.49
Chorioamnionitis	114 (3.9)	4 (1.7)	16 (4.9)	30 (2.7)	36 (4.9)	28 (5.4)	0.009
Diabetes	69 (2.4)	6 (2.5)	8 (2.5)	16 (1.4)	23 (3.1)	16 (3.1)	0.122
Induction	1,261 (51.7)	103 (51.8)	122 (44.5)	497 (54.1)	323 (52.6)	216 (49.8)	0.072
Multiple gestation	48 (1.6)	5 (2.1)	1 (0.3)	24 (2.2)	7 (0.9)	11 (2.1)	0.072
Neuromuscular disorder	39 (1.3)	5 (2.01)	2 (0.6)	18 (1.6)	7 (0.9)	7 (1.3)	0.438
Nulliparous	1,183 (40.2)	74 (30.6)	141 (43.1)	453 (40.6)	276 (37.6)	239 (45.9)	0.001
Placenta accreta spectrum	3 (0.1)	0 (0.0)	0 (0.0)	1 (0.1)	0 (0.0)	2 (0.4)	0.248
Prior cesarean section	470 (10.3)	47 (19.4)	46 (14.1)	170 (15.2)	133 (18.1)	82 (15.7)	0.217
Renal disorder	6 (0.20)	0 (0.0)	1 (0.3)	4 (0.4)	0 (0.0)	1 (0.2)	0.482
Outcomes							
Composite SMM	77 (2.6)	6 (2.5)	8 (2.5)	31 (2.8)	18 (2.5)	14 (2.7)	0.992
Minor SMM[a]	60 (2.0)	5 (2.1)	4 (1.2)	23 (2.1)	16 (2.2)	12 (2.3)	0.853
Major SMM[b]	20 (0.7)	1 (0.4)	4 (1.2)	10 (0.9)	3 (0.4)	2 (0.4)	0.416
Equity Analysis[c]	N/A						N/A
False Negative Rate		33%	29%	45%	50%	21%	
False Negative Rate Disparity[d]		0.74	0.64	1	1.12	0.48	
False Positive Rate		22%	10%	14%	13%	14%	
False Positive Rate Disparity[d]		1.61	0.75	1	0.95	1.07	
Precision		7%	14%	10%	9%	13%	
Precision Disparity[d]		0.74	1.37	1	0.91	1.33	
True Positive Rate		67%	71%	55%	50%	70%	
True Positive Rate Disparity[d]		1.21	1.29	1	0.91	1.42	

Data presented as n (%) or median with interquartile range.
BMI: body mass index kg/m², SMM: severe maternal morbidity; N/A: not applicable
a: Minor SMM is defined as <3 units of blood transfused.
b: Major SMM is defined as ≥3 units of blood transfused OR other non-transfusion SMM. Minor and Major SMM are not mutually exclusive.
c: All fairness metrics calculated using the top 15% of VPRSM scores.
d: Disparity is the ratio of parity measure of a group to the reference group i.e., White
Note: Asian, Black, Other and White groups are Non-Hispanic groups

987 Prospective validation of an automated Peripartum Risk Score Model to predict severe maternal morbidity (SMM)

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OBJECTIVE: To create and validate an automated Peripartum Risk Score Model (PRSM) in the electronic medical record (EMR) to identify patients at highest risk for SMM during delivery admission.

STUDY DESIGN: Using health-system data from all deliveries/terminations from 1/1/13-10/21/20, a retrospective cohort was used to build/validate the PRSM model. A separate prospective cohort (7/21/22-12/26/22) was used for prospective validation. The 21 CDC-defined SMM were identified by ICD9/10 codes, audited and time-stamped using pre-specified diagnostic criteria. Excluded from both cohorts were patients with an SMM prior to/on admission. Model includes demographic and clinical data. One variable from all pairs of highly correlated variables (Pearson's r $\geq$0.6) was removed as were variables without a univariable signal. Logistic regression model was built/ validated to predict SMM using the retrospective cohort and then validated prospectively. SMM was characterized as Composite (any SMM), Minor (transfusion of < 3 units of blood) and Major (transfusion of $\geq$3 units of blood or any non-transfusion SMM).The area under the receiver operating characteristic curve (AUC) was used to assess goodness of fit. Sensitivity and precision were determined.

RESULTS: Descriptive characteristics were similar between the retrospective (n=36,581) and prospective (n=2,940) cohorts with some exceptions.(Table) For Composite SMM, the PRSM had an AUC of 0.8 (95%CI: 0.76-0.84) on retrospective data and an AUC of 0.76 (95% CI: 0.7-0.82) on prospective validation. When the top 30% of prospective PRSM scores were flagged, the sensitivity for the

prediction of Major SMM was 74% and 69% for both Composite and Minor SMM. The sensitivity increased to 90% for Major and 82% for Composite and Minor SMM when the top 40% of patients were flagged with a precision of 8%.

CONCLUSION: We have built and prospectively validated an automated PRSM in the EMR to identify pregnant patients at highest risk for SMM during their delivery admission.

Table. Demographics, clinical characteristics and severe maternal morbidity outcomes between the retrospective and prospective cohort

	Retrospective cohort (n=36,581)	Prospective cohort (n=2,940)	p-value
Demographics			
Age	32.0 (29.0, 35.0)	32.0 (28.0, 36.0)	0.044
Race and Ethnicity			<0.001
Non-Hispanic Black	2,494 (6.8)	242 (8.2)	
Non-Hispanic Asian	3,948 (10.8)	327 (11.1)	
Non-Hispanic White	18,448 (50.4)	1,116 (37.9)	
Hispanic	4,458 (12.2)	734 (24.9)	
Other	7,233 (19.8)	521 (17.7)	
Clinical characteristics			
Gestational Age	39.3 (38.3, 40.0)	39.1 (38.1, 39.9)	<0.001
BMI	29.8 (26.7, 33.9)	30.8 (27.4, 35.3)	<0.001
Asthma	1,406 (3.8)	178 (6.1)	<0.001
Bleeding disorder	1,111 (3.0)	94 (3.2)	0.667
Cardiac disorder	287 (0.8)	21 (0.7)	0.758
Chorioamnionitis	2,236 (6.1)	114 (3.9)	<0.001
Diabetes	770 (2.1)	69 (2.4)	0.418
Induction	11,828 (32.3)	1,261 (51.7)	<0.001
Multiple gestation	1,137 (3.1)	48 (1.6)	<0.001
Neuromuscular disorder	456 (1.3)	39 (1.3)	0.773
Nulliparous	14,937 (40.8)	1,183 (40.2)	0.541
Placenta accreta spectrum	152 (0.4)	3 (0.1)	0.014
Prior cesarean section	6,068 (16.6)	478 (16.3)	0.663
Renal disorder	106 (0.3)	6 (0.2)	0.509
Outcomes			
Composite SMM	639 (1.6)	77 (2.6)	0.001
Minor SMM[a]	505 (1.9)	60 (2.0)	0.005
Major SMM[b]	213 (0.6)	20 (0.7)	0.587

Data presented as n (%) or median with interquartile range
BMI: body mass index kg/m², SMM: severe maternal morbidity
a: Minor SMM is defined as <3 units of blood transfused.
b: Major SMM is defined as ≥3 units of blood transfused OR other non-transfusion SMM. Minor and Major SMM are not mutually exclusive.

988 Tetanus-diptheria-acellular pertussis (Tdap) vaccine receipt in pregnancy and its association with community-level socioeconomic vulnerability

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OBJECTIVE: To estimate the association between prenatal Tdapvaccine receipt and measures of community-level socioeconomic deprivation, as limitations of existing research preclude an accurate characterization of the relationship.

STUDY DESIGN: A retrospective cohort study of pregnant women who delivered at ≥ 28 weeks at a single tertiary care center between September 1, 2019 and November 30, 2022 for whom prenatal records were available. The primary exposure was socioeconomic vulnerability as measured by the CDC's Social Vulnerability Index (SVI). Patient addresses were geocoded and linked at the census tract level to assign their SVI values. SVI scores are composed of 15 variables organized into 4 themes**:** socioeconomic status, household composition/disability, minority status/language, and housing type/transportation. Scores range from 0-1; greater values indicate greater socioeconomic disadvantage. Automated data abstraction was used to obtain discrete variables from the medical record, including demographics and the primary outcome, Tdapvaccine receipt. The primary exposure was assessed as a continuous and categorical quartile variable. We used multivariable logistic regression to estimate the independent association between SVI and Tdap vaccine receipt.

RESULTS: Of 5190 pregnant women included, the rate of Tdap vaccine receipt was 57%. Women with higher SVI scores had lower odds of Tdap vaccination (aOR 0.51, 95%CI 0.42-0.62). Women in the highest quartile for SVI themes 3 and 4 had lower odds of Tdap vaccination (aOR 0.63, 95%CI 0.50-0.79, aOR 0.69, 95%CI 0.57-0.85, respectively) (Table). Non-English language and public insurance were also associated with lower odds of Tdap vaccine receipt.

CONCLUSION: Pregnant women living in areas with greater socioeconomic disadvantage are less likely to receive the Tdap vaccine. Among SVI themes, racial/ethnic minority status and housing type/transportation appear to drive the inverse relationship between SVI and Tdap vaccine receipt. SVI may be used to identify barriers to prenatal vaccine receipt and thereby guide interventions that seek to enhance vaccine equity.

Table 1. Association between SVI and prenatal Tdap vaccine receipt

		SVI, by quartile			
		Quartile 1 (REF) (≤25%ile) (n = 1300)	Quartile 2 (>25% to 50%) (n = 1319)	Quartile 3 (>50% to 75%) (n = 1309)	Quartile 4 (>75% to 100%) (n = 1262)
Overall					
SVI	Rate, n (%)	835 (64.2)	776 (58.8)	689 (52.6)	661 (52.4)
	aOR (95%CI)	REF	0.80 (0.68-0.93)	0.62 (0.53-0.72)*	0.61 (0.52-0.72)*
SVI Theme (1–4), aOR (95%CI)					
1 – Socioeconomic status		REF	0.91 (0.76-1.08)	1.11 (0.91-1.34)	1.21 (0.96-1.54)
2 – Household Characteristics		REF	0.97 (0.82-1.15)	0.78 (0.65-0.93)*	0.91 (0.73-1.13)
3 – Racial & Ethnic Minority Status		REF	0.86 (0.73-1.02)	0.87 (0.73-1.04)	0.63 (0.50-0.79)*
4 – Housing Type & Transportation		REF	0.86 (0.73-1.02)	0.74 (0.62-0.89)*	0.69 (0.57-0.85)*

aOR, adjusted odds ratio; *CI*, confidence interval; *SVI*, Social Vulnerability Index; *Tdap*, tetanus-diptheria-acellular pertussis; REF, reference category is quartile 1.
* P<0.05

989 Maternal and ultrasound characteristics associated with persistence of cell-free DNA from a vanishing twin pregnancy

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OBJECTIVE: Vanishing twins (VTs) occur in up to 30% of early twin pregnancies and are associated with increased fetal aneuploidy and challenges for aneuploidy screening in the living twin (LT). These include potential for inaccurate cell-free (cf)DNA results due to a persistent cfDNA signal from the VT for up to 15 weeks. We sought to identify maternal and ultrasound (US) characteristics associated with persistence of cfDNA from a VT.

STUDY DESIGN: Planned secondary analysis of data from a prospective study of VTs at 17 centers between August 2021 – February 2023

aimed to develop a cfDNA algorithm for the LT in pregnancies with a LT and a VT. Monochorionicity, use of a donor egg, or iatrogenic fetal demise were excluded. SNP-based cfDNA screening at ≥9 weeks' gestation evaluated the presence of one or two distinct sets of fetal alleles (signals). Univariate analysis was used to compare maternal and US characteristics among patients with one fetal signal, two fetal signals, or no-call results. Multivariable logistic regression was used to account for confounding.

RESULTS: Of 101 VT pregnancies, 42 had 1 fetal signal, 49 had 2, and 10 could not be determined due to very low fetal fractions . Median maternal age was 34.4 years and 20% conceived with assistance (IVF, ovulation induction and/or intrauterine insemination). Median GA of the LT at VT diagnosis was 9.4 weeks and median GA at cfDNA screening was 13 weeks. A non-viable fetus was visible in 54 and an empty sac in 47 cases (Table 1). Detection of two signals was associated with increasing GA at VT diagnosis (aOR = 1.66; 95%CI 1.19-2.49), a visible non-viable fetus on US (aOR = 3.48, 95%CI 1.05-12.60) and assisted conception (aOR = 6.10; 95%CI 1.19-47.50).

CONCLUSION: Persistence of a second fetal signal was present in approximately half of VT pregnancies in our study and was more common with assisted conception, VT diagnosis after 8 weeks' gestation, cfDNA within 3 weeks of VT diagnosis, and a visible non-viable fetus on US. This information may be helpful in optimizing timing of cfDNA screening in pregnancies with a VT.

Table 1. Maternal and vanishing twin characteristics and number of distinct cell-free DNA signals

	Total (N=101)	One Signal (N=42)	Two Signals (N=49)	Not determined (N=10)	p-value
Median maternal age (years) at cfDNA blood draw (IQR)	34.4 (31.7, 36.4)	33.2 (31.3, 35.6)	34.4 (31.8, 36.3)	36.0 (35.5, 39.4)	0.028
BMI median (IQR)	28 (23, 34)	26 (23, 32)	28 (25, 34)	30 (25, 39)	0.3
Parity					0.7
Nulliparous	40 (40%)	17 (40%)	18 (37%)	5 (50%)	
Multiparous	61 (60%)	25 (60%)	31 (63%)	5 (50%)	
Mode of conception					0.07
In Vitro Fertilization (IVF)	11 (11%)	3 (7.1%)	6 (12%)	2 (20%)	
Intrauterine Insemination (IUI)	5 (5.0%)	1 (2.4%)	2 (4.1%)	2 (20%)	
Ovulation Induction	4 (4.0%)	0 (0%)	4 (8.2%)	0 (0%)	
Spontaneous	81 (80%)	38 (90%)	37 (76%)	6 (60%)	
Median GA (weeks) of LT at VT diagnosis (IQR)	9.43 (8.14, 10.86)	8.71 (7.32, 9.57)	10.57 (8.86, 12.00)	10.00 (7.54, 11.11)	<0.001
GA of LT at VT diagnosis					0.008
<8 weeks	23 (23%)	15 (36%)	5 (10%)	3 (30%)	
≥8 weeks	78 (77%)	27 (64%)	44 (90%)	7 (70%)	
Median GA (weeks) at cfDNA screening (IQR)	13.00 (12.00, 14.57)	13.14 (12.32, 14.11)	12.71 (11.71, 14.00)	14.71 (12.68, 15.18)	0.2
Median time (weeks) between cfDNA screening and VT diagnosis (IQR)	3.57 (1.57, 5.00)	4.50 (3.04, 5.43)	2.00 (0.86, 4.29)	4.43 (3.11, 5.96)	<0.001
Time between cfDNA screening and VT diagnosis (categorical)					<0.001
<3 weeks	40 (40%)	9 (21%)	29 (59%)	2 (20%)	
≥3 weeks	61 (60%)	33 (79%)	20 (41%)	8 (80%)	
Ultrasound appearance of VT at diagnosis					0.031
Visible non-viable fetus	54 (53%)	16 (38%)	32 (65%)	6 (60%)	
Empty sac (no fetus)	47 (47%)	26 (62%)	17 (35%)	4 (40%)	

990 The impact of pregnancy, maternal and neonatal complications on breastfeeding at the time of discharge

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OBJECTIVE: Breastfeeding has been associated with significant benefits for both the infant and the mother. Such benefits include, for example, lower risk of childhood infections, obesity, and SIDS, for the infant, and lower risk of developing type 2 diabetes, breast cancer, and ovarian cancer for the mother. We aimed to assess the impact of different pregnancy, maternal and neonatal complications on the prevalence of breastfeeding at the time of hospital discharge.

STUDY DESIGN: A retrospective analysis of the Centers for Disease Control and Prevention, Natality Live Birth database (2019-2021). We compared the prevalence of breastfeeding at the time of hospital discharge between birthing individuals who had a specific pregnancy, maternal or neonatal complication and those who did not using Pearson's chi-square test. We then conducted a multivariate regression analysis to account for potential confounding variables. The results are presented as adjusted odds ratios (aOR) and 95% confidence intervals (CI), with the statistical significance set to 0.05.

RESULTS: A total of 9,104,236 live births were analyzed. The overall prevalence of breastfeeding at the time of discharge from the hospital was 83.3%. The prevalence of breastfeeding and the aORs for different maternal, neonatal and pregnancy complications are displayed in the table.

CONCLUSION: As expected, most pregnancy, maternal and neonatal complications were associated with a decreased prevalence of breastfeeding. Specifically, preterm delivery, pre-gestational diabetes, chronic hypertension, gestational hypertension, eclampsia, cesarean delivery, blood transfusion, unplanned hysterectomy, maternal ICU admission, 5-min Apgar score, neonatal ICU admission, suspected neonatal sepsis, neonatal seizures and congenital anomalies were all associated with decreased prevalence of breastfeeding. These findings may help in guiding hospital and obstetric providers on allocating resources, such as lactation consultants, to this high-risk population.

Table. Prevalence and aOR of breastfeeding at time of discharge by pregnancy complication.

		Breastfeeding at the time of discharge (%)	aOR (95% CI)
Preterm Delivery	Y	810,758/1,079,033 (75.1)	0.78 (0.77-0.79)
	N	6,729,264/7,970,727 (84.4)	Ref
Chorioamnionitis	Y	111,465/130,390 (85.5)	1.18 (1.16-1.20)
	N	7,428,557/8,919,370 (83.3)	Ref
Pre-gestational Diabetes	Y	73,110/95,826 (76.3)	0.91 (0.89-0.92)
	N	7,466,912/8,953,934 (83.4)	Ref
Gestational Diabetes	Y	575,643/693,035 (83.1)	0.99 (0.99-1.00)
	N	6,964,379/8,356,725 (83.3)	Ref
Chronic HTN	Y	179,554/237,254 (75.7)	0.82 (0.81-0.83)
	N	7,360,468/8,812,506 (83.5)	Ref
Gestational HTN	Y	639,394/788,283 (81.1)	0.95 (0.94-0.96)
	N	6,900,628/8,261,477 (83.5)	Ref
Eclampsia	Y	20,462/26,670 (76.7)	0.85 (0.83-0.88)
	N	7,519,560/9,023,090 (83.3)	Ref
Route of Delivery	Cesarean	2,356,118/2,899,955 (81.3)	0.86 (0.84-0.88)
	Vaginal	5,183,904/6,149,805 (84.3)	Ref
Blood Transfusion	Y	31,388/43,627 (71.9)	0.71 (0.69-0.72)
	N	7,508,634/9,006,133 (83.4)	Ref
Uterine Rupture	Y	2,245/3,130 (71.7)	1.01 (0.93-1.11)
	N	7,537,777/9,046,630 (83.3)	Ref
Unplanned Hysterectomy	Y	2,791/4,189 (66.6)	0.89 (0.83-0.96)
	N	7,537,231/9,045,571 (83.3)	Ref
Maternal ICU Admission	Y	8,644/14,442 (59.9)	0.50 (0.48-0.52)
	N	7,531,378 (83.4)	Ref
5-min Apgar Score	9-10	6,468,683/7,691,925 (84.1)	Ref
	7-8	951,307/1,180,878 (80.6)	0.94 (0.93-0.95)
	4-6	97,934/133,646 (73.3)	0.97 (0.96-0.99)
	0-3	22,098/43,311 (51.0)	0.58 (0.56-0.61)
NICU Admission	Y	617,801/833,022 (74.2)	0.78 (0.77-0.79)
	N	6,922,221/8,216,738 (84.3)	Ref
Suspected Neonatal Sepsis	Y	128,356/181,193 (0.8)	0.75 (0.74-0.76)
	N	7,411,666/8,868,567 (83.6)	Ref
Neonatal Seizures	Y	1,726/3,039 (56.8)	0.62 (0.57-0.67)
	N	7,538,296/9,046,721 (83.3)	Ref
Congenital Anomalies	Y	21,868/31,447 (69.5)	0.59 (0.58-0.61)
	N	7,518,154/9,018,313 (83.7)	Ref

991 Racial and ethnic disparities in post-cesarean opioid prescribing and pain experiences

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OBJECTIVE: To evaluate whether there are racial and ethnic disparities in post-cesarean delivery (CD) inpatient opioid administration and, among participants assigned to an individualized opioid prescription protocol (IOPP), discharge opioid prescribing and pain experience.

STUDY DESIGN: Secondary analysis of a multicenter trial of participants post-CD randomly assigned to an IOPP or fixed quantity of opioids upon discharge. We included participants who self-reported as non-Hispanic White (NHW), non-Hispanic Black (NHB), or Hispanic. The primary outcome was morphine milligram equivalents (MMEs) used in 24 hours prior to randomization (all participants). Secondary outcomes (IOPP participants) were number of tablets recommended (based on MMEs use in 24 hours prior to randomization) and requested, and pain experience outcomes at 1-week post-discharge. Outcomes were compared by race and ethnicity using bivariable and multivariable analyses.

RESULTS: Of 5464 individuals, 43% identified as NHW, 28% NHB, and 21% Hispanic. Pain score prior to randomization was similar among groups (median 7). MMEs used in 24 hours prior to randomization was higher in NHB and lower in Hispanic vs. NHW individuals (Table). In adjusted analyses, MME use was lower for Hispanic participants (median difference -8.3, CI [-10.2, -6.3]) but similar for NHB (median difference 1.1, CI [-1.8, 4.0]) vs. NHW participants. Hispanic IOPP participants were recommended and requested fewer tablets and were less likely to request an opioid prescription after discharge. In contrast, NHB IOPP participants were more likely to request an opioid prescription after discharge, more likely to have pain and pain interference scores ≥4 on Brief Pain Inventory, and less likely to report improved global impression of change with treatment.

CONCLUSION: Race and ethnicity were associated with post-CD inpatient opioid administration and post-discharge pain experiences. Contrary to prior literature, NHB participants used similar MMEs post-CD and were more likely to request an opioid prescription after discharge, yet still had poorer pain experience-related outcomes.

Table. Primary and secondary outcomes by self-reported maternal race and ethnicity

	Bivariable analyses			Multivariable analyses vs NHW^^	
Full cohort*	NHW (N=2352)	NHB (N=1505)	Hispanic (N=1163)	NHB	Hispanic
MMEs used 24-hours prior to randomization ‡	15 (0, 37.5)	22.5 (7.5, 45)	7.5 (0, 25)	1.1 [-1.8, 4.0]	**-8.3 [-10.2, -6.3]**
IOPP arm only†	NHW (N=1158)	NHB (N=759)	Hispanic (N=574)	NHB	Hispanic
Tablets recommended ‡	9 (0, 20)	14 (0, 20)	4 (0, 15)	-0.6 [-2.7, 1.5]	**-5.0 [-6.5, -3.5]**
Tablets requested ‡	12 (5, 20)	20 (10, 20)	10 (5, 20)	1.1 [-0.1, 2.3]	**-3.0 [-4.2, -1.9]**
Post-discharge opioid prescription §‖	881 (78%)	634 (86%)	340 (63%)	**1.5 [1.1, 2.0]**	**0.4 [0.3, 0.6]**
1-week post discharge	NHW (N=1158)	NHB (N=759)	Hispanic (N=574)	NHB	Hispanic
MMEs used ‡	15 (0, 60)	30 (0, 75)	0 (0, 45)	7.0 [0.2, 13.8]	**-10.1 [-13.9, -6.4]**
Worst pain ≥ 4 ¶§	564 (52%)	516 (73%)	292 (59%)	**1.9 [1.5, 2.4]**	1.2 [0.9, 1.5]
Pain interference ≥ 4 #§	448 (41%)	388 (55%)	231 (47%)	**1.4 [1.1, 1.8]**	1.1 [0.9, 1.4]
Improved pain with treatment **§	1017 (93%)	591 (84%)	460 (92%)	**0.5 [0.3, 0.7]**	0.8 [0.5, 1.3]

^^Multivariable analyses compared to NHW are adjusted for maternal age, body mass index, marital status, prior cesarean delivery, labor, and postpartum hemorrhage.
* Data not shown for Asian, American Indian, Alaska Native, Native Hawaiian, Pacific Islander and multiracial participants.
† Participants post-CD were randomly assigned to IOPP or fixed quantity (20 tablets of 5mg oxycodone). Prior to discharge, participant's morphine milligram equivalents (MME) in 24 hours prior to randomization were calculated. In the IOPP group, a number of tablets based on the MME calculation was recommended and participants were able to modify and select a quantity of post-discharge tablets (up to 20) to be prescribed.
‡ Data are median (interquartile range) by race and ethnicity and adjusted median difference [95% CI] when compared to NHW participants.
§ Data are N (%) by race and ethnicity and odds ratio [95% CI] when compared to NHW participants.
‖ Data reflect participants that requested one or more opioid prescriptions within 1-week post discharge
¶ Brief Pain Inventory (BPI) worst pain ≥ 4 at 1-week post discharge
# Brief Pain Inventory (BPI) pain interference ≥ 4 at 1-week post discharge
** Improved global impression of change in overall pain with treatment

992 Plasma sFlt-1/PlGF ratio as MoM improves prediction of preeclampsia with severe features within two weeks

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OBJECTIVE: Cut-off values of the ratio of soluble fms-like tyrosine kinase 1 (sFlt-1) to placental growth factor (PlGF) as preeclampsia biomarker vary with assay platforms. This study compares multiples of the median (MoM) of maternal plasma sFlt-1/PlGF ratio, sFlt-1, PlGF, and conventional clinical and laboratory values to predict preeclampsia with severe features (PSF).

STUDY DESIGN: Secondary data analysis of a cohort study across 18 U.S. centers involving hospitalized hypertensive patients between 23-35 weeks' gestation. Receiver operating characteristic curve (ROC) analyses of maternal plasma biomarkers, highest systolic or diastolic blood pressures, and laboratory values were performed for the prediction of PSF. Their areas under the curve (AUC) were compared and quasi-Poisson regression models were done. Primary outcome**:** PSF within two weeks. Secondary outcomes**:** composite of severe adverse maternal outcomes (HELLP syndrome, placental abruption, eclampsia, DIC, and pulmonary edema) and composite of severe adverse neonatal outcomes [birthweight< 3rd percentile, very preterm birth (< 32 weeks) and fetal/neonatal death].

RESULTS: A total of 543 patients were included. ROC-derived cut-off of 11.5 MoM for sFlt-1/PlGF plasma ratio provided sensitivity (90.6%), specificity (76.9%), PPV (66%), NPV (94.3%) and accuracy for PSF (81.4%) akin to FDA-approved predictive values. This cut-off was used to compare cases (≥ cut-off) and controls (< cut-off). PSF within two weeks was observed in 66% of cases vs. 5.7% in controls (IRR**:** 1.001; p< 0.001). Higher proportion of cases developed composites of severe adverse maternal (IRR**:** 1.001; p=0.028) or neonatal outcomes (IRR**:** 1.002; p< 0.001) than controls (Table 1). The AUC of sFlt-1/PlGF plasma ratio in MoM (0.91) for PSF within two weeks was significantly higher (< 0.05 for all comparisons) than either plasma biomarker alone or any of the other parameters.

CONCLUSION: sFlt-1/PlGF plasma ratio ≥11.5 MoM among hospitalized, hypertensive patients prior to 35 weeks of gestation is independently associated with PSF within two weeks and severe a

Table 1. Demographic and clinical characteristics of the study population according to sFlt-1/PlGF plasma ratio using 11.5 multiples of the median (MoM) as cutoff

	sFlt-1/PlGF<11.5 MoM (n=296) Controls	sFlt-1/PlGF≥11.5 MoM (n= 247) Cases	p
Maternal age (years)	31.93 ± 5.44	31.56 ± 6.14	0.407
Nulliparity %	38.51 (114)	52.63 (130)	0.001
Maternal first trimester BMI (kg/m²)	35.29 ± 11.28	34.49 ± 10.11	0.547
Race (%):			
White/Caucasian	53.38 (158)	53.44 (132)	0.14
Black/African American	32.77 (97)	27.13 (67)	
Other	13.85 (41)	19.43 (48)	
Outpatient ASA in pregnancy	48.31 (143)	41.70 (103)	0.141
Gestational age at enrollment - weeks	31.01 ± 3.20	30.63 ± 2.85	0.017
Highest systolic blood pressure at enrollment-mm Hg	152.99 ± 20.09	164.99 ± 17.69	<0.001
Highest diastolic blood pressure at enrollment-mm Hg	91.03 ± 13.51	99.15 ± 10.75	<0.001
Creatinine at enrollment - mg/dl	0.57 ± 0.19	0.65 ± 0.18	<0.001
AST at enrollment - U/l	19.81 ± 20.20	21.91 ± 10.46	<0.001
ALT at enrollment - U/l	21.99 ± 51.97	18.67 ± 15.19	0.004
Platelets at enrollment x10³/µl	256.39 ± 73.84	250.47 ± 68.82	0.563
Highest urine protein/creatinine ratio at enrollment	0.66 ± 1.93	1.34 ± 2.24	<0.001
Plasma sFlt-1 MoM (IQR)	0.98 (0.65-1.57)	5.89 (3.77-8.99)	<0.001
Plasma PlGF MoM (IQR)	0.75 (0.41-1.45)	0.08 (0.04-0.12)	<0.001
Crude plasma sFlt-1/PlGF MoM (IQR)	4.55 (2.13-10.68)	228.1 (110.6-604.8)	<0.001
Gestational age at delivery - weeks	35.66 ± 2.50	32.42 ± 3.06	<0.001
Neonatal weight at birth - grams	2621.51 ± 727.90	1687.24 ± 777.33	<0.001
Birth weight <10th percentile	8.11 (24)	30.36 (75)	<0.001
Preeclampsia with severe feature within two weeks	5.74 (17)	65.99 (163)	<0.001
Composite of severe adverse maternal outcomes	2.70 (8)	8.1 (20)	0.006
Composite of severe adverse neonatal outcomes	10.14 (30)	41.30 (102)	<0.001

Results listed as means ±SD, median (interquartile range: IQR), or % (number). Body-mass index (BMI); ALT denotes alanine transaminase; ASA, aspirin; and AST, aspartate transaminase; MoM, multiple of the median.

993 Plasma sFlt-1/PlGF ratio in mom and severe adverse neonatal outcomes in non-preeclamptic patients

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OBJECTIVE: The adoption of ever-changing clinical criteria to diagnose preeclampsia has hindered progress in the prevention of adverse maternal and neonatal outcomes associated with it. This study compares the ratio of maternal plasma soluble fms-like tyrosine kinase 1 (sFlt-1) to placental growth factor (PlGF), sFlt-1 or PlGF alone, and conventional clinical or laboratory values in the prediction of adverse perinatal outcomes in hospitalized patients with the suspicion of preeclampsia.

STUDY DESIGN: Secondary data analysis of a cohort study across 18 U.S. centers involving hospitalized hypertensive patients between 23-35 weeks' gestation. Areas under the curve (AUC) of multiple of the median (MoM) values of maternal plasma sFlt-1/PlGF ratio, maternal plasma sFlt-1 or PlGF alone, highest systolic or diastolic blood pressures, and laboratory values were compared for the prediction of severe adverse neonatal outcomes [birthweight< 3rd percentile, very preterm birth (< 32 weeks) and fetal/neonatal death]. Quasi-Poisson regression models were done to determine the value of sFlt-1/PlGF ratio in MoM for the prediction of adverse perinatal outcomes adjusted for clinical or laboratory values.

RESULTS: A total of 330 hypertensive patients whose diagnosis of preeclampsia was not confirmed were included. The AUC of sFlt-1/PlGF plasma ratio in MoM (0.73) for the prediction of severe adverse perinatal outcomes was modest but it was significantly higher than highest systolic (0.60, p=0.01) or diastolic blood pressures (0.58, p=0.002), platelet count (0.59, p=0.04), and creatinine (0.59, p=0.01), AST, or ALT (both 0.53, p=0.001) concentrations. However, the AUC of sFlt-1/PlGF plasma ratio in MoM was similar than that of sFlt-1 (0.71) or PlGF (0.73) alone in the prediction of study outcomes. Regression analysis demonstrated that sFlt-1/PlGF ratio in MoM is independently associated with severe adverse perinatal outcomes (IRR**:** 1.002; 95% CI**:** 1.001-1.003; p< 0.001).

CONCLUSION: Angiogenic imbalances is associated with severe adverse perinatal outcomes even if the diagnosis of preeclampsia is not confirmed.

994 The effect of addition of intrauterine suction device to treat postpartum hemorrhage on composite morbidity

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OBJECTIVE: We sought to determine if addition of Jada, an intrauterine suction device (ISD), to a standardized algorithm for treatment of postpartum hemorrhage (PPH) as a third line option would result in improved outcomes.

STUDY DESIGN: We performed a retrospective review of outcomes associated with a standard PPH clinical decision support algorithm

with, and without the ISD. All women who delivered in one of 5 hospitals from a single, large healthcare system between 1/1/2022-6/1/2023 who suffered a PPH, defined as quant blood loss ≥ 1000 cc during 24 hr. after delivery, or who received either uterine balloon tamponade (UBT) or ISD due to concern for PPH, were included. Women in the Control Group delivered between 1/1/2022-9/30/2022 when the ISD was not available while those in the Study Group delivered between 10/1/22-6/1/23 after ISD was implemented as third line therapy (1st line - pharmacologic and 2nd line - UBT as needed). The primary outcome was a maternal morbidity composite of blood transfusion, surgical/IR intervention (D&C, B-Lynch, Hysterectomy, or uterine art embolization), need for ICU admit, or massive blood loss (≥ 2,000 cc). Demographic and outcome data were compared using Student t-test, chi-square test and Fisher's Exact Test as indicated.

RESULTS: The overall rate of PPH for the control group vs. the study group was 2.1% (241 PPH/10,925 total del) vs. 3.0% (285 PPH/9,461 total del) and the rate of the primary outcome was 0.8% (161/20,238) vs. 0.92% (167/18,034) respectively. Maternal demographic information and outcomes are in Table 1. There was no significant difference in the rate of the primary composite outcome after implementation of the ISD in the study group compared to the control group [106 cases/9,461 del (1.1%) vs. 95 cases/10,925 del (0.87%); p=0.6].

CONCLUSION: Introduction of the ISD as a third line of treatment for PPH was not associated with a reduction of the composite morbidity of PPH.

Maternal Characteristics PPH Cases	Control Group ISD not available N=241	Study Group ISD available N= 285	P Value
Maternal age	29.6 ± 5.9	29.8 ± 5.9	p = 0.71
Nulliparous	77 (32.0%)	77 (27%)	p = 0.13
Vaginal delivery	127 (52.7%)	160 (56.1%)	P=0.43
BMI	34.4 + 8.7	34.6 + 8.2	P=0.75
Race			P=0.08
White	202 (83.8%)	234 (82.1%)	
Native Hawaiian or Pacific Islander	15 (6.2%)	10 (3.5%)	
Asian	1 (0.4%)	7 (2.5%)	
Black or African American	1 (0.4%)	6 (2.1%)	
American Indian or Alaska Native	3 (1.2%)	1 (0.4%)	
Unavailable	19 (7.8%)	27 (9.5%)	
Presence of any OB complication	105 (43.5%)	123 (43.2%)	P=0.92
Multiple gestation	0	3 (1.2%)	
HTN/Pree	37 (15.4%)	34 (11.9%)	
DM	64 (26.6%)	77 (27.0%)	
IUGR	40 (16.6%)	44 (15.4%)	
Polyhydramnios	5 (2.1%)	5 (1.8%)	
Outcomes			
Total Deliveries	10,925	9,461	
PPH n (%)	241 (2.1%)	285 (3.0%)	
Primary Composite outcome - n (%)	95 (0.87%)	106 (1.1%)	P = 0.6
Blood transfusion - n (%)	64 (0.59%)	61 (0.65%)	
Surg/IR - n (%)	22 (0.2%)	15 (0.16%)	
ICU admit - n (%)	8 (0.07%)	7 (0.07%)	
QBL ≥ 2,000 cc - n (%)	39 (0.36%)	53 (0.56%)	
Number UTB used	125	75	
Number Jada used	0	48	

995 The impact of art therapy in women at risk for postpartum depression: a pilot study

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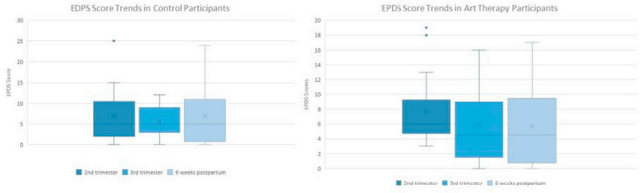
OBJECTIVE: Postpartum depression results in great distress for mothers and leads to impaired bonding with newborns. Finding useful interventions and prevention strategies are needed to decrease the growing incidence of postpartum depression.

STUDY DESIGN: A randomized control trial was completed to assess how art therapy during pregnancy may impact women at risk for postpartum depression. Inclusion criteria included age greater than eighteen years, having at least one risk factor for postpartum depression, and receiving prenatal care with plans for delivery at our medical center. Participants were randomized into either the control or intervention group. The intervention group attended six online art therapy sessions during the late second trimester through the early third trimester. All participants completed Edinburgh Postnatal Depression Scale (EPDS) screenings at time of enrollment, in the third trimester, and at six weeks postpartum. Comparison between groups was completed to assess differences.

RESULTS: Of the forty-three participants in the pilot study, twenty-one were in the control arm of the study and twenty-two participants were in the intervention arm. There were no significant differences of characteristics between the groups. The average EPDS score for the control group was 7 and was 8 for the intervention group. Figure 1 shows the ranges of EPDS scores. When comparing differences between the average EPDS scores at the start of participation, in the third trimester, and at six weeks postpartum, there were no statistically significant differences between groups [X^2 (1, N=43)=0.14, p=0.93]. Furthermore, participants' depression screen results did not significantly differ from the controls' when comparing results from the start of participation to the conclusion [X^2 (1, N=43)= 0.03, p=0.86].

CONCLUSION: Participating in art therapy during pregnancy did not have a significant role in reducing EPDS scores in women who are at risk for postpartum depression. However, this is a small pilot study and further investigation on the use of art therapy in the pregnant population is needed.



996 Maternal and neonatal outcomes of pregnancies with PPROM following expectant management or elective termination

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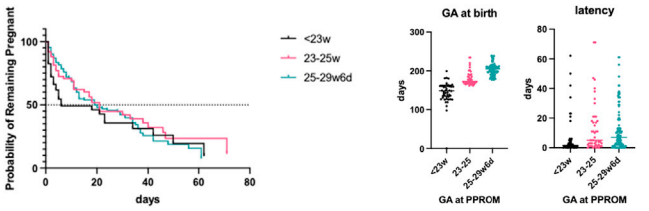
OBJECTIVE: Preterm premature rupture of membranes (PPROM) accounts for one third of preterm deliveries and is associated with significant perinatal morbidity. Neonatal resuscitation has been extended to earlier gestational ages, including for patients with PPROM, but maternal and neonatal outcomes are not well characterized. Our objective is to compare patient outcomes following PPROM at 25-29 weeks to previable and periviable PPROM.

STUDY DESIGN: A retrospective cohort of 233 pregnancies with 256 neonates were identified by maternal ICD-9/10 codes for PPROM who delivered at UPMC between 2015 and 2019. Patients were excluded with congenital anomalies. Detailed chart review was performed. Patients were stratified by gestational age (GA) at

PPROM. Chi square test was used for dichotomous variables and t-test for continuous variables.

RESULTS: Neonatal demographics did not vary by cohort with the exception of GA at PPROM. In the previable and periviable cohorts, 77 pregnancies in our cohort (58%) ended in termination, fetal or neonatal demise. Significantly fewer maternal complications including chorioamnionitis, sepsis, endometritis, and death were observed in patients who underwent elective termination for previable PPROM (p= 0.0053). In our previable cohort, 100% of neonates from pregnancies that were expectantly managed had severe outcomes including late onset sepsis, intraventricular hemorrhage, and chronic lung disease. Neonatal outcomes were statistically significantly different across all cohorts, with increased morbidity associated with earlier GA at PPROM. Maternal morbidity rates were similar across cohorts. All cohorts achieved similar mean latencies.

CONCLUSION: Despite achieving similar GA at birth and latency, earlier GA at PPROM is associated with higher neonatal death rates and severe morbidity in survivors. Moreover, neonatal morbidity is greater than has been reported by gestational age. Maternal morbidity was similar across all cohorts. However, significantly fewer maternal complications were seen in pregnancies with previable PPROM that were electively terminated.



997 The impact of ACOG's 39-week rule on fetal death rates in america: a systematic review

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OBJECTIVE: The "39-week rule," implemented in August 2009, strongly discouraged early term deliveries before 39 weeks without accepted ACOG indications. In this study, we evaluated fetal death rates before and after the 39-week rule in the United States (US) by review of published series.

STUDY DESIGN: Systematic literature searches were performed in PubMed, Cochrane Central Register of Controlled Trials, Embase, Cumulative Index to Nursing and Allied Health Literature, Web of Science, and Scopus databases (January 2009-June 2023). Searches were focused on the 39-week rule and fetal death. In each concept, we identified keywords, subject headings, synonyms, and other related terms to exhaust search results in accordance with PRESS guidelines. We included observational studies that examined fetal death risk pre- and post-implementation of the 39-week rule. Articles were excluded if they were non-English, included non-US population, and included multiple gestations. Two blinded authors reviewed the titles (and the abstract, when necessary). The study was prospectively registered in PROSPERO.

RESULTS: Of 833 articles identified after initial search, 6 peer-reviewed studies met the inclusion criteria. There were 8,726 fetal deaths/7,267,648 total births (0.12%) post-implementation of the 39-week rule, and 8,523 fetal deaths/7,622,439 total births (0.11%) pre-implementation (p< 0.001) (TABLE). Compared to pre-implementation, the odds of fetal death after the 39-week rule were 1.07 (95% confidence interval 1.04-1.11).

CONCLUSION: Implementation of ACOG's 39-week rule, currently used as a quality indicator, resulted in an 7% increased risk of fetal death, compared to pre-implementation of the 39-week rule. Further study is needed to identify other unintended consequences, such as the impact on maternal and neonatal morbidity and mortality, associated with adoption of this policy.

TABLE
Impact of the 39-week rule on fetal death rates in America: results of a systematic review

Source	Total Patients		Total Fetal Death		Fetal death rate/1000 Total Births	Fetal death rate/1000 Total Births
	Pre-39-week rule	Post-39-week rule	Pre-39-week rule	Post-39-week rule	Pre-39-week rule	Post-39-week rule
Clark, 2010	222084	211467	1522	1497	6.85	7.08
Ehrenthal, 2011	12015	12013	7	17	5.76	14.01
Little, 2014	17078	4144	25	6	1.46	1.45
Snowden, 2016	28309	17738	110	83	3.89	4.68
Kennedy, 2018	20719	49660	11	35	0.53	1.69
Pilliod, 2019	7322234	6972626	6848	7088	0.94	1.02
Total:	7622439	7267648	8523	8726	3.24	4.99

998 Relationship between intrapartum blood glucose values and adverse outcomes in individuals with diabetes

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OBJECTIVE: Patients with diabetes mellitus (DM) are typically managed with frequent monitoring and tight control of blood glucose (BG) during labor to reduce adverse outcomes, notably neonatal hypoglycemia (NH). However, there is limited evidence to support this method. Continuous glucose monitoring (CGM) is becoming more ubiquitous for managing DM and may soon replace fingerstick (FS). We sought to evaluate the relationship between intrapartum glucose levels and outcomes using FS and CGM.

STUDY DESIGN: We conducted a multicenter prospective study (11/2021-12/2022) of parturients with pregestational or gestational DM at $\geq$ 34 wks. Cohorts had a blinded CGM (Dexcom G6 PRO) placed from admission through delivery and were monitored with FS according to usual care. Time in the target range (TIR; range 70−110 mg/dL), time above the target range (TAR; >110mg/dL) expressed as % of all CGM readings, and mean glucose was obtained for both CGM and FS. We evaluated the association of these measures with NH and compared CGM versus FS in the prediction of NH and outcomes related to glucose control. Youden index was used to choose the cut-off point for TAR and prediction of NH.

RESULTS: Of 9,479 deliveries during the study period, 202 (2.1%) met inclusion criteria, and 112 (56%) were enrolled (n=7 did not have CGM data). Of these, 45 (40%) had pregestational DM, and 65 (60%) had gestational DM. The mean BG using a CGM was 102 mg/dL (IQR: 89.9,113.5 mg/dL), and the average TIR was 62.1% (IQR:

36.9,85.6). CGM and FS were poor predictors of NH, with no differences in AUC (0.61, 95% CI: 0.49,0.73 vs. 0.54, 95% CI: 0.43,0.65). Using a threshold of time >120 mg/dL (AUC: 0.58, 95% CI: 0.46,0.70) or >130 mg/dL (AUC: 0.55, 95% CI: 0.43,0.67) did not improve prediction of NH. The best cutoff for the prediction of NH was a TAR of 61%, with 23% being above the threshold. The rate of NH was similar for TAR ≥61% vs < 61% (45.8% vs 25.9%, p=0.06) (Table).

CONCLUSION: We could not find a glucose measure by CGM or FS associated with or predictive of neonatal hypoglycemia. Intrapartum management of diabetic patients may need to be re-evaluated.

Table: Neonatal and maternal outcomes by CGM time above range < or ≥ 61%

Outcome	Time above range <61% (N=81)	Time above range ≥61% (N=24)	P-value	ARR (95%CI)#
Neonatal				
Hypoglycemia*	21 (25.9)	11 (45.8)	0.06	1.35 (0.84, 2.16)
Shoulder dystocia	1 (1.2%)	1 (4.2)	0.4	NA
C-peptide ng/ml^	**0.7 (0.5, 1.0)**	**1.3 (0.7, 1.9)**	**0.017**	NA
Large for GA**	8 (9.9)	3 (12.5)	0.7	NA
Blood sugar***	62.0 (48.0, 75.0)	57.0 (39.2, 70.5)	0.2	NA
NICU admission	32 (39.5)	11 (45.8)	0.6	0.78 (0.49, 1.23)
Need for IV glucose	9 (11.1)	9 (37.5)	0.005	1.81 (0.86, 3.77)
Respiratory distress****	5 (6.1)	3 (12.5)	0.4	1.12 (0.28, 4.58)
Need for CPAP	**3 (3.7)**	**5 (20.8)**	**0.015**	**1.12 (1.02, 1.24)**
Mechanical ventilation	1 (1.1)	1 (4.2)	0.4	1.03 (0.98, 1.08)
Hyperbilirubinemia	11 (13.6)	3 (12.5)	0.9	0.92 (0.79, 1.06)
Length of hospital stay, days	3.0 (2.0, 3.5)	3.0 (2.0, 5.0)	0.12	NA
Maternal				
Average FS glucose	**90.0 (78.0, 99.5)**	**113.0 (98.0, 146.2)**	**<0.001**	
Time in range	**72.2 (53.6, 88.9)**	**15.4 (2.9, 28.5)**	**<0.001**	
Insulin drip	**3 (4)**	**9 (38)**	**<0.001**	
Cesarean delivery	24 (30%)	12 (50%)	0.16	
PPH	**3 (4%)**	**5 (21%)**	**0.015**	
Endometritis	2(2)	0(0)	0.99	
Wound infection	1 (1)	1(4)	0.41	

Data are presented as number (percentage), or median (interquartile range)
NICU, neonatal intensive care unit; IV, intravenous; CPAP, continuous positive airway pressure; FS, fingerstick; PPH, postpartum hemorrhage
Adjusted for type of diabetes, chronic hypertension and preterm labor
*Defined as blood glucose <40mg/dL in the first 24 hours of life or <50mg/dL after or requiring medical therapy
***First blood sugar after delivery before feeding
**Defined as birthweight above 90th percentile using the nomogram by Duryea et al.
****Defined as the need of at least 4 hours of respiratory support with supplemental oxygen, continuous positive airway pressure or ventilation at the first 24 hours of life)
^ Missing C-peptide values (n=18 in the TAR <61% group, n=6 in the TAR ≥61% group)

999 Proof-of-concept testing of vascular closure devices for use in fetal surgery

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OBJECTIVE: Prior clinical findings have demonstrated that maternal laparotomy with trans-amniotic trans-uterine suturing of the fetoscopic port site during in utero myelomeningocele repair reduces the risk of membrane rupture. However, due to laparotomy-associated morbidity, we aimed to explore the feasibility of using a vascular closure device for percutaneous trans-amniotic trans-uterine suturing.

STUDY DESIGN: This IRB and IACUC-exempt study utilized sheep undergoing cesarean delivery for other research purposes. At the time of cesarean, size 12 French Checkflo® were inserted in different approaches: (1) Seldinger technique, (2) Seldinger technique insertion of Checkflo® cannula and subsequent use of the Abbott Perclose® device to suture the port site after check flow removal, (3) Abbott Perclose® device utilized in what is described as a "pre-close" technique, where prior to catheter placement, trans-uterine trans-amniotic stitches are placed and the 12 French Checkflo® cannula is inserted over the same guidewire. H&E staining was performed to assess uterine hole closure and amnion-to-uterus fixation.

RESULTS: The Perclose® device effectively sutured the amnion to the uterus in both pre-close and post-close fashion, but the pre-close technique achieved better amnion-to-uterus approximation and more appropriate uterine hole closure (see representative Figure 1). H&E staining revealed that without suturing, amnion separation from the chorion layer occurred, and the uterine hole persisted. The second technique showed partial connection between the amnion and chorion, but inadequate uterine hole closure with amnion shift into the defect. Optimal closure, with secure amnion-to-chorion fixation and uterine closure, was achieved through the pre-close technique (Figure).

CONCLUSION: This proof-of-concept study suggests the potential viability of using vascular closure devices for percutaneous trans-amniotic trans-uterine suturing during fetoscopic surgery. Further animal studies are required to investigate the feasibility of this technique during mid-pregnancy procedures.

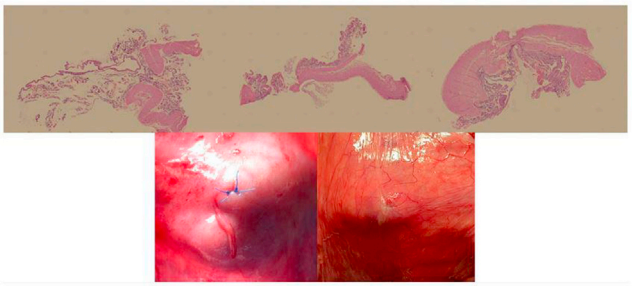

Figure A-F. A. Histology of sheep amnion and uterus after 12 F Checkflo® insertion, with a persistent defect in the myometrial layers and separation of the amnion from uterus. B. Histology of sheep amnion and uterus after 12 F Checkflo® insertion and site closure with Perclose®. The amnion layer remains in proper location and contact with the uterus, however the defect is not appropriately closed. C. Histology of sheep amnion and uterus after placement of sutures with Perclose® used in "pre-close" fashion and subsequent 12 F Checkflo® insertion. The amnion is secured in proper location and the uterine defect is closed. E&F. The uterine and amnion side of the sheep uterus after placement of Perclose® sutures with a well closed fetoscopic port site.

1000 Surgical antibiotic prophylaxis among patients treated for intraamniotic infection

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OBJECTIVE: Patients with intraamniotic infection (IAI) are at increased risk of postpartum infection. For patients with IAI receiving broad-spectrum antibiotics and undergoing cesarean delivery (CD), the optimal surgical antibiotic prophylaxis is unknown. We sought to determine if preoperative cefazolin in patients with IAI is associated with reduced postpartum infection.

STUDY DESIGN: Retrospective cohort study of patients with IAI (from ICD10 codes) undergoing unscheduled CD for a ≥24-week singleton between 2017-2022 within one healthcare system. Exclusion criteria were PPROM. The primary exposure was cefazolin administration at delivery; antibiotics received before or on the day of delivery were obtained from the medical record. The primary outcome was a composite of infection within 6 weeks postpartum (ICD10 codes for endometritis, SSI, sepsis, or postoperative infection; or post-delivery positive blood, wound, respiratory, or urinary cultures). Secondary outcomes included incisional complications (cellulitis, disruption, or positive wound culture) and need for oral antibiotics after delivery. Multivariable logistic regression analysis

controlled for delivery BMI, smoking, pregestational diabetes, failure to progress CD indication, duration of membrane rupture (hours), and use of adjunctive azithromycin.

RESULTS: During the study, 1,306 patients with IAI delivered. Pre-delivery antibiotic regimens received varied widely; most included ampicillin and gentamicin (70.5%). Cefazolin was administered to 1,040 (79.6%) of patients. The primary outcome occurred in 227 (17.4%) patients; 51 (3.9%) had an incisional complication and 156 (11.9%) received oral antibiotics after delivery. In the adjusted model, receipt of cefazolin was associated with lower odds of the primary outcome (aOR 0.80, 95% CI 0.69-0.93, p< 0.01), incisional complications (aOR 0.48, 95% CI 0.30-0.76, p< 0.01), and post-delivery oral antibiotic use (aOR 0.82, 95% CI 0.74-0.90, p< 0.01) (Table).

CONCLUSION: Cefazolin surgical prophylaxis for patients with IAI undergoing CD is associated with a reduction in postoperative infection.

Factor	Primary Outcome aOR [95% CI]	p	Incisional Complication aOR [95% CI]	p	Antibiotics after Delivery aOR [95% CI]	p
Cefazolin	0.80 [0.69-0.93]	<0.01	0.48 [0.3-0.76]	<0.01	0.82 [0.74-0.90]	<0.01
Adjunctive Azithromycin	0.87 [0.70-1.06]	0.17	0.58 [0.28-1.19]	0.14	0.46 [0.35-0.59]	<0.01
Delivery BMI						
Normal Weight	Ref		Ref		Ref	
Overweight	0.79 [0.59-1.05]	0.10	0.72 [0.25-2.06]	0.54	0.95 [0.64-1.42]	0.82
Obese	0.8 [0.66-0.96]	0.02	0.69 [0.30-1.59]	0.39	0.73 [0.53-1.01]	0.06
Morbidly Obese	0.96 [0.7-1.32]	0.82	0.89 [0.51-1.55]	0.68	1.22 [0.96-1.56]	0.11
Failure to Progress	0.86 [0.7-1.06]	0.16	0.53 [0.37-0.78]	<0.01	0.70 [0.45-1.10]	0.12
Smoking	1.36 [0.58-3.18]	0.48	2.03 [0.78-5.28]	0.15	3.74 [1.77-7.9]	<0.01
Prediabetes	1.91 [1.09-3.36]	0.02	—	—	2.46 [0.45-13.5]	0.3
Rupture to Delivery Time (h)	1.01 [1.00-1.02]	0.01	1.02 [0.98-1.06]	0.36	0.99 [0.96-1.02]	0.55

1001 Post-traumatic stress disorder two months after a cesarean delivery: a multicenter prospective study

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OBJECTIVE: The prevalence and risk factors of post-traumatic stress disorder (PTSD) after cesarean delivery outside high-risk contexts, remain unclear. Our objectives were to assess the prevalence and risk factors of PTSD two months after cesarean delivery.

STUDY DESIGN: Prospective ancillary cohort study of the TRAAP2 trial, conducted in 27 French hospitals in 2018-2020.

Women expected to undergo cesarean delivery before or during labor at 34 or more weeks of gestation were enrolled.

After randomization, characteristics of the cesarean delivery were prospectively collected. PTSD profile and provisional diagnosis were assessed two months after childbirth by two self-administered questionnaires (IES-R and TES). The corrected prevalence of PTSD was estimated with inverse probability weighting to account for non-respondents. Associations between potential risk factors and PTSD were analyzed by multivariate logistic or linear regression.

RESULTS: Questionnaires were returned by 2,785/4,431 and 2,792/4,431 women for the IES-R and TES, respectively (62.9% and 63.0% response rate). Prevalences of PTSD profile and provisional diagnosis were respectively 9.0% (95%CI 7.8-10.3%) and 1.7% (95%CI 1.2-2.4%). Characteristics associated with a higher risk of PTSD profile were prepregnancy vulnerability factors - young age, high BMI and Africa-born migrant — and obstetric factors related to the context of the cesarean - cesarean delivery after an induced labor (aOR 1.81 95%CI 1.14-2.87), postpartum hemorrhage (aOR 1.61 95%CI 1.04-2.46) and high intensity of pain during the postpartum stay (aOR 1.90 95%CI 1.17-3.11). Women who had immediate skin-to-skin contact with their newborn had a lower risk of PTSD (aOR 0.66 95%CI 0.46-0.98). Women with bad memories of delivery at day 2 postpartum were at increased risk of PTSD (aOR 3.20 95%CI 1.97-5.12). Results were consistent with the IES-R and the TES scales.

CONCLUSION: Around one of eleven women with cesarean delivery have PTSD profile at two months postpartum. Certain obstetric interventions and management of cesarean may influence the risk of PTSD.

Table 1. Factors associated with PTSD profile (defined as IES-R score above the 95th percentile) at two months after a cesarean delivery (n=2,785).

		Model 1[a]		Model 2[b]		Model 3[c]	
	Crude OR[d]	aOR[d] (95% CI)	*P*	aOR[d] (95% CI)	*P*	aOR[d] (95% CI)	*P*
Women's characteristics							
Maternal age (5-year increase)	0.77 (0.65-0.91)	0.80 (0.67-0.95)	.01	0.80 (0.67-0.95)	.01	0.80 (0.67-0.96)	.01
BMI (kg/m²)			.03		.03		.09
Lower than 18.5	0.85 (0.30-2.37)	0.89 (0.30-2.56)		0.88 (0.31-2.53)		0.89 (0.30-2.63)	
18.5 24.9	*Ref*	*Ref*		*Ref*		*Ref*	
25-29.9	1.62 (1.08-2.43)	1.41 (0.93-2.15)		1.42 (0.93-2.17)		1.35 (0.88-2.08)	
30 or higher	1.96 (1.30-2.94)	1.55 (1.02-2.40)		1.57 (1.01-2.43)		1.43 (0.92-2.23)	
Place of birth			<.01		<.01		<.01
Europe	*Ref*	*Ref*		*Ref*		*Ref*	
North Africa	3.40 (2.20-5.27)	3.55 (2.23-5.65)		3.49 (2.19-5.55)		3.56 (2.22-5.71)	
Sub-Saharan Africa	2.30 (1.40-3.77)	2.02 (1.18-3.44)		2.00 (1.17-3.40)		2.13 (1.24-3.65)	
Other	1.30 (0.59-2.86)	1.22 (0.54-2.74)		1.22 (0.54-2.75)		1.13 (0.50-2.60)	
Chronic condition before pregnancy	1.27 (0.86-1.86)	1.19 (0.80-1.77)	.3	1.20 (0.80-1.80)	.4	1.20 (0.80-1.79)	.4
Psychiatric history	1.24 (0.62-2.49)	1.16 (0.56-2.41)	.7	1.17 (0.56-2.41)	.7	1.11 (0.53-2.33)	.9
Previous abortion	1.35 (0.89-2.04)	1.37 (0.88-2.11)	.1	1.39 (0.90-2.14)	.1	1.31 (0.84-2.03)	.2
Parity and previous cesarean delivery			.5		.5		.5
Multiparous with previous cesarean delivery	*Ref*	*Ref*		*Ref*		*Ref*	
Multiparous without previous cesarean delivery	1.33 (0.80-2.20)	1.21 (0.70-2.09)		1.27 (0.74-2.19)		1.21 (0.69-2.10)	
Primiparous	1.34 (0.93-1.92)	1.20 (0.78-1.86)		1.21 (0.78-1.87)		1.16 (0.74-1.81)	
Characteristics of the pregnancy							
Hospitalization during pregnancy	1.35 (0.87-2.08)	0.87 (0.53-1.43)	.6	0.87 (0.53-1.44)	.6	0.91 (0.55-1.51)	.7
Gestational age at delivery under 37 weeks	1.72 (1.03-2.88)	1.40 (0.73-2.66)	.3	1.39 (0.73-2.64)	.3	1.40 (0.72-2.68)	.3
Context of the cesarean delivery							
Timing of cesarean delivery			.02		.02		.02
Before labor without emergency	*Ref*	*Ref*		*Ref*		*Ref*	
Before labor with emergency	1.15 (0.57-2.34)	0.93 (0.44-1.97)		0.90 (0.43-1.89)		0.90 (0.42-1.92)	
During labor after spontaneous labor	1.48 (0.93-2.33)	1.37 (0.83-2.24)		1.36 (0.83-2.23)		1.24 (0.75-2.06)	
During labor after induced labor	2.27 (1.52-3.40)	1.81 (1.14-2.87)		1.86 (1.17-2.94)		1.40 (1.02-2.30)	
Presence of a support person in operative room	0.58 (0.37-0.89)	0.88 (0.52-1.48)	.6	0.90 (0.54-1.50)	.6	0.82 (0.50-1.40)	.5
Clinically significant ?PH	1.71 (1.13-2.58)	1.61 (1.04-2.46)	.03			1.54 (1.01-2.39)	.04
Immediate skin-to-skin in operative room or PACU	0.62 (0.42-0.92)	0.66 (0.46-0.98)	.04	0.65 (0.42-0.98)	.04	0.68 (0.45-1.00)	.05
Postpartum period							
Neonatal complication	1.61 (1.10-2.36)	1.24 (0.79-1.94)	.3	1.25 (0.80-1.95)	.3	1.19 (0.76-1.87)	.4
High intensity of pain during the postpartum stay [e]	2.39 (1.50-3.79)	1.90 (1.17-3.11)	.01	1.90 (1.16-3.12)	.01	1.74 (1.06-2.87)	.04
Hemoglobin level <9 g/dL at day 2	1.41 (0.86-2.30)			1.11 (0.67-1.85)	.7		
Bad memories of delivery at day 2	4.49 (2.89-7.03)					3.20 (1.97-5.12)	<.01

PTSD, post-traumatic stress disorder; IES-R, Impact of Event Scale Revised; OR, odds ratio; aOR, adjusted odds ratio; CI, confidence interval; BMI, body mass index; PPH, postpartum hemorrhage;
a model with clinically significant PPH (defined by the answer "yes" by the caregiver in charge of the cesarean to the question "was there a PPH?");
b model with postpartum anemia (defined as hemoglobin level <9 g/dL at day 2);
c model with bad memories of delivery (defined as "bad" or "very bad" memories of childbirth);
d univariate and multivariate logistic regression model after multiple imputation of missing data and multilevel mixed-effects with the random intercept on the center;
e defined as pain assessed at 7/10 or higher by caregivers via the visual analog scale or digital visual scale.

1002 Maternal diet, physical activity, and perinatal outcomes

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OBJECTIVE: Maternal physical activity may be associated with significant health consequences to the mother and offspring. The current research aimed to study the association between engagement in physical activity before or during early pregnancy and the risk for adverse pregnancy outcomes including gestational diabetes mellitus (GDM), hypertensive disorders, anemia, preterm delivery (PTD) and low birth weight.

STUDY DESIGN: A prospective cohort study was conducted, consisting of women recruited from two medical centers. Medical records were summarized and self-completed questionnaires regarding physical activity were administered. Pregnancy outcomes were compared between women who engaged or not engaged in physical activity before and during early pregnancy. Multivariable logistic models were used to study the association between engaging in physical activity and pregnancy outcomes, while adjusting for body mass index, maternal age, and socioeconomic status.

RESULTS: The study included 514 pregnant women, 69.5% (n=244) were physically active before or during early pregnancy. The incidence of the studied outcomes are presented in the Table. Women who engaged in physical activity *before* pregnancy were less likely to

suffer from GDM (15.4% vs 2.0%, p=0.022) and PTD (10.2% vs 4.4%, p=0.038). This association was also significant in the multivariable model for engaging in physical activity before pregnancy (adjusted OR for GDM= 0.092 95%CI 0.01 − 0.82 and adjusted OR for PTD95%= 0.375 CI 0.15 − 0.92). Engaging in physical activity *during* early pregnancy was also associated with lower risk for GDM (adjusted OR=0.098 95%CI 0.017 − 0.56) but not for PTD (adjusted OR=0.872 95%CI 0.36 − 2.11).

CONCLUSION: Engaging in physical activity, either before or during the first trimester, is associated with a reduced risk for GDM and PTD.

	Engaged in physical activity before pregnancy (n=215)	Did not engage in physical activity before pregnancy (n=136)	P value	Adjusted OR**; 95% CI
Gestational Diabetes Mellitus*	**2%**	**15.4%**	**0.022**	**0.092 (0.01 – 0.82)**
Gestational Hypertension	4.2%	5.5%	0.606	0.92 (0.29 – 2.9)
Anemia	31.6%	35.7%	0.286	0.77 (0.48 – 1.25)
Preterm Delivery* **	**4.4%**	**10.2%**	**0.038**	**0.38 (0.15 – 0.92)**
Gestational Age Mean + SD	38.76 + 2.25	38.22 + 3.5	0.084	
Birth Weight (gr) Mean + SD	3193.12 ± 491.6	3164.7 ± 439.5	0.594	
Low Birthweight	7.3%	6.3%	0.717	1.30 (0.48 – 3.57)
Small for gestational age (SGA)	3.3%	1.5%	0.303	1.73 (0.34 – 8.71)

* 16 missing (the analysis was exclusively conducted on a specific section, recruited during the 1st trimester).

** Adjusted for Maternal Age and pre-pregnancy BMI

*** Adjusted for Maternal Age.

1003 Prenatal polycystic ovarian syndrome is associated with an increase in severe maternal morbidity

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OBJECTIVE: It has been well known that polycystic ovary syndrome (PCOS) is associated with adverse perinatal outcomes such as pre-eclampsia, preterm birth, gestational diabetes and low birth weight; however, association between PCOS and severe maternal morbidity (SMM) is not well studied. The objective of this study is to examine the association between PCOS and SMM.

STUDY DESIGN: This is a retrospective cohort study using California's linked vital statistics- hospital discharge data (2008-2019). We included singletons, non-anomalous births with gestational age of 23-42 weeks. Outcome of interest was SMM, which was defined as the published list of ICD-9 and ICD-10 diagnoses and procedure codes, provided by Center for Disease Control and Prevention (CDC). As blood transfusion is known to be a major contributor to SMM, we classified non-transfusion SMM (ntSMM) by excluding blood transfusion from the composite score of SMM. Chi-square and multivariable logistic regression analyses were used for analyses.

RESULTS: A total of 4,674,311 patients were included, of whom 14,274 (0.31%) had PCOS. Majority of patients with PCOS were non-Hispanic white (38.9% vs 26.5%; p< 0.001), with private insurance (82.5% vs 47.5%; p< 0.001) and gestational diabetes (23.2% vs 9.4%; p< 0.001). After adjusting for demographics, patients with PCOS had higher odds of SMM (aOR=1.61; 95% CI: 1.42, 1.83) and ntSMM (aOR=2.09 (1.74, 2.51). Among SMM indicators, we found higher odds of blood products transfusion (aOR=1.42 (1.22, 1.65), disseminated intravascular coagulation (DIC) (aOR=1.41 (1.04, 1.92), acute renal failure (ARF) (aOR=2.68; 95% CI: 1.90, 3.80), sepsis (aOR=1.87 (1.30, 2.68), eclampsia (aOR=2.06 (1.39, 3.04), hysterectomy (aOR= 1.68 (1.07, 2.64)), shock (aOR=1.97 (1.11, 3.49)) and pulmonary edema (aOR=2.33 (1.37, 3.96)).

CONCLUSION: Our study found higher odds of SMM in patients with PCOS. The clinicians should keep in mind these complications while treating patients with PCOS. These patients need additional care during pregnancy and parturition.

Table: Associaticn of polycystic ovarian syndrome with severe maternal morbidity using multivariable logistic regression model.

	No PCOS N=4,660,037	PCOS N=14,274	P*	Adjusted odds ratio (95% Confidence interval)**
Severe maternal morbidity	1.15%	1.84%	<0.001	1.61 (1.42, 1.83)
Non-transfusion SMM	0.35%	0.86%	<0.001	2.09 (1.74, 2.51)
SMM Indicators (Top 8 indicators from more prevalent in PCOS to least prevalent)				
Blood products transfusion	0.93%	1.24%	<0.001	1.42 (1.22, 1.65)
Disseminated intravascular coagulation	0.21%	0.29%	0.03	1.41 (1.04, 1.92)
Acute renal failure	0.06%	0.23%	<0.001	2.68 (1.90, 3.80)
Sepsis	0.08%	0.21%	<0.001	1.87 (1.30, 2.68)
Eclampsia	0.08%	0.18%	<0.001	2.06 (1.39, 3.04)
Hysterectomy	0.08%	0.15%	0.01	1.68 (1.07, 2.64)
Pulmonary edema	0.03%	0.10%	<0.001	2.33 (1.37, 3.96)
Shock	0.04%	0.09%	0.005	1.97 (1.11, 3.49)

*Chi-square/Fisher Exact test
aOR-Adjusted odds ratio, CI-Confidence interval
**Adjusted for maternal race and ethnicity, age, body mass index, education, insurance, parity and smoking status, gestational diabetes and macrosomia.

1004 Postpartum discharge opioid prescribing in nulliparous, term, singleton, vertex pregnancies in opioid-naive birthing people

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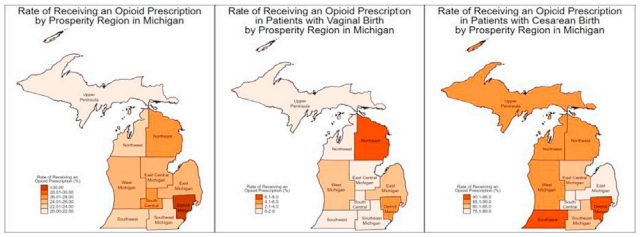
OBJECTIVE: To describe the patient, provider, hospital, and regional predictors of postpartum opioid prescribing for birthing people who had no prior opioid exposure.

STUDY DESIGN: We conducted a retrospective cohort analysis of 89,721 opioid-naive, nulliparous, term, singleton, vertex (NTSV) births from 1/1/2020-1/1/2023, using registry data obtained from a Michigan statewide maternity care collaborative, the Obstetrics Initiative. Patient demographics and clinical data were obtained from registry data. We assessed variation in postpartum prescribing by region. Then, using models adjusted for patient, prescribing provider, hospital, and regional characteristics, we assessed the factors most associated with receipt of a discharge opioid prescription following vaginal and cesarean birth.

RESULTS: Of the 89,721 opioid- naive birthing people, 24,317 (27%) received an opioid prescription at discharge. The prescription rates for Cesarean births was 88% and for vaginal births was 3%. For vaginal births, the prescription rate varied across regions from 0.14% to 6.9%. The regional variation in prescription rates for cesarean birth ranged from 76.4% to 92.8%. In adjusted models, region of childbirth was a predictor of opioid prescribing for vaginal births but not cesarean births. The strongest predictors of receiving an opioid prescription after vaginal birth were 3rd and 4th degree laceration (aOR 7.23, 95% CI 6.12-8.55) and hysterectomy (aOR 7.69, 95% CI 1.33-44.28). The strongest predictors of receiving an opioid

prescription after cesarean birth were non-Hispanic Black (aOR 1.27, 95% CI 1.08-1.49) and Asian race (aOR 1.27, 95% CI 1.02-1.58) and postpartum hemorrhage (aOR 1.15, 95% CI 1.02-1.30).

CONCLUSION: Opioid prescribing after vaginal birth was low, and largely driven by delivery related morbidity. Prescribing after cesarean birth was high and variable, and driven in part by non-clinical factors. Future work is needed to identify and address discrepancies that result in inequitable prescribing patterns.



1005 The clinical experience of prenatal whole genome sequencing in a maternal fetal medicine practice

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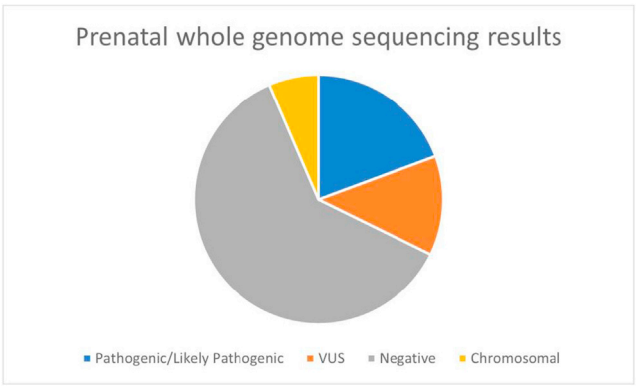
OBJECTIVE: Prenatal whole genome sequencing (WGS) recently became commercially available for patients undergoing CVS and amniocentesis procedures. We sought to characterize the clinical experience and evaluate the results of patients who elected to pursue prenatal WGS.

STUDY DESIGN: Pregnant patients undergoing diagnostic procedures from April 2022 to June 2023 were retrospectively studied. All patients underwent genetic counseling to discuss benefits and limitations of diagnostic testing and to obtain written consent. Inclusion criteria for WGS: patients undergoing CVS/amniocentesis with negative NIPT and at least one structural abnormality and/or a first trimester nuchal translucency measurement $\geq$ 3mm.

RESULTS: A total of 149 CVS/amniocentesis specimens were obtained. Of these, 31 patients elected to pursue WGS. Of the 31 cases, 6 (19%) were found to have a pathogenic or likely pathogenic mutation, 4/31 (13%) were found to have a variant of uncertain significance (VUS) related to clinical phenotype, 2/31 (6%) were found to have an abnormality that would have been detected through standard karyotype and/or chromosomal microarray (one case with 47,XXY and one with a 862 kb deletion within the region of 16p11.2) and 19/31 (62%) were negative.

CONCLUSION: Thirty-two percent of samples yielded a pathogenic/likely pathogenic variant or a VUS in a gene related to a clinical phenotype that would have been missed on chromosomal microarray analysis. These results suggest that WGS should be offered to patients undergoing diagnostic procedures when there is an anomaly noted on fetal ultrasound.



1006 The impact of screening for preeclampsia and preterm birth in nulliparous women: the PREVENTION-pilot study

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OBJECTIVE: Vaginal progesterone in women with a short cervix reduces spontaneous preterm births (sPTB) and particularly the early forms of sPTB. Aspirin initiated in the first-trimester can reduces preeclampsia (PE), particularly early PE, but also other outcomes related to deep placentation disorders (Great Obstetrical Syndromes). We wanted to study the impact of combined 1st trimester (early PE) and 2nd trimester (sPTB) screening on pregnancy outcomes.

STUDY DESIGN: We carried out an historical comparative study. From 2014 to 2017, we recruited nulliparous pregnant women with a singleton pregnancy in the 1st trimester of pregnancy. The 1st trimester FMF screening was performed, but the result remained secret and no intervention was proposed. From 2020 to 2022, we recruited nulliparous pregnant women with the same criteria in the same center to whom we gave the result of the FMF screening (giving aspirin in high-risk women) and to whom we performed a mid-trimester assessment of cervical length (giving vaginal progesterone in cases of short cervix). We compared the pregnancy outcomes, including PTB, sPTB before 37 weeks, 34 weeks, and before 32 weeks along with PE, PE $<$ 37 weeks, and PE$\leq$ 34 weeks, and intra-uterine fetal death (IUFD).

RESULTS: We compared the pregnancy outcomes of 5593 participants who did not receive screening results (2014-2017) with 1703 participants who received screening results (2021-2022). We observed no significant change in terms of PTB and PE overall, but a significant reduction of sPTB$<$ 32 weeks – RR : 0.32; 95%CI 0.13 – 0.83 (p=0.01), and a favorable trend for the other outcomes: all sPTB – RR : 0.83; 95%CI 0.63 – 1.09; sPTB $<$ 34 weeks – RR : 0.60; 95%CI 0.36 – 1.03, p=0.06; early PE – RR : 0.86; 95%CI 0.32 – 2.31; IUFD – RR: 0.75 95%CI : 0.22 – 2.65.

CONCLUSION: The introduction of 1st trimester PE screening combined to a 2nd trimester sPTB screening does not reduce the overall rates of PTB and PE, but can have a significant impact on the most

severe forms of those diseases, particularly sPTB < 32 weeks. A randomized trial with larger number of participants is warranted.

1007 Racial trends in severe maternal morbidity in the US

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OBJECTIVE: Racial disparities in severe maternal morbidity (SMM) are well known, however, data regarding temporal trends and regional variation are limited. We sought to evaluate these trends by race and ethnicity.

STUDY DESIGN: Retrospective cohort study of SMM using data from the National Inpatient Sample of US delivery hospitalizations (2010-2020). ICD9-10 codes identified SMM diagnoses as defined by the CDC (excluding transfusion). SMM rates by racial group (American Indian; AI; Asian and Pacific Islander; API; non-Hispanic Black; NHB; Hispanic; non-Hispanic White; NHW) were compared. Joinpoint regression determined annual percent change (APC) and average APC (AAPC) in SMM. Adjusted relative risk of SMM by region (Northeast; NE, Midwest; MW, South, and West) were ascertained using NHW (lowest SMM risk) as the referent group.

RESULTS: Of all US deliveries (2010-2020), the overall rate of SMM (per 100,000) was 673, 1183, 755, 811, and 999 among NHW, NHB, Hispanic, API, and AI cohorts respectively. SMM rate increased for all races (2010-2020 AAPC; NHB 2.3, CI 1.4-3.3, Hispanic 4.6, CI 3.3-6.2, API 2.8, CI 0.6-5.1, AI 3.8, CI 0.5-7.8) except NHW (AAPC -0.1 CI -0.8-0.7).

NHW SMM APC increased significantly after 2017. NHB and API groups had significant APC increases beginning in 2018 while Hispanic APC increased significantly during 2010-2011 and again during 2017-2020. AI SMM APC was significant and constant throughout.

SMM risk was higher in NHB compared to NHW parturients in the NE (aRR 1.8, CI 1.7-1.9), MW (aRR 1.7, CI 1.6-1.7), South (aRR 1.4, CI 1.3-1.4), and West (aRR 1.6, CI 1.5-1.6). SMM risk was likewise significantly higher for the Hispanic cohort (aRR range 1.1-1.4) in all regions except the South. For API, SMM risk was higher (aRR range 1.1-1.2) in every region outside the NE. AI had higher SMM risk (aRR range 1.1-1.2) in the NE and West but not MW and South.

CONCLUSION: All racial groups other than NHW had a significant increase in average APC of SMM (2010-2020). Significant regional and temporal variation in SMM exists between racial groups in the US.

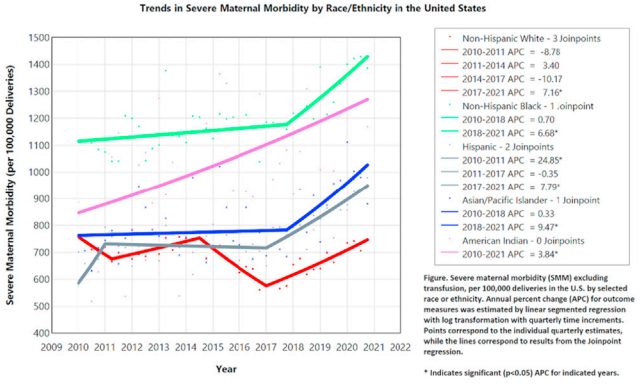

Figure. Severe maternal morbidity (SMM) excluding transfusion, per 100,000 deliveries in the U.S. by selected race or ethnicity. Annual percent change (APC) for outcome measures was estimated by linear segmented regression with log transformation with quarterly time increments. Points correspond to the individual quarterly estimates, while the lines correspond to results from the Joinpoint regression.

* Indicates significant (p<0.05) APC for indicated years.

1008 Risk of severe maternal morbidity among pregnancies resulting from infertility treatment

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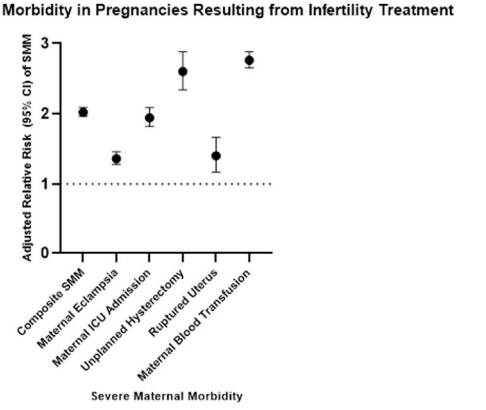
OBJECTIVE: As infertility rates rise in the US, more women are seeking infertility treatment. Though there is much to gain from infertility treatments (IT), there are well-documented risks associated with resulting pregnancies. Despite the rising number of IT pregnancies, data on the relationship between IT and severe maternal morbidity (SMM) are limited.

STUDY DESIGN: Retrospective population-based cohort study of all singleton US live births using vital statistics birth certificate records, 2014-2019. Demographic, medical, and pregnancy factors were compared between pregnancies resulting from infertility treatment and those not. The primary outcome was composite SMM, defined as maternal ICU admission, eclampsia, blood transfusion, unplanned hysterectomy, or ruptured uterus. Multivariate logistic regression estimated the relative influence of infertility treatment on SMM risk in pregnancies after adjustment for co-existing risks.

RESULTS: Of 22,568,980 singleton live births, 299,069 (1.8%) resulted from IT. Composite SMM rate was 0.70% in pregnancies without IT, and 2-fold higher (1.4%) among those with IT, adjRR 2.02 (95% CI 1.96, 2.09). IT was also associated with significantly increased risk of all individual measures of SMM, even after adjusting for confounding variables (figure). IT pregnancies resulting specifically from fertility enhancing drugs (FED) had 60% increased risk of composite SMM, adjRR 1.62 (95%CI 1.53, 1.71) and those with assisted reproductive technology (ART) had 50% increased risk, adjRR1.51 (95%CI 1.22, 1.89) compared to pregnancies without IT. Unplanned hysterectomy and blood transfusion risks were over 3-fold increased with ART, adjRR 3.25 (95% CI 2.89, 3.65) and adjRR 3.43 (95% CI 3.26, 3.61), respectively.

CONCLUSION: Pregnancies achieved following infertility treatment in the US are associated with significantly increased risk of SMM. These findings may inform counseling on pregnancy risks among those seeking fertility treatment and decisions regarding acuity level of care access for prenatal care and delivery planning.



Referent group: pregnancies without infertility treatment
Adjusted RR: covariates included maternal black race, maternal age 35 years and greater, and Medicaid status

1009 Surgical site infection severity in patients receiving non-cephalosporin antibiotics at time of cesarean section

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OBJECTIVE: To determine severity of surgical site infections (SSI) occurring in patients receiving cephalosporin versus non-cephalosporin based prophylaxis at time of cesarean section (CS).

STUDY DESIGN: This is a retrospective chart review of all SSIs occurring at two tertiary care centers. Inclusion criteria included women who had CS from 1/1/2016 to 12/31/2022. Exclusion criteria included combined delivery of multiples. Our primary outcome was development of organ space SSI. Secondary outcomes included postpartum endometritis, incisional infection, postpartum readmission, and other indicators of maternal morbidity data was analyzed using standard statistical tests.

RESULTS: We identified 134 patients with SSI**:** 112 received a standard (cephalosporin-based) regimen and 22 received a non-standard (non-cephalosporin-based regimen). Cohorts were similar in demographics and medical co-morbidities (Table). Those in non-standard cohort were more likely to develop an organ/space SSI ($p = 0.04$) and require hospital readmission ($p = 0.05$). There were also higher rates of composite procedures (return to OR, hysterectomy, drain placement) in the non-standard group, but did not reach significance. 59% (n=13) of patients in the non-standard group went on to receive a penicillin analogue for subsequent treatment without allergic reaction.

CONCLUSION: Patients with SSI who received non-standard (non-cephalosporin antibiotics) regimens at CS were more likely to develop organ/space SSI and experience hospital readmission. Further, the majority of the non-standard cohort subsequently received penicillin analogues noting the importance of allergy testing in reducing SSI related morbidity and associated resource utilization.

	Standard Regimen (cephalosporin-containing regimen) N=112	Non-standard Regimen (non-cephalosporin containing regimen) N=22	P Value
Demographics (N, %)			
Age, years (mean +/- SD)	30.65 (6.43)	30.05 (6.51)	0.68
Race			0.27
Black	46 (41.07)	6 (27.27)	
White	37 (33.04)	12 (54.55)	
Asian	2 (1.75)	0	
Other	27 (23.68)	4 (18.18)	
Ethnicity, n = 133			0.23
Hispanic	22 (19.82)	2 (9.09)	
Non-Hispanic	89 (80.18)	20 (90.91)	
Nulliparity	49 (43.75)	17 (77.27)	<0.01
Multiple gestation	7 (6.25)	1 (4.55)	0.76
BMI, kg/m2 (mean +/- SD)	38.63 (11.34)	38 (9.89)	0.82
Chronic hypertension	33 (29.46)	6 (27.27)	0.84
Diabetes mellitus	12 (10.71)	1 (4.55)	0.37
Outcomes (N, %)			
GA at delivery, days (mean +/- SD)	256.68 (27.45)	258.96 (33.14)	0.71
Organ/Space infection	12 (10.71)	6 (27.27)	0.04
Incisional infection (superficial or deep)	75 (66.96)	13 (59.09)	0.48
Postpartum endometritis	25 (22.32)	3 (13.64)	0.36
Postpartum readmission	46 (41.07)	14 (63.64)	0.05
Sepsis	10 (8.77)	8 (36.36)	0.50
Severe maternal morbidity	33 (29.46)	8 (36.36)	0.52
Composite procedure (washout, IR drain, hysterectomy)	22 (19.64)	8 (36.36)	0.09
Return to operating room	13 (11.61)	5 (22.73)	0.16
Hysterectomy	4 (3.57)	1 (4.55)	0.83
IR drain placement	9 (8.04)	4 (18.18)	0.14

1010 The relationship between platelets indices and hypertensive disorders of pregnancy

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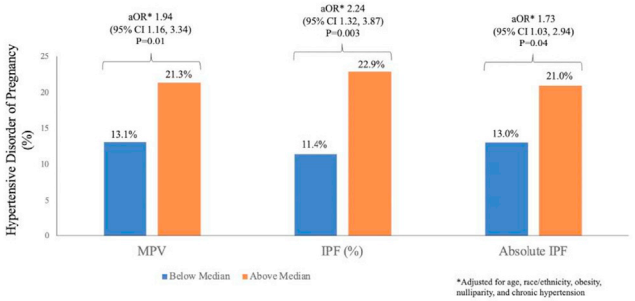
OBJECTIVE: The underlying mechanism of hypertensive disorders of pregnancy (HDP) is unclear. Aspirin, a well-known platelet function inhibitor, is indicated in high-risk pregnancies for the prevention of preeclampsia. We sought to investigate the relationship between platelet indices (count, size, and production/immaturity) and HDP.

STUDY DESIGN: This was a prospective cohort of pregnant participants followed from the 1st trimester between 2/2022 to 6/2022. Routine platelet indices obtained prospectively during prenatal care and delivery were compared between those who developed HDP and those who did not. We assessed platelet count (by trimester), mean platelet volume (MPV, an assessment of platelet size), and immature platelet function (IPF, an assessment of platelet production/immaturity) measured as percent (%) and absolute count. Platelet indices are presented as median (25th,75th %ile) and compared between groups via Mann-Whitney U test. Data are presented as adjusted odds ratio (95% CI) following multivariable logistic regression.

RESULTS: Overall, 78 of 459 (17.0%) developed HDP. While age and race/ethnicity did not differ, obesity (29.5% v. 13.6%, $p< 0.01$) and chronic hypertension (12.8% v. 5.8%, $p< 0.05$) were more frequent in those who developed HDP. There was no significant difference in platelet count in the 1st trimester, 2nd trimester, or at delivery in those with or without HDP. In contrast, people who developed HDP had higher MPV (11.7 fL [10.8,12.4] v. 11.1 fL [10.5,12.0], $P_{adj}=0.005$), IPF% (7.3% [4.9,10.7] v. 5.9% [4.2,9.2], $P_{adj}=0.025$), and absolute IPF (16.4 $x10^9$ [11.2,20.4] v. 13.3 $x10^9$ [9.3,17.4], $P_{adj}=0.022$) than those without. When stratified by the median, the prevalence and adjusted odds of HDP increased with increasing MPV, IPF (%), and absolute IPF. (Figure).

CONCLUSION: Platelet indices of size and production/immaturity were significantly increased in those with HDP, suggesting that platelets play an important role in HDP development. These data support further investigation into platelet activity and the role of targeting platelets with aspirin to prevent HDP.

Figure. Prevalence and Adjusted Odds of HDP with Increased Markers of Platelet Size and Immaturity



1011 Routine TVUS at the time of anatomy scan: to do or not to do?

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OBJECTIVE: There are no universal guidelines for transvaginal ultrasound (TVUS) at time of anatomy scan. TVUS can provide information on placental location and cervical length (CL), but may lead to more interventions. As a quality assurance initiative, a universal TVUS (UTVUS) protocol at the time of anatomy scan was started at our institution. This study was conducted to assess whether there was a decrease in preterm birth (PTB), postpartum hemorrhage (PPH), and neonatal intensive care unit (NICU) admission once UTVUS was implemented.

STUDY DESIGN: This was a retrospective cohort study performed on singleton gestations from February 2021-January 2022. During the first six months of the study period, patients only had a TVUS based on risk factors (history of cervical procedure, history of prior PTB, placenta appears low lying or cervix appears short on abdominal ultrasound) (pre group). The second half of the study period, UTVUS was implemented at the time of anatomy scan (post group).

RESULTS: A total of 2118 patients were included. There were 1037 patients in the pre group, of which 161 underwent TVUS based on high risk factors. The post group/UTVUS included 1081 patients. Regarding patient characteristics, patients in the pre group had statistically significant earlier gestational age at first TVUS ($p< 0.0001$), were less likely to have had a prior PTB < 36 weeks ($p=0.03$), and were more likely to have a history of cervical procedure ($p=0.0006$) than patients in the post group. However, the proportion of patients with PTB, PPH, or NICU admission did not significantly differ between the two groups even after adjusting for cofounders ($p >0.05$).

CONCLUSION: Our data shows that UTVUS did not decrease adverse pregnancy outcomes. In addition, the implementation of UTVUS increases discomfort for the patient, duration of the scan and is an additional cost. Therefore, surveillance by abdominal ultrasound may be reasonable with addition of TVUS based on risk factors.

Table 1. Patient Demographics & Univariable and Multivariable Analysis of Primary Outcomes

	Pre UTVUS (n=1037)		Post UTVUS (n=1081)		P-Value
	N	Mean (SD)	N	Mean (SD)	
Maternal age (years)	1037	33.6 (5.0)	1081	33.4 (4.9)	0.33
Pregravid BMI	1030	26.9 (6.2)	1079	27.1 (6.3)	0.52
	N	Median (IQR)	N	Median (IQR)	
Gravity	1037	2 (1, 3)	1081	2 (1, 3)	0.15
Parity (term)	1037	0 (0, 1)	1081	0 (0, 1)	0.05
Parity (preterm)	1037	0 (0, 0)	1081	0 (0, 0)	0.08
GA at first TVUS (days)	148	20w2d (19w3d,20w5d)	1081	20w4d (20w1d, 21w)	<0.05
GA at delivery (days)	1037	39w1d (38w2d,39w6d)	1081	39w1d (38w2d, 40w0d)	0.46
Race/Ethnicity	N (%)		N (%)		0.27
White	438 (42.2)		487 (45.1)		
Black or African American	168 (16.2)		181 (16.7)		
Asian	150 (14.5)		160 (14.8)		
Other	281 (27.1)		253 (23.4)		
Insurance payor					0.22
Commercial	814 (78.5)		872 (80.7)		
Public	223 (21.5)		209 (19.3)		
Prior preterm birth < 36 weeks					0.03
Yes	29 (2.8)		50 (4.6)		
No	1008 (97.2)		1031 (95.4)		
Other reason for serial CL					>0.99
Bicornuate uterus	3 (0.3)		1 (0.1)		
Didelphic uterus	1 (0.1)		0 (0)		
History of short cervix	2 (0.2)		1 (0.1)		
LEEP	2 (0.2)		0 (0)		
Cerclage placed					0.08
Yes	11 (1.0)		22(1.5)		
No	1019 (98.3)		1063 (98.3)		
History of cervical procedure					<0.05
Yes	14 (1.4)		1 (0.1)		
No	1023 (98.6)		1080 (99.9)		
Type of cervical procedure					
LEEP	13 (1.3)		1 (0.1)		<0.05
Cone	1 (0.1)		0 (0)		0.49
Mode of delivery					0.79
Vaginal	683 (65.9)		706 (65.3)		
C-section	354 (34.1)		375 (34.7)		

	Pre UTVUS (n=1037)	Post UTVUS (n=1081)	Univariable Analysis Pre vs. Post		Multivariable Analysis Pre vs. Post *	
	N (%)	N (%)	OR (95% CI)	p-value	OR (95% CI)	p-value
Preterm Birth (GA < 37 weeks)	83 (8.0)	98 (9.1)	1.2 (0.8-1.6)	0.38	1.2 (0.9-1.6)	0.24
Postpartum hemorrhage (EBL/QBL > 1 L)	45 (4.3)	53 (4.9)	1.1 (0.8-1.7)	0.53	1.1 (0.8-1.7)	0.55
NICU admission	35 (3.4)	52 (4.8)	1.4 (0.9-2.2)	0.10	1.5 (1.0-2.3)	0.08

US = ultrasound, SD = standard deviation, IQR = interquartile range, BMI = body mass index, GA = gestational age, CL = cervical length
*Adjusted for age, race (White vs other), parity, commercial vs public insurance, BMI. Outcome of postpartum hemorrhage and NICU admission are also adjusted for mode of delivery.

1012 The association between uterine fibroid size and number and risk of preterm birth

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OBJECTIVE: While the association between uterine fibroids and preterm birth (PTB) is well known, data regarding whether fibroid characteristics such as size or number modifies such risk are limited. Therefore, we aimed to evaluate the association between uterine fibroid size and number and risk of PTB.

STUDY DESIGN: Multicenter retrospective cross-sectional study of all patients who had a prenatal ultrasound at ≥ 18 weeks and delivered from 2019-2022. When fibroids were identified on ultrasound, their characteristics were documented. Patients with more than one delivery during the study period had only their first included for analysis. The risk of PTB, stratified by gestational age (< 37, < 34, and < 28 weeks), was assessed based on fibroid number (1, 2, ≥3) and size (largest dimension < 5cm, 5-10cm, >10cm) compared to patients with no fibroids. Multivariate logistic regression was performed to adjust for potential confounders. Data were presented as adjusted odds ratios (aOR) with 95% confidence intervals (CI).

RESULTS: Among the 65,590 patients studied, 4,421 (6.7%) had at least one fibroid. The prevalence of PTB was 8.7%. The presence of any fibroid, regardless of size or number, was associated with an increased risk of PTB < 37 weeks (Table). Increasing fibroid number and size were associated with higher risks of PTB < 37 weeks. Patients with 2 and ≥3 fibroids were at increased risk of PTB < 34 and

< 28 weeks compared to those with no fibroids. Increasing fibroid size was also associated with an increased risk of PTB < 34 weeks. Patients with fibroids >10cm were at increased risk of PTB < 28 weeks compared to those with no fibroids.

CONCLUSION: Data from this large cohort suggest that fibroid characteristics such as size and number are associated with the PTB and impact the severity of PTB. Providers should consider and inform these risks while caring for pregnancies with prenatally detected uterine fibroids.

Table 1. Association between fibroid number and size and preterm birth.

		aOR* (95% CI)		
		PTB <37 weeks	PTB <34 weeks	PTB <28 weeks
Number of fibroids	No fibroids	Reference		
	1	1.26 (1.10-1.44)	1.23 (0.97-1.55)	1.01 (0.63-1.63)
	2	1.27 (1.01-1.58)	1.96 (1.43-2.69)	1.92 (1.08-3.41)
	>3	1.60 (1.29-1.99)	1.66 (1.17-2.35)	1.92 (1.07-3.44)
Fibroid size based on largest dimension	No fibroids	Reference		
	<5cm	1.19 (1.04-1.36)	1.39 (1.12-1.72)	1.28 (0.84-1.95)
	5-10cm	1.47 (1.23-1.75)	1.50 (1.13-1.99)	1.26 (0.72-2.20)
	>10cm	2.26 (1.55-3.28)	2.06 (1.13-3.78)	3.32 (1.42-7.73)

56,765 patients included in logistic regression models as 13.9% of study cohort had missing data on BMI and/or marital status.
*Models adjusted for maternal age, BMI, insurance type, marital status, race/ethnicity, parity, history of preterm birth, history of uterine surgery (myomectomy or cesarean), pregestational diabetes, and chronic hypertension.

1013 Preterm delivery and the risk for childhood celiac disease of the offspring

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OBJECTIVE: Preterm delivery is the endpoint of a multifactorial process resulting in a premature birth of the neonate. Some immunological disorders causing an immune-mediated inflammation, have been linked to preterm delivery, and women carrying these traits may pass them along to their offspring. As celiac disease is an immune-mediated disease, we investigated whether children born preterm (< 37 weeks) are at an increased risk to develop celiac disease.

STUDY DESIGN: A large population-based cohort study of singleton deliveries in a tertiary hospital between the years 1991 and 2021 was conducted. The risk of celiac disease was compared between children (up to the age of 18 years) born preterm and children born at term. Data for celiac disease diagnosis of the offspring were extracted from community-based clinics and hospitalization records. Kaplan-Meier survival curve was used to compare the incidence of celiac disease between the study groups. A multivariable Cox proportional hazards model was used to control for confounders.

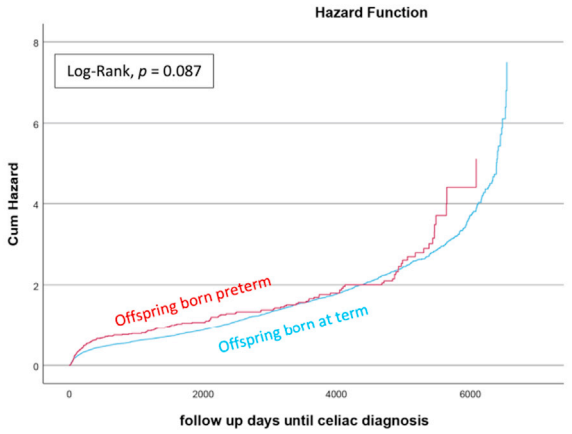
RESULTS: A total of 356,109 singleton deliveries were included, of which, 24,511 deliveries (6.9%) were preterm. Children born preterm had higher rates of celiac disease as compared to children born at term (0.7% vs 0.5%, p=0.012, Figure). However, the Kaplan-Meier survival curve illustrated comparable cumulative incidence of celiac disease in preterm and term born offspring (Log Rank, p=0.087, Figure). When using a Cox proportional hazards model, controlling for maternal celiac disease, maternal age and small for gestational age (SGA) neonates, being born prematurely was not associated with celiac disease (adjusted hazard ratio (HR)=1.14, 95%CI 0.97-1.34, p=0.103, Figure).

CONCLUSION: Being born prematurely is not a risk factor to develop childhood celiac disease.

Figure. The association between being born prematurely and celiac disease: Univariate analysis, Kaplan Meier survival curve and results from a Cox proportional hazards model

	Preterm delivery (n=24,511)	Term delivery (n=331,598)	Odds Ratio (95% CI)	Adjusted* HR (95% CI)
Celiac disease	163 (0.7%)	1797 (0.5%)	1.22 (1.04 – 1.44)	1.14 (0.97 – 1.34)

* Adjusted for maternal celiac disease, maternal age and SGA (<5th percentile for gestational age and gender)



1014 Predictors of antibiotic redosing in cesarean deliveries with excessive blood loss

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OBJECTIVE: Surgical site infections occur in up to 15% of patients after cesarean delivery, and elevated blood loss during surgery is associated with postoperative infectious complications. Multiple societies recommend that surgical patients who experience excessive blood loss should receive an additional intraoperative dose of the pre-incision antibiotic. However, these guidelines are not consistently followed. We sought to examine factors associated with receiving a redose of preincision antibiotic in cesarean deliveries with excessive blood loss.

STUDY DESIGN: A retrospective cohort study of all patients who underwent cesarean delivery at a single site from October 2018 - April 2022 with an estimated or quantitative blood loss > 1.5 liters. Demographic and pregnancy data were abstracted from the electronic medical record. The relationship between blood loss, baseline characteristics, and antibiotic redose was described by univariable analysis. We identified factors associated with antibiotic redose using multivariable logistic regression.

RESULTS: Of 113 patients who met criteria for redose, 35 (31.0%) were given an additional dose of preincision antibiotic. The median blood loss was 2000 mL (IQR 1800 - 3000mL). 44 (38.9%) patients underwent a cesarean hysterectomy. Patients were more likely to receive a redose if they had higher blood loss (p=.0002), cesarean hysterectomy (p< .0001), or delivered at an earlier gestational age (p=.007) (Table). After adjusting for confounders, only cesarean hysterectomy was still an independent predictor of antibiotic redose (aOR 4.56, 95% CI 1.59 - 13.06).

CONCLUSION: Patients with blood loss > 1.5 liters during cesarean delivery were more likely to receive the recommended redose of

preincision antibiotics if they underwent cesarean hysterectomy. Overall compliance with the recommendation to redose antibiotics in cesarean deliveries with excessive blood loss was suboptimal, and measures should be taken to improve redosing in all patients who meet criteria.

Table. Patient characteristics.

	No redose (n=78)	Redose (n=35)	p
Age	35.7 ± 5.1	35.6 ± 5.0	.90
Hysterectomy	20 (25.6)	24 (68.6)	**<.0001**
Blood loss (mL)	2000 (1800-2100)	3100 (2550-4150)	**.0002**
Gestational age (weeks completed)	38 (36-39)	36 (34-39)	**.006**
Birthweight (g)	3343 (3020-3515)	3210 (2610-3965)	.55
Parity			
Nulliparous	46 (59.0)	18 (51.4)	.45
Multiparous	32 (41.0)	17 (48.6)	
Body mass index			
< 30	42 (53.9)	16 (45.7)	.42
≥ 30	36 (46.2)	19 (54.3)	
Race			
Asian	12 (15.4)	3 (8.6)	.51
Black	8 (10.3)	1 (2.9)	
Hispanic	15 (19.2)	8 (22.9)	
Other	11 (14.1)	7 (20.0)	
White	32 (41.0)	16 (45.7)	
Insurance			
Public	7 (9.0)	4 (11.8)	.65
Private	71 (91.0)	30 (88.2)	

*Data are n (%), mean ± standard deviation, or median (interquartile range).

1015 The Effect of latent-phase duration on pregnancy outcomes in nulliparas undergoing induction of labor: Meta-analysis

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OBJECTIVE: Failed induction of labor (IOL) is defined as failure to deliver or achieve active labor after an adequate period of oxytocin and rupture of membrane (ROM). Previous studies showed an association between adverse maternal outcomes and longer duration of oxytocin and rupture of membranes (ROM). However, neonatal outcomes were not well-described. We sought to perform a meta-analysis of studies that evaluated outcomes according to the duration of oxytocin and ROM.

STUDY DESIGN: Studies were included in the meta-analysis if they were observational studies that examined a cohort of nulliparous individuals undergoing IOL with cephalic presentation and singleton pregnancies at 36 weeks or greater. The primary outcome was admission to the neonatal intensive care unit (NICU). Secondary outcomes included rates of chorioamnionitis, endometritis, cesarean delivery, and postpartum hemorrhage (PPH). Outcomes were compared between individuals who remained in latent labor and those who exited the latent phase (active labor or delivered) at 6, 9, 12, 15, and 18 hours of oxytocin and ROM. Findings were summarized as relative risk (RR) with 95% confidence interval (CI) using the random effects model.

RESULTS: Of 1364 studies found on the initial search, 4 studies and 22,184 nulliparous individuals were included in the meta-analysis. Compared to individuals who exited the latent labor, those who remained in latent labor at 12, 15, and 18 hours after oxytocin and ROM had an increased risk of NICU admission (range of RR 1.48-1.82; Table 1). All adverse maternal outcomes were increased in those who remained in latent labor at all time points (6, 9, 12, 15, and 18 hours) except for endometritis and PPH which were not significantly different after 18 hours of oxytocin and ROM.

CONCLUSION: In nulliparous individuals undergoing IOL, adverse neonatal outcomes increase significantly after 12 hours in those who do not deliver or achieve active phase. A definition of failed IOL as failure to achieve active labor after 12 hours of oxytocin and ROM is appropriate to minimize adverse outcomes.

Table 1. Outcomes for individuals who remained in latent labor vs. those who exited latent labor

Outcome	In latent labor (%)	Exited latent labor (Active labor or delivered) (%)	Number of studies	I^2, %	RR (95%CI)
NICU					
at 6 hours	667/7823 (8.5)	1066/14361 (7.4)	4	65.9	1.17 (0.95-1.44)
at 9 hours	323/3412 (9.5)	1394/18375 (7.6)	3	56.3	1.24 (1.00-1.53)
at 12 hours	173/1541 (11.2)	1668/20643 (8.1)	4	0	1.48 (1.28-1.72)
at 15 hours	91/663 (13.7)	1540/19777 (7.8)	2	0	1.73 (1.42-2.10)
at 18 hours	50/350 (14.3)	1603/20487 (7.8)	3	0	1.82 (1.40-2.36)
Chorioamnionitis					
at 6 hours	947/7823 (12.1)	846/14361 (5.9)	4	8.3	2.08 (1.90-2.27)
at 9 hours	504/3412 (14.8)	1230/18375 (6.7)	3	0	2.24 (2.04-2.47)
at 12 hours	279/1541 (18.1)	1517/20643 (7.3)	4	34.8	2.45 (2.06-2.91)
at 15 hours	115/663 (17.3)	1438/19777 (7.3)	2	75.4	2.44 (1.67-3.57)
at 18 hours	49/350 (14.0)	1565/20487 (7.6)	3	2.9	1.72 (1.32-2.24)
Endometritis					
at 6 hours	170/3916 (4.3)	148/7194 (2.1)	2	0	2.38 (1.93-2.93)
at 9 hours	90/1775 (5.7)	223/9385 (2.4)	2	0	2.54 (2.03-3.19)
at 12 hours	45/707 (6.4)	275/10403 (2.6)	2	0	2.63 (1.98-3.51)
at 15 hours	12/277 (4.3)	123/9486 (1.3)	1	NA	3.34 (1.87-5.97)
at 18 hours	4/137 (3.0)	135/9626 (1.4)	1	NA	2.08 (0.78-5.55)
Cesarean					
at 6 hours	3539/7823 (45.2)	3220/14361 (22.4)	4	98.6	2.05 (1.47-2.86)
at 9 hours	1899/3505 (54.2)	5006/18655 (26.8)	4	96.9	2.16 (1.66-2.80)
at 12 hours	905/1506 (60.0)	6215/20469 (30.4)	4	90.9	1.89 (1.62-2.21)
at 15 hours	426/682 (62.5)	6571/19967 (33.0)	3	75.8	1.86 (1.60-2.16)
at 18 hours	209/337 (62.0)	6920/20313 (34.1)	3	58.1	1.83 (1.55-2.15)
PPH					
at 6 hours	328/7416 (4.4)	370/13421 (2.8)	3	44.7	1.55 (1.34-1.80)
at 9 hours	167/3251 (5.1)	499/17189 (3.0)	2	0	1.77 (1.49-2.10)
at 12 hours	90/1470 (6.1)	608/19367 (3.1)	3	79.8	2.02 (1.23-3.32)
at 15 hours	41/663 (6.2)	624/19777 (3.2)	2	46.5	2.04 (1.34-3.11)
at 18 hours	21/350 (6.0)	678/20487 (3.3)	3	71.0	1.97 (0.80-4.85)

Abbreviations: NICU (neonatal intensive care unit); PPH (postpartum hemorrhage); RR (relative risk)

1016 The T rend in Maternal Morbidity

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OBJECTIVE: Multiple reports indicate that severe maternal morbidity (SMM) is increasing. Whether this increase is due to change in patient characteristics or practice patterns is not adequately evaluated. Our objective was to examine the temporal trends of SMM in the US population in relation to trends in maternal characteristics.

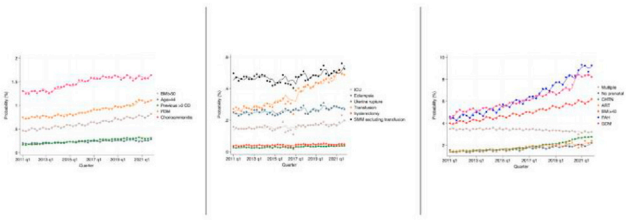
STUDY DESIGN: We performed a repeated cross-sectional analysis of US birth certificate data from 2011 to 2021. Our primary outcome was SMM defined as the occurrence of intensive care unit admission (ICU), eclampsia, uterine rupture, blood product transfusion, and hysterectomy. We also examined the proportions of age (> 44 years), BMI (>40 kg/m^2 and >50 kg/m^2), > 3 prior cesareans, pregestational diabetes, multiple gestation, no prenatal care, chronic hypertension, and assisted reproductive technology. The incidence rate ratio per year (IRR) was calculated using negative binomial regression.

RESULTS: There were 42,519,424 births from 2011 to 2021. Figure 1 shows statistically significant increases in the rates of patient with age >44 years (IRR 1.03 [95% CI 1.03-1.04]), BMI >40 kg/m2 (IRR 1.06 [95% CI 1.06-1.06]), BMI >50 kg/m2 (IRR 1.07 [95% CI 1.07-1.07]), no prenatal care (IRR 1.04 [95% CI 1.04-1.05]), chronic hypertension (IRR 1.07 [95% CI 1.06-1.07]), pregestational diabetes (IRR 1.06 [95% CI 1.06-1.06]), and >3 prior cesarean (IRR 1.08 [95% CI 1.07-1.08]). There were statistically significant increases in SMM (IRR 1.03 [95% CI 1.02-1.03]), ICU (IRR 1.04 [95% CI 1.03-

1.05]), eclampsia (IRR 1.02 [95% CI 1.01-1.02]), hysterectomy (IRR 1.04 [95% CI 1.03-1.05]), uterine rupture (IRR 1.05 [95% CI 1.04-1.06]), and transfusion (IRR 1.09 [95% CI 1.08-1.09]). However, these were no longer significant after adjusting for the increase in BMI >40 kg/m2, age >44 years, and no prenatal care.

CONCLUSION: SMM increased over the past decade, but this increase was not out of proportion to the temporal trends in maternal characteristics. Addressing SMM requires tackling issues that are not directly related to the index pregnancy.

Figure 1: Trends in maternal morbidities



1017 Late preterm antenatal steroids in women with gestational diabetes mellitus

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OBJECTIVE: Pregnant people with gestational diabetes mellitus (GDM) were included in the ALPS study but represented only 11% of the sample. Additionally, neonatal outcomes were not stratified based on maternal diabetes status. The objective of this study was to examine the rate of neonatal hypoglycemia, NICU admission, and respiratory morbidity in neonates of pregnant individuals with GDM who were exposed to late preterm antenatal steroids (AS) and those who were not.

STUDY DESIGN: This was a retrospective cohort study in four hospitals in one healthcare system between 2016-2021. Pregnant people with either GDMA1 (diet controlled) or GDMA2 (requiring medication) who presented in the late preterm period with concern for preterm delivery were included. The indication for preterm delivery was classified as preterm labor (PTL), preterm pre-labor rupture of membranes (PPROM), or maternal/fetal indication. Exclusion criteria included multifetal gestations, prior course of AS or no anticipation of delivery in the next 7 days. Adjusted odds ratios with 95% confidence intervals were calculated for neonatal outcomes.

RESULTS: The sample included 199 women in the AS group and 123 women in the non-AS group. Of those in the AS and non-AS groups, 92 and 61 had GDMA1; 107 and 62 had GDMA2. The indication for admission was PTL (22.1%, 26.8%), PPROM (21.6%, 35.8%) and maternal/fetal indication (56.3%, 37.4%) in the AS and non-AS groups respectively. In the AS group, 40% received one dose of steroids and 60% received two doses. After adjusting for gestational age at birth and birth weight, there were no significant differences in hypoglycemia (0.87 [0.53-1.43]) and NICU admission (1.03 [0.62-1.70]). Respiratory distress syndrome was lower in the AS group (0.50 [0.27-0.95]) but there was no difference in the composite respiratory score (0.93 [0.57-1.54]).

CONCLUSION: Administration of late preterm AS to women with GDM does not increase the risk of hypoglycemia or NICU admission. AS reduce the risk of respiratory distress syndrome but not other respiratory or neonatal morbidity.

Table 1 – Neonatal outcomes in patients with gestational diabetes

Outcome	Betamethasone (n=199)	No Betamethasone (n=123)	Unadjusted OR (95% CI)*	Adjusted OR (95%CI)*
Hypoglycemia	60 (30.2)	40 (32.5)	0.90 (0.55-1.46)	0.87 (0.53-1.43)
CPAP/HFNC >4 hours	43 (21.7)	27 (22.5)	0.96 (0.56-1.67)	0.74 (0.41-1.33)
Supplemental oxygen >2 hours	18 (9.1)	17 (14.2)	0.61 (0.30=1.24)	0.50 (0.24-1.06)
ECMO	1 (0.5)	0 (0.0)	N/A	N/A
Mechanical ventilation	7 (3.5)	9 (7.5)	0.45 (0.16-1.25)	0.35 (0.11-1.02)
Resuscitation	47 (23.7)	23 (19.2)	1.31 (0.76-2.33)	1.15 (0.65-2.08)
RDS	39 (19.7)	27 (22.7)	0.84 (0.48-1.46)	**0.50 (0.27-0.95)**
TTN	25 (12.6)	18 (15.0)	0.82 (0.43-1.59)	0.74 (0.38-1.48)
Apnea	15 (7.6)	3 (2.5)	**3.20 (1.03-14.02)**	2.26 (0.69-10.18)
Pneumonia	2 (1.0)	0 (0.0)	N/A	N/A
Surfactant	7 (3.5)	5 (4.2)	0.84 (0.26-2.91)	0.62 (0.18-2.25)
IVH	1 (0.5)	1 (0.8)	0.60 (0.02-15.32)	0.53 (0.02-14.04)
Sepsis	2 (1.0)	0 (0.0)	N/A	N/A
Hyperbilirubinemia	85 (42.7)	46 (38.3)	1.20 (0.76-1.91)	0.94 (0.57-1.53)
Hypothermia	29 (14.6)	13 (10.8)	1.41 (0.72-2.92)	1.04 (0.50-2.22)
Feeding difficulties	48 (24.2)	25 (20.8)	1.22 (0.71-2.13)	0.71 (0.37-1.33)
NICU admission	118 (59.6)	64 (52.0)	1.36 (0.86-2.14)	1.03 (0.62-1.70)
Length of NICU stay	3 (0-8) †	2 (0-6.75) †	0.76 (-0.84-2.36)	-0.39 (-1.87-1.06)
Respiratory composite score	76 (38.4)	42 (35.6)	1.13 (0.70-1.82)	0.93 (0.57-1.54)
Neonatal morbidity composite score	107 (54.0)	60 (50.4)	1.16 (0.73-1.82)	0.86 (0.53-1.41)

Data are reported as n (%)
†Data are reported as median (IQR1 -IQR3)
*Outcomes adjusted for gestational age at birth and birth weight
An estimate rather than odds ratio was calculated for length of NICU stay

1018 Late preterm antenatal steroids in women with pregestational diabetes mellitus

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OBJECTIVE: Pregnant people with pregestational diabetes mellitus (PGDM) were excluded from the ALPS study due to concern for worsening hypoglycemia in neonates exposed to antenatal steroids (AS). However, AS may improve neonatal respiratory outcomes, which are compromised in neonates of diabetic mothers. The objective of this study was to examine the rate of neonatal hypoglycemia, NICU admission and respiratory morbidity in neonates exposed to late preterm AS compared to those who were not.

STUDY DESIGN: This was a retrospective cohort study in four hospitals in one healthcare system between 2016-2021. Pregnant people with either Type 1 or 2 diabetes (T1DM, T2DM) who presented in the late preterm period with concern for preterm delivery were included. The indication for preterm delivery was classified as preterm labor (PTL), preterm pre-labor rupture of membranes (PPROM), or maternal/fetal indication. Exclusion criteria included multifetal gestations, prior course of AS, or no anticipation for delivery in the next 7 days. Adjusted odds ratios with 95% confidence intervals were calculated for neonatal outcomes.

RESULTS: The sample included 65 women in the AS group and 58 women in the non-AS group. Of mothers in the AS and non-AS

groups, 12 and 14 had T1DM and 53 and 44 had T2DM, respectively. The indication for admission was PTL (12.3%, 10.3%), PPROM (12.3%, 22.4%) and maternal/fetal indication (75.4%, 67.2%) in the AS and non-AS groups, respectively. In the AS group, 38% received one dose of steroids and 61% received two doses. After adjusting for gestational age at birth and birth weight, there were no significant differences in hypoglycemia (1.54 [0.71-3.41]) and NICU admission (0.81 [0.31-2.06]). There was a trend toward decreased composite respiratory score in the AS group (0.456 [0.19-1.05]) as well as a significant reduction in supplemental oxygen and need for resuscitation.

CONCLUSION: Administration of late preterm AS to women with PGDM does not increase the risk of hypoglycemia or NICU admission in our retrospective cohort. Neonatal respiratory morbidity with AS may be decreased.

Table 1 – Neonatal outcomes in patients with pregestational diabetes

Outcome	Betamethasone (n=65)	No Betamethasone (n=58)	Unadjusted OR (95% CI)*	Adjusted OR (95%CI)*
Hypoglycemia	34 (52.3)	25 (43.1)	1.45 (0.71-2.97)	1.54 (0.71-3.41)
CPAP/HFNC >4 hours	20 (31.2)	18 (31.6)	0.98 (0.46-2.14)	0.42 (0.15-1.08)
Supplemental oxygen > 2 hours	6 (9.4)	9 (15.8)	0.55 (0.17-1.64)	**0.27 (0.65-0.95)**
ECMO	0 (0.0)	1 (1.8)	N/A	N/A
Mechanical ventilation	9 (14.1)	3 (5.3)	2.95 (0.83-13.81)	1.23 (0.28-6.79)
Resuscitation	14 (21.9)	16 (28.1)	0.72 (0.31-1.64)	**0.36 (0.12-0.96)**
RDS	17 (26.6)	14 (24.6)	1.11 (0.49-2.55)	0.54 (0.19-1.42)
TTN	9 (14.1)	7 (12.3)	1.16 (0.41-3.49)	0.90 (0.28-2.96)
Apnea	7 (10.9)	2 (3.5)	3.38 (0.78-23.34)	2.64 (0.52-19.75)
Pneumonia	1 (1.6)	0 (0.0)	N/A	N/A
Surfactant	4 (6.2)	1 (1.8)	3.73 (0.53-74.22)	1.26 (0.13-28.24)
IVH	0 (0.0)	2 (3.5)	N/A	N/A
Sepsis	0 (0.0)	2 (3.5)	N/A	N/A
Hyperbilirubinemia	38 (59.4)	26 (45.6)	1.74 (0.85-3.61)	1.39 (0.62-3.15)
Hypothermia	9 (14.1)	7 (12.3)	1.17 (0.41-3.49)	0.29 (0.06-1.13)
Feeding difficulties	21 (32.8)	12 (21.1)	1.83 (0.81-4.27)	0.07 (0.24-1.91)
NICU admission	50 (76.9)	38 (66.7)	1.67 (0.75-3.74)	0.81 (0.31-2.06)
Length of NICU stay	6 (3-11)†	4 [0-8]†	1.85 (-1.14-4.84)	-1.64 (-4.55-1.26)
Respiratory composite score	30 (46.9)	29 (50.9)	0.85 (0.42-1.74)	0.456 (0.19-1.05)
Neonatal morbidity composite score	44 (68.8)	34 (59.6)	1.49 (0.71-3.17)	0.96 (0.41-2.25)

Data are reported as n (%)
†Data are reported as median (IQR1 -IQR3)
*Outcomes adjusted for gestational age at birth and birth weight
An estimate rather than odds ratio was calculated for length of NICU stay.

1019 Multi-country trial of intrapartum oral azithromycin: cultures of maternal infections

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OBJECTIVE: An intrapartum oral dose of azithromycin (AZI) reduced maternal death or sepsis (by WHO clinical criteria). Herein, we compare the frequency of cultures, organisms and antimicrobial resistance from maternal infections by AZI vs. placebo groups.

STUDY DESIGN: Ancillary study of the NICHD A-PLUS trial in which women in labor, ≥28 weeks' and planning vaginal delivery were randomized to a 2g dose of AZI or placebo at 8 sites in 7 low- and middle-income countries (LMICs). Culture specimens from suspected infections were tested when feasible using standard of care clinical microbiological procedures at each site supplemented by AZI susceptibility testing. Cultures were encouraged for suspected sepsis (blood), cesarean or perineal wound infection, abdominopelvic or breast abscess (free pus from sites), mastitis (breast milk) and pyelonephritis (urine).

RESULTS: Of 29,278 women randomized, 14,590 had AZI vs. 14,688 placebo. Among randomized, AZI group was associated with fewer maternal clinical cultures (any source), culture positivity, and AZI resistance **(Table 1A)**. Among actual maternal cultures, AZI was not significantly associated with culture positivity or AZI resistance. The most prevalent organisms (Table 1B) were gram-negative rods (GNRs - *E. coli* and *K. pneumoniae*) and gram-positive cocci (GPCs - *S. aureus* and MRSA). GNRs and GPCs were also the most prevalent among 325 blood cultures, 168 perineal wounds and 94 cesarean wounds, while GPCs (Staph) were predominant in breast abscess and GNRs (*E. coli*) in pyelonephritis.

CONCLUSION: A single intrapartum oral dose of AZI was associated with a lower prevalence of cultures and culture-positivity in LMICs and less AZI resistant organisms.

Table 1. Maternal Clinical Cultures, Organisms and AZI Resistance by Group

A	Azithromycin	Placebo	RR (95% CI)[1]	Total
Women randomized, n	14,590	14,688		29,278
Cultured[2], n/N (%)	**348/14,590 (2.4)**	**548/14,688 (3.7)**	**0.64 (0.56, 0.73)**	896/29,278 (3.1)
≥1 + culture (% randomized)	**118/14,590 (0.8)**	**206/14,688 (1.4)**	**0.58 (0.46, 0.72)**	324/29,278 (1.1)
≥1 + culture (% cultured)	118/347 (34.0)	206/545 (37.8)	0.84 (0.67, 1.05)	324/892 (36.3)
≥1 organism tested for AZI susceptibility, n/N (%)	56/118 (47.5)	112/206 (54.4)	n/a	168/324 (51.9)
≥1 AZI resistant org (% randomized)	**55/14,590 (0.4)**	**87/14,688 (0.6)**	**0.64 (0.45, 0.89)**	142/29,278 (0.5)
≥1 AZI resistant org (% tested)	55/56 (98.2)	87/112 (77.7)	1.23 (0.88, 1.73)	142/168 (84.5)

B	Azithromycin			Placebo			Total		
	Cultured n	Tested n (%)	Resistant n (%)	Cult. n	Tested n (%)	Resistant n (%)	Cult. n	Tested n (%)	Resistant n (%)
Any organisms	126	59 (46.8)	58 (98.3)	239	121 (50.6)	93 (76.9)	365	180 (49.3)	151 (83.9)
Gram Negative Bacilli	75	38 (50.7)	38 (100)	127	75 (59.1)	60 (80.0)	202	113 (55.9)	98 (86.7)
Escherichia coli	40	29 (72.5)	29 (100)	64	51 (79.7)	43 (84.3)	104	80 (76.9)	72 (90.0)
Klebsiella pneumoniae	9	2 (22.2)	2 (100)	15	8 (53.3)	7 (87.5)	24	10 (41.7)	9 (90.0)
Pseud. aeruginosa	7	0 (0.0)	0 (0.0)	10	2 (20.0)	1 (50.0)	17	2 (11.8)	1 (50.0)
Gram Positive Cocci	45	21 (46.7)	20 (95.2)	105	46 (43.8)	33 (71.7)	150	67 (44.7)	53 (79.1)
Staphylococcus aureus	10	4 (40.0)	3 (75.0)	36	16 (44.4)	9 (56.3)	46	20 (43.5)	12 (60.0)
MRSA	18	11 (61.1)	11 (100)	24	11 (45.8)	8 (72.7)	42	22 (52.4)	19 (86.4)

1020 The four critical components of an induction of labor protocol to reduce cesarean delivery

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OBJECTIVE: Standardized protocols for management of labor induction (IOL) may reduce cesarean delivery (CD). However, it is unclear if there is a specific threshold of adherence to protocol components or if specific components themselves are associated with reduced CD.

STUDY DESIGN: This is a secondary analysis of a prospective cohort study evaluating standardized IOL management at 2 sites from 2018-2022. Singletons ≥37 weeks with intact membranes receiving cervical ripening were included. Adherence was measured to 8 IOL protocol components (Table). CD rate was evaluated by percent of the 8 protocol components each IOL was adherent to (< 50%, 50-74.9%, 75-99.9%, 100%) and tests for trends by group were calculated using Mantel-Haenszel. Next, we aimed to see if there were individual protocol components critical to reducing CD. Poisson regression with relative risk evaluated independent association of adherence to each component with CD while controlling for confounders. Finally, CD rate was evaluated for IOLs adherent to the four protocol components found to be independent predictors in modeling.

RESULTS: 8509 IOLs were included with an overall CD rate of 21.7%. Median protocol adherence was 80%. Increasing adherence to the

protocol was associated with decreasing CD rate (< 50% adherence: CD 45.4%; 50-74.9% adherence: CD 23.7%; 75-99.9% adherence: CD 18.6%; 100% adherence: CD 14.2%; p< 0.001). In multivariable modeling, 4 protocol components were independently associated with reduced CD even when controlling for covariates: "if misoprostol is utilized, it should not be continued >6 doses or >24h; transition to oxytocin", "if a Foley is utilized, remove at 12h or when falls out", "cervical exams q2-4h in latent labor", and "q1-2h in active labor". Notably, for IOLs adherent to all 4 of these components, CD rate was similar to IOLs adherent to all 8 components (15.0% vs. 14.2%, p=.46).

CONCLUSION: There are 4 critical components of this IOL protocol which, when adhered to, were associated with decreased risk of CD. These components include not continuing "futile" cervical ripening and frequent cervical exams.

Table: IOL protocol adherence and associations with CD

Percent adherence to protocol components					OR [IQR]
	<50%	50-74.9%	75-99.9%	100%	
CD rate	315/694 (45.4)	723/3046 (23.7)	565/3032 (18.6)	246/1736 (14.2)	0.63[0.60-0.67]
			CD		
Protocol components			Adherent[a]	Non-adherent[a]	aRR for CD with component adherence [IQR]
1 If misoprostol is utilized, it should not be continued beyond 6 doses or 24h of use; transition to oxytocin			1647/7640 (21.6)	28/42 (66.7)	0.32[0.16-0.63][b]
2 If a Foley balloon is utilized, it is to be removed at 12h or when falls out			1471/6823 (21.6)	124/309 (40.1)	0.64[0.50-0.83][c]
3 If more than 6h since last misoprostol and unable to place another/ AROM not feasible, start oxytocin			1019/5240 (19.5)	656/2442 (26.9)	0.89[0.79-1.01][b]
4 If patient is ≥4cm dilated and has intact membranes, perform amniotomy if feasible.			1175/5546 (21.2)	587/2875 (20.4)	1.06[0.93-1.19][c]
5 Latent labor exams q2-4h.			518/3237 (16.0)	1331/5272 (25.3)	0.83[0.73-0.94][d]
6 Active labor exams q1-2h.			506/6385 (7.9)	302/1065 (28.4)	0.31[0.26-0.36][c]
7 If active labor dystocia and oxytocin not yet started, start oxytocin.			6/21 (28.6)	18/48 (37.5)	0.63[0.19-2.04][e]
8 If active labor dystocia and oxytocin already started, place IUPC.			97/159 (61.0)	117/219 (53.4)	1.27 [0.81-1.98][f]

[a] Component adherence or non-adherence among those eligible for that component. [b] Controlling for race, ethnicity, BMI, parity, diabetes, modified Bishop, maternal age, gestational age, indication for IOL [c] Controlling for race, BMI, parity, diabetes, modified Bishop, maternal age, and gestational age [d] Controlling for race, BMI, parity, diabetes, modified Bishop, maternal age, gestational age, and indication for IOL [e] Controlling for diabetes and indication for IOL [f] Controlling for race, BMI, parity, maternal age, and indication for IOL

1021 Preterm delivery risk in women with a prior pregnancy complicated by previable PPROM (pPPROM)

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OBJECTIVE: Preterm delivery (PTD), defined by ACOG as delivery from 20w0d to 36w6d, can be a devastating finding often associated with severe fetal morbidity and mortality. In addition, these pregnancies have a heightened risk for preterm delivery in a subsequent pregnancy. A method to reduce this elevated risk is to offer cervical length screening and possible cerclage in a subsequent pregnancy. However, in women who rupture prior to 20w, data and guidance are sorely lacking.

STUDY DESIGN: This was a multi-center, retrospective cohort study of women with previable PPROM divided into < 20w (16w0d -19w6d) and ≥20w (20w0d -22w6d) collected from 1/1/2010-12/31/2020. Exclusion criteria included fetal demise prior to PPROM, multiples, and PPROM at < 16w or ≥23w. Primary outcome was gestational age (GA) at delivery (>37w vs ≤37w) in a subsequent pregnancy. Secondary outcomes included the rate of chorioamnionitis, placental abruption in the index pregnancy, rate of PPROM and PTB in the immediately ensuing pregnancy, progesterone use (intramuscular or vaginal), and neonatal outcomes.

RESULTS: 133 patients with pPPROM met criteria, 67 patients < 20w vs 66 patients ≥20w. 63 of these women had a recorded subsequent pregnancy. The rate of PTD was similar between < 20w and ≥20w group, 33% vs 41.7% (p = 0.50) respectively. Within these two gestational cohorts, both groups suffered comparable rates of PPROM, 19.4% (< 20w) vs 18.2% (≥20w) (p = 0.99), at subsequent pregnancy. Diagnosis of chorioamnionitis and placental abruption in the index pregnancy was similar between the two cohorts (p = 0.61 and 0.11, respectively). Progesterone use (IM vs vaginal vs none) was similar between cohorts in both the index and subsequent pregnancy (p = 0.10 and 0.98, respectively). Neonatal demise at index pregnancy was markedly different with 91.0% suffering mortality < 20w compared to 69.7% ≥20w (p = 0.002).

CONCLUSION: The rate of recurrent preterm birth in < 20w parallels those who deliver ≥20w. This finding would suggest that women who suffer pPPROM prior to 20 weeks should also be offered similar treatment.

Table: Index Pregnancy Characteristics and Subsequent Pregnancy Outcomes Following pPPROM

	Statistics (N=133)	16w0d-19w6d (N=67)	20w0d-22w6d (N=66)	p-value
Index Pregnancy				
Age at delivery	29.8 ± 6.2	29.4 ± 6.2	30.2 ± 6.2	0.43[a1]
GA at PPROM (total days)	138.6 ± 13.2	127.6 ± 7.9	149.8 ± 6.2	***<0.001[a2]***
GA at delivery (total days)	151.0 ± 27.1	142.3 ± 31.1	159.9 ± 18.6	***<0.001a2***
Chorioamnionitis				***0.61c***
No	92 (69.2)	45 (67.2)	47 (71.2)	
Yes	41 (30.8)	22 (32.8)	19 (28.8)	
Placental abruption				0.11[c]
No	105 (83.3)	55 (88.7)	50 (78.1)	
Yes	21 (16.7)	7 (11.3)	14 (21.9)	
Progesterone use				***0.10c***
No	96 (72.7)	54 (80.6)	42 (64.6)	
Yes - IM	17 (12.9)	7 (10.4)	10 (15.4)	
Yes - Vaginal	19 (14.4)	6 (9.0)	13 (20.0)	
Neonatal Outcome				***0.002[c]***
Alive	26 (19.5)	6 (9.0)	20 (30.3)	
Deceased	107 (80.5)	61 (91.0)	46 (69.7)	
Subsequent Pregnancy				
GA at delivery (total days)	266.0 [244.0, 274.0]	266.0 [244.0, 274.0]	266.0 [244.0, 275.0]	0.53[b]
GA at delivery				0.50[c]
<37w0d	23 (36.5)	13 (33.3)	10 (41.7)	
≥37w0d	40 (63.5)	26 (66.7)	14 (58.3)	
PPROM in pregnancy				0.99[d]
No	47 (81.0)	29 (80.6)	18 (81.8)	
Yes	11 (19.0)	7 (19.4)	4 (18.2)	
Progesterone use				0.98[c]
No	18 (29.5)	11 (28.9)	7 (30.4)	
Yes - IM	29 (47.5)	18 (47.4)	11 (47.8)	
Yes - Vaginal	14 (23.0)	9 (23.7)	5 (21.7)	

Statistics presented as Mean ± SD, Median [P25, P75], N (column %).
p-values: a1=t-test, a2=Satterthwaite t-test, b=Wilcoxon Rank Sum test, c=Pearson's chi-square test, d=Fisher's Exact test.

1022 Progesterone Use Following Previable Prelabor Rupture of Membranes

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OBJECTIVE: Many preterm intervention studies, including the Meis trial, do not include women with history of preterm birth (PTB) less than 20 weeks of gestation. Research looking at subsequent pregnancy outcomes in women with a history of previable PPROM is limited. We explored progesterone use in women with a history of previable preterm prelabor rupture of membranes (PPROM) between 16 and 23 weeks of gestation and the effect of progesterone use on reduction of preterm delivery in a subsequent pregnancy.

STUDY DESIGN: We conducted a multi-center, retrospective study of women with previable PPROM between 16w0d and 22w6d of gestation occurring between 1/1/2010-12/31/2020. Exclusion criteria included cases of IUFD prior to PPROM, twins or multiples. The first subsequent pregnancy reaching the second trimester was then selected for review. Investigators searched the EMR for documentation of intramuscular (IM) and vaginal progesterone use in both the index and subsequent pregnancy. Pearson's chi-squared test was used to determine the effect of progesterone use on PTB in subsequent pregnancies.

RESULTS: 133 patients had previable PPROM between 16w0d-22w6d of gestation, with 27.3% of women having documented progesterone

use in this pregnancy (12.9% IM vs 14.4% vaginal, p = 0.10). 63 women had a subsequent pregnancy reaching the second trimester, with 69.8% using progesterone (65.9% IM vs 34.1% vaginal). Of the subsequent pregnancies using progesterone, 65.9% (52.5% IM vs 20.0% vaginal) delivered at a gestational age >37w compared to 34.1 (34.8% IM vs 30.4 vaginal) at ≤37w (p=0.54).

CONCLUSION: The majority of patients with a history of previable PPROM used progesterone in some form in the following pregnancy. However, treatment with progesterone in the subsequent pregnancy (IM or vaginal) did not significantly change whether the patient delivered at term.

Table 1: Effects of progesterone use on PTB in subsequent pregnancies

	N	N (%)	<37w0d (N=24)	≥37w0d (N=41)	p-value
Progesterone use in subsequent	63				0.54[c]
No		19 (30.2)	8 (34.8)	11 (27.5)	
Yes		44 (69.8)	15 (65.2)	29 (72.5)	
Progesterone use	63				0.38[c]
No		19 (30.2)	8 (34.8)	11 (27.5)	
Yes - intramuscular		29 (46.0)	8 (34.8)	21 (52.5)	
Yes – vaginal		15 (23.8)	7 (30.4)	8 (20.0)	

Statistics presented as N (column %).
p-values: c=Pearson's chi-square test.

1023 Preterm premature rupture in patients with adult congenital heart disease

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OBJECTIVE: Women with adult congenital heart disease (ACHD) are at risk for endocarditis in labor. We sought to identify whether rates of preterm premature rupture of membranes (PPROM) were higher, potentially increasing risk of bacterial exposure in these patients.

STUDY DESIGN: This is a retrospective cohort study evaluating pregnant patients with a delivery encounter in the National Inpatient Sample database through AHRQ-HCUP from 2017 to 2019. Women were included if they delivered greater than 20 weeks gestation and excluded if gestational age at delivery was unknown or the hospital encounter was not linked to a delivery. Women with ICD10 codes specific to congenital heart disease were compared to those without. The primary outcome was PPROM. Secondary outcomes included PPROM and delivery at less than 34 and 28 weeks as well as other infectious morbidity including endocarditis. T-tests, chi2 analysis, and logistic regression were used to compare groups.

RESULTS: A total of >2.2 million subjects were included with 2,409 affected by ACHD. ACHD subjects were more likely to identify as non-Hispanic white, be younger, obese, privately insured and have more comorbidities (p< 0.05). They also delivered at larger, urban teaching and private hospitals (p< 0.05) via cesarean (39.5% vs 33.1%) (p< 0.001). Rates of PPROM overall (3.2% vs 1.7%, p< 0.001) and at < 37 weeks and < 34 weeks gestation (3.1% vs 1.6 and 1.6% vs 0.7%, respectively) was higher in those with ACHD. Rates of endocarditis were significantly higher (0.3% vs < 0.0%, p< 0.001) and so were rates of endometritis and other postpartum infections, but not chorioamnionitis. PPROM at less than 37 weeks, endocarditis, endometritis and other infections remained significantly associated with ACHD after controlling for confounders that differed between groups at baseline with p< 0.05.

CONCLUSION: ACHD is associated with higher rates of PPROM and other infectious morbidity at the time of delivery admission, including endocarditis.

	ACHD compared to non-ACHD subjects OR (95% CI)	ACHD compared to non-ACHD subjects aOR (95% CI)*
PPROM	**1.92 (1.54-2.41)**	**1.44 (1.10-1.89)**
PPROM and delivery <37 weeks	**1.91 (1.51-2.43)**	**1.36 (1.02-1.82)**
PPROM and delivery <34 weeks	2.21 (1.59-3.08)	1.50 (0.98-2.29)
PPROM and delivery <28 weeks	1.71 (0.92-3.18)	0.93 (0.40-2.18)
Endocarditis	**103.41 (49.73-215.02)**	**79.47 (28.38-222.53)**
Composite infectious morbidity	1.25 (1.01-1.55)	1.12 (0.88-1.42)
Endometritis	**2.33 (1.55-3.52)**	**1.64 (1.67-4.16)**
Chorioamnionitis	0.97 (0.74-1.27)	0.88 (0.66-1.17)
Other PP infections**	**2.29 (1.65-3.17)**	**2.52 (1.71-3.73)**

*Controlled for: AGE, race, obesity, tobacco, diabetes, chronic HTN, asthma anemia, insurance, patient income and location, hospital size/control/teaching status, gestational age at delivery,
**includes surgical site, cervicitis, endometritis or urinary tract infection postpartum

1024 Pigment epithelium derived-factor (PEDF), a potent anti-angiogenic protein, is elevated in fetal growth restriction

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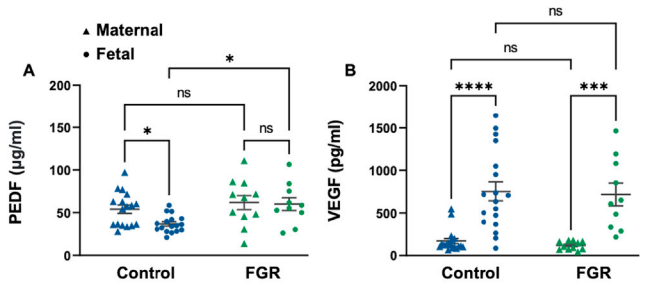
OBJECTIVE: To examine pigment epithelium-derived factor (PEDF) expression in pregnancies complicated by fetal growth restriction (FGR). PEDF is a pleiotropic protein with anti-angiogenic and anti-oxidative properties, known to negate vascular endothelial growth factor (VEGF) and regulate trophoblast function under hypoxia.

STUDY DESIGN: Maternal sera, cord blood and placentas from pregnancies complicated by FGR (n=12) and normal controls (n=18) were obtained following deliveries. Changes in PEDF, PEDF receptors and VEGF mRNAs, were quantified using qPCR. Sera levels of PEDF and VEGF were quantified using ELISA and compared to clinical parameters such as birth-weight percentile and doppler measurements of fetal umbilical and middle cerebral arteries.

RESULTS: VEGF and PEDF mRNA level were significantly elevated (p=0.016; p=0.009) in placentas from FGR pregnancies compared to controls. PEDF receptors showed differential expression in FGR placentas; LRP6, was upregulated (p=0.046) and Laminin receptor was downregulated (p< 0.0001). PEDF was also elevated in cord blood of FGR pregnancies compared to normal pregnancies (p=0.02) while VEGF displayed low concentrations in maternal sera (p=0.0001) and a wide range in cord blood with no significant difference between FGR and controls. Due to the small sample size, no significant correlation was found when comparing clinical parameters to PEDF protein level in cord blood of FGR pregnancies. Data was analyzed by one-way ANOVA with FDR correction.

CONCLUSION: Elevated level of PEDF in cord blood and placentas from FGR pregnancies may represent trophoblast response to chronic hypoxic stress in the fetal-placental interphase.



Maternal serum and cord blood concentration of PEDF (A) and VEGF (B) in normal and FGR pregnancies measured by ELISA. A) Elevated PEDF in maternal sera compared to cord blood of normal pregnancies (blue; n=18). Elevated PEDF in cord blood of FGR pregnancies (green; n=12) compared to normal pregnancies, thus resembling the level of PEDF in maternal sera. **B)** Low VEGF in maternal sera compared to cord blood levels which showed a wide range. No significant difference in VEGF blood concentration was found comparing control and FGR pregnancies. Data expressed as mean±SEM. PEDF indicates pigment epithelium derived factor and VEGF, vascular endothelial growth factor. *P<0.05, ***P<0.001 and ****P<0.0001.

1025 Pigment epithelium derived-factor (PEDF), a potent anti-angiogenic protein, is upregulated in women with preeclampsia

Noa Hasky[1], Luba Nemerovsky[2], Hadas Bar-Joseph[3], Anat Eldar-Boock[3], Lisa Barchilon-Tiosano[1], Sivan Farladansky Gershnabel[1], Tal Biron-Shental[4], Gil Shechter Maor[1], Ruth Shalgi[3]

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OBJECTIVE: Maternal endothelial dysfunction due to circulating angiogenic factors such as vascular endothelial growth factor (VEGF) and its soluble receptor sFlt-1 are the hallmark of pre-eclampsia (PE) pathophysiology. Pigment epithelium derived-Factor (PEDF) is a potent anti-angiogenic glycoprotein that negates VEGF activity and elicits sFlt-1 cleavage. Recent studies have unraveled a potential role for PEDF as a regulator of anti-angiogenic processes at the fetoplacental interface.

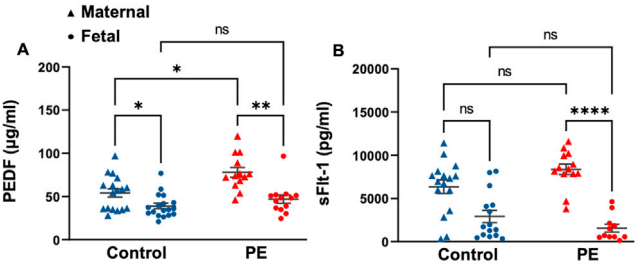
Our goal was to investigate PEDF expression in placentas of pregnancies complicated by PE compared to controls and in maternal and fetal sera.

STUDY DESIGN: Maternal sera, cord blood and placentas of women with PE (n=16) and controls (n=18) were obtained following deliveries.

Changes in vascular effectors were quantified by qPCR (mRNAs) and Western blotting (proteins) and serum levels of PEDF, VEGF and sFlt-1 measured by ELISA. Protein expression was determined by immunofluorescence in histological sections using antibodies against PEDF, pan-cytokeratin and CD31.

RESULTS: PEDF is expressed in the placenta by trophoblasts, stromal and endothelial cells. Placental PEDF mRNA ($p< 0.0001$) and protein level ($p=0.01$), as well as PEDF serum concentration ($p=0.025$) were significantly higher in women with PE compared to control. LRP6, a PEDF receptor was also significantly upregulated in PE placentas ($p=0.038$). Additionally, PEDF concentration was significantly higher in maternal sera compared to their matched cord-blood samples in both normal ($p=0.026$) and PE pregnancies ($p=0.004$), representing a differential expression pattern between mothers and their fetuses. Data was evaluated by one-way ANOVA with FDR correction.

CONCLUSION: PEDF expression is eminently elevated in placentas and sera of women with PE compared to healthy controls, presenting PEDF as a potential novel biomarker for PE.



Maternal serum and cord blood concentration of PEDF (A) and sFlt-1 (B) in normal pregnancies and preeclampsia measured by ELISA.
A) Elevated PEDF level in women with PE (red triangles; n=16) compared to healthy controls (blue triangles; n=18), whereas no difference was detected between cord blood of healthy and PE pregnancies (spheres). PEDF level in maternal sera was higher than cord blood level in both groups. **B)** In PE, sFlt-1 was higher in maternal blood compared to cord blood and only a trend was observed when comparing sFlt-1 serum level of women with PE to controls. Data expressed as mean±SEM. PEDF indicates pigment epithelium derived factor; sFlt-1, fms-like tyrosine kinase-1. *P<0.05; **P<0.01; ****P<0.0001.

1026 Plasminogen Activator Inhibitor 1 promotes endothelial cell inflammatory response

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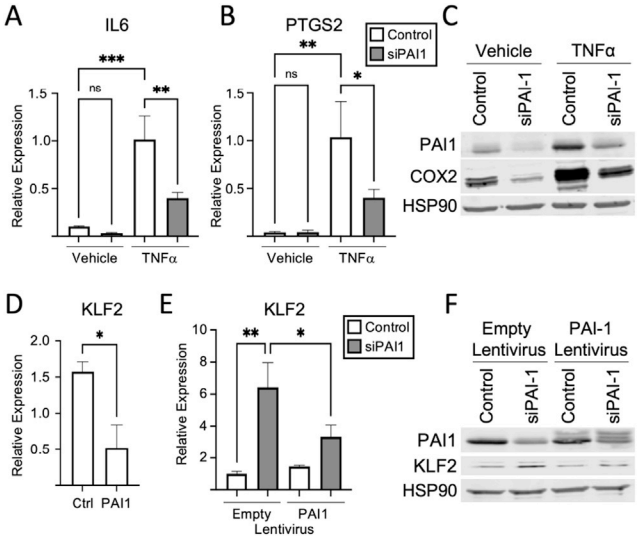
OBJECTIVE: Plasminogen Activator Inhibitor 1 (PAI1) is elevated in preeclampsia. In addition to its prothrombotic activity, emerging evidence suggests that PAI-1 directly contributes to endothelial dysfunction. Our objective was to determine whether PAI1 modulates the endothelial cell response to tumor necrosis factor alpha (TNFα), an inflammatory cytokine that is elevated in preeclampsia.

STUDY DESIGN: Human umbilical vein endothelial cells (HUVECs) were transfected with PAI1-specific silencing RNA or non-targeting control, followed by treatment with TNFα (1 ng/mL) for 16 hours. In other experiments, HUVECs were treated with purified recombinant PAI1 (40 ng/µL) prior to TNFα. To rescue the phenotype, HUVECs were infected with a lentivirus that over-expresses PAI1 prior to RNA silencing and TNFα treatment. Gene expression was measured by reverse transcription polymerase chain reaction (RT-PCR). Protein levels were determined by Western blot. Statistical analysis was performed in GraphPad Prism 9. Between-group differences were analyzed by two-way analysis of variance (ANOVA) with post-hoc analysis using Sidak's test for multiple comparisons. Differences were considered significant if $P < 0.05$.

RESULTS: HUVECs treated with TNFα have upregulation of pro-inflammatory genes, but silencing PAI1 significantly blunted the TNFα response for genes including *IL6* (Figure a), *PTGS2* (b), *CXCL8*, and *EDN1*. Reduction of COX2 was confirmed by Western blot (c). Reciprocally, addition of recombinant PAI-1 increased the expression of *PTGS2*, *CXCL8*, and *IL6*. KLF2 is a transcription factor that promotes endothelial cell homeostasis. Silencing PAI-1 increased KLF2 transcription, and addition of recombinant PAI-1 decreased KLF2 transcription (d). Lentiviral over-expression of PAI-1 partially restored the response to TNFα by significantly reducing

KLF2 expression in response to TNFα as seen by RT-PCR and Western blot (e, f).

CONCLUSION: PAI-1 promotes the endothelial cell response to TNFα, which may be mediated by suppressing KLF2. These findings suggest that PAI-1 may contribute directly to endothelial dysfunction in preeclampsia.



1027 The effect of rooming-in on postpartum hemorrhage: A propensity score analysis

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OBJECTIVE: We aimed to investigate the effect of rooming-in on postpartum hemorrhage (PPH) and other immediate post-partum complications.

STUDY DESIGN: Retrospective study conducted at a high-volume tertiary obstetric center. All healthy women with a singleton uncomplicated pregnancy and childbirth, between 2012 and 2022 were included. Women were categorized into 2 groups based on their choice of neonatal care method: rooming-in vs. hospital nursery. Propensity score matching was used to create comparable groups in a 2:1 ratio. The matching was based on the following parameters: age, body mass index (BMI) at birth, total pregnancy days, newborn weight, parity, prior cesarean section, epidural and perineal lacerations. The primary outcome measure was defined as PPH or the need for postpartum blood transfusion. Secondary outcomes included breastfeeding, postpartum fever, postpartum preeclampsia, and duration of hospitalization.

RESULTS: A total of 79,936 women delivered during the study period, of which 16,201 met the inclusion criteria. After propensity score matching, 15,459 women were included in the analysis, of whom 10,306 chose nursery care and 5,153 rooming-in. Rooming-in was associated with lower odds of PPH (1.71% Vs. 2.43%, OR 0.7, 95% CI 0.55-0.89, p= 0.004), postpartum blood transfusion (0.60% Vs. 1.13%, OR 0.51, 95% CI 0.36-0.79, p=0.001) and a lower likelihood of postpartum hospitalization exceeding 48 hours (82.42% Vs. 86.81%, OR 0.71, 95% CI 0.65-0.78, p< 0.001) and 72 hours (12.17% Vs. 13.75%, OR 0.87, 95% CI 0.79-0.96, p=0.006). Rooming-in was also associated with a higher rate of breastfeeding (92.66% Vs. 85.79%, OR 2.09, 95% CI 1.86-2.36, p< 0.001). Choice of immediate neonatal care was not associated with postpartum fever or preeclampsia.

CONCLUSION: This study provides evidence of an association between rooming-in and a decreased risk of PPH and the need for blood transfusion.

These findings highlight the potential benefits of the rooming-in practice and can assist in making more informed decisions regarding postpartum care.

Table 2: Rooming-in vs. hospital nursery - obstetrical outcomes

	Rooming-in n=5,153	Hospital nursery n=10,306	P value	OR (95% CI)
Postpartum Hemorrhage	88 (1.71%)	250 (2.43%)	0.004	0.7 (0.55-0.89)
Postpartum Blood Transfusion	31 (0.60%)	116 (1.13%)	0.001	0.51 (0.36-0.79)
Postpartum Preeclampsia	4 (0.08%)	9 (0.09%)	1.000	0.89 (0.44-1.81)
Postpartum Fever	38 (0.74%)	80 (0.78%)	0.845	0.95 (0.65-1.40)
Postpartum Hospitalization > 48hr	4247 (82.42%)	8947 (86.81%)	<0.001	0.71 (0.65-0.78)
Postpartum Hospitalization > 72hr	627 (12.17%)	1417 (13.75%)	0.006	0.87 (0.79-0.96)
Breastfeeding	4775 (92.66%)	8842 (85.79%)	<0.001	2.09 (1.86-2.36)

1028 The impact of placental cord drainage on third stage of labor: A randomized controlled trial

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OBJECTIVE: We aimed to investigate the impact of placental drainage during the third stage of labor on key obstetric outcomes, specifically third-stage length, maternal blood loss and postpartum hemorrhage (PPH) incidence.

STUDY DESIGN: In a randomized controlled trial at a high-volume tertiary obstetric center between 2021-2022, 212 pregnant women with a singleton uncomplicated pregnancy were enrolled. They were randomly assigned to two groups: an intervention group of 104 women receiving placental drainage and a control group of 108 women receiving standard care without drainage. Placental drainage involved unclamping the cut umbilical cord, allowing blood to drain into a plastic bag placed below, which was weighed after placenta removal. All participants received 10 units of oxytocin immediately after delivery, according to department's standard care. The allocation was concealed and blinded to the participants but not to the care providers.

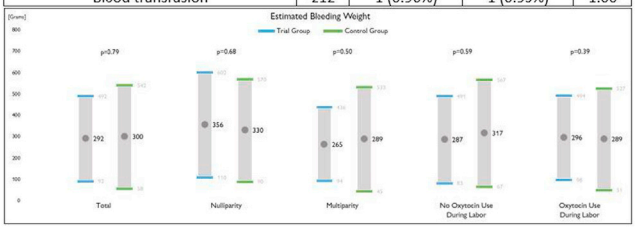
RESULTS: The two groups were similar in their baseline characteristics. No significant differences were observed between the intervention and control groups regarding the duration of the third stage of labor (10.56 minutes ± 6.12 vs. 10.95 ± 6.33, p=0.65), the incidence of PPH (3.84% vs. 7.41%, p=0.38) or the amount of bleeding during the third stage of labor (292 grams ± 200 vs. 300 ± 242, p=0.79).

Furthermore, no significant differences were observed in the amount of bleeding in a subgroup analysis for nulliparity (356 ± 246 vs. 330 ± 240, p=0.68), multiparity (265 ± 171 vs. 289 ± 244, p=0.50), women who received oxytocin during labor (296 ± 198 vs. 289 ± 238, p=0.39) or not (287 ± 204 vs. 317 ± 250, p=0.59).

CONCLUSION: Placental drainage during the third stage of labor offers no benefit on third-stage length, PPH incidence or maternal blood loss.

Table 1. Delivery third stage outcomes among women with or without placental cord drainage

outcome		N	Trial group n=104	Control group n=108	P value
Third stage of labor length [minutes]		212	10.56 ± 6.12	10.95 ± 6.33	0.65
Postpartum hemorrhage		212	4 (3.84%)	8 (7.41%)	0.38
Maternal blood loss, [grams]	Total	212	292 ± 200	300 ± 242	0.79
	Nulliparity	61	356 ± 246	330 ± 240	0.68
	Multiparity	151	265 ± 171	289 ± 244	0.50
	No Oxytocin use during labor	87	287 ± 204	317 ± 250	0.59
	Oxytocin use during labor	125	296 ± 198	289 ± 238	0.39
Revision/Manual lysis of placenta		212	1 (0.96%)	5 (4.63%)	0.21
Blood transfusion		212	1 (0.96%)	1 (0.93%)	1.00



1029 Postpartum preeclampsia readmissions- Is de novo postpartum hypertension worse?

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OBJECTIVE: To determine if maternal outcomes vary between individuals readmitted with de novo postpartum hypertension compared to individuals with underlying hypertensive disease of pregnancy.

STUDY DESIGN: This is a retrospective cohort analysis of postpartum preeclampsia readmission (up to 6 weeks postpartum) between 2017-2023 at a tertiary medical center. Subjects were stratified based on underlying hypertensive status: 1. de novo postpartum hypertension (de novo PP HTN) and 2. those with a known diagnosis of hypertensive disorder of pregnancy or chronic hypertension (HDP). Our primary outcome was composite maternal morbidity: acute kidney injury, pulmonary edema, stroke, eclampsia, ICU admission, maternal death, and thromboembolism. Data were analyzed using Chi-squared and Fisher's exact tests for categorical variables and Poisson regression model was used for calculating relative risk.

RESULTS: Of 359 included subjects, 83 (23%) had de novo PP HTN; 276 (77%) had HDP. Individuals with HDP had higher rates of obesity, diabetes mellitus, and a history of preeclampsia in prior pregnancies (Table 1). Composite maternal outcomes did not differ between the groups (P=0.324), however rates of stroke and ICU admission during readmission were increased among individuals with de novo PP HTN (4.8% vs 0.4%, p= 0.01; and 6% vs 1.8%, p=0.04) (Table 1). Time from delivery discharge to readmission and length of stay during readmission were not different between the groups (Table 1).

CONCLUSION: Individuals readmitted with de novo PP HTN and those with HDP have similar composite maternal morbidity, however rates of stroke and ICU admission are increased among those with de novo PP HTN. Thus, there is a need to identify risk factors for de novo PP HTN in order to facilitate closer monitoring postpartum in this population.

Table 1. Baseline Characteristics and Maternal Outcomes in Postpartum Preeclampsia Readmissions

	De Novo PP HTN N=83[1]	HDP N=276[1]	p-value
Age	31.4 (5.69)	31.96(5.53)	0.304
AMA ≥35	27 (32.5)	101 (36.6)	0.498
Race			
African American	42 (50.6)	144 (52.2)	
Hispanic	7 (8.4)	19 (6.9)	0.9
White	19 (22.9)	55 (19.9)	
Other/Unknown	15 (18.1)	58 (21.0)	
Tobacco Use	1 (1.2)	17 (6.2)	0.108
Substance Use	5 (6.0)	16 (5.8)	0.407
BMI ≥30	49 (59.1)	199 (72.1)	0.02
Primiparous	41 (49.4)	124 (44.9)	0.47
Diabetes			
Pregestational	2 (2.4)	26 (9.4)	**0.02**
Gestational	2 (2.4)	20 (7.3)	
SLE	0 (0.0)	6 (2.2)	0.34
History of preeclampsia in prior pregnancy	6 (7.2)	61 (22.1)	**0.002**
Primary Outcome: Composite Maternal Outcomes	12/82 (14.6)	29/272 (10.7)	0.32
Acute Kidney Injury	1/82 (1.2)	10/272 (3.7)	0.47
Pulmonary edema	1 (1.2)	7 (2.5)	0.69
Stroke	4 (4.8)	1 (0.4)	**0.01**
Eclampsia	4 (4.8)	10 (3.6)	0.75
ICU admission	5 (6.0)	5 (1.8)	**0.04**
Maternal death	0 (0.0)	0 (0.0)	N/A
Thromboembolism	0 (0.0)	0 (0.0)	N/A
Time from delivery discharge to readmission (days)	7.4 (4.9)	7.2 (8.1)	0.83
Length of readmission (days)	2.6 (3.8)	2.1 (1.2)	0.28

[1]n (%)

1030 Outcomes of non-participants in a chronic hypertension in pregnancy treatment trial: CHAP ancillary observational study

Alan T. Tita

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OBJECTIVE: In CHAP, treatment of pregnant women with mild chronic (C) HTN to a BP goal < 140/90 mmHg (vs. no treatment unless BP ≥160/105) was beneficial and safe. Since only 1:12 screened women participated in the trial, we implemented an ancillary study to compare characteristics and outcomes of non-participants without severe CHTN to randomized participants.

STUDY DESIGN: Retrospective observational cohort (OC) study of patients with new or known CHTN who were screened but not randomized in CHAP. We included patients who were excluded due to advanced gestational age (GA), BP not ≥140/90 mmHg off medication or who declined randomization. Those with severe or secondary CHTN, FGR, kidney disease, diabetes class D or greater and/or stillbirth/pregnancy loss remained excluded. Patients were randomly selected per site in a ratio of 1 OC: 2 randomized. Outcomes were ascertained by abstraction of records without adjudication. The primary outcome was a composite of preeclampsia + severe features, perinatal death, indicated preterm birth (PTB) < 35 weeks or abruption. The sample size of 1100-1200 in the OC would provide 80-85% power to estimate a 25-30% difference in the outcome from a reference >30%.

RESULTS: A total of 1102 patients were included in the OC; compared to randomized groups, they were more likely to be NH white, non-diabetic and have private insurance with lower mean systolic and diastolic BP (4-5 mmHg) and mean BMI (2 kg/m^2). The primary composite was more frequent in the control but not the active group compared to the OC (Table). Perinatal death, PTB, GA at delivery and preeclampsia were more frequent in both active and control groups. Additional components of the primary and secondary

outcomes were more frequent in the control group (Table). Results were consistent in covariate-adjusted models.

CONCLUSION: CHAP screened non-participants without severe HTN had a more favorable risk profile than participants and better pregnancy outcomes than active and control CHAP participants even after adjustments.

Table. Outcome results of observational cohort compared to CHAP randomized groups

	Study Groups and Comparisons*				
	Active (n=1208)	Control (n=1200)	Observational (O) (n=1102)	Active vs. O RR (95% CI)	Control vs. O RR (95% CI)
Composite Primary Outcome	353/1170 (30.2)	427/1155 (37.0)	320/1102 (29.0)	1.04 (0.92-1.18)	**1.27 (1.13-1.43)**
Preeclampsia + severe features	272/1170 (23.3)	336/1155 (29.1)	244/1102 (22.1)	1.05 (0.90-1.22)	**1.31 (1.14-1.52)**
Indicated preterm birth <35 wks	143/1170 (12.2)	193/1155 (16.7)	142/1102 (12.9)	0.95 (0.76-1.18)	**1.29 (1.06-1.58)**
Placental abruption	20/1170 (1.7)	22/1155 (1.9)	14/1102 (1.3)	1.35 (0.68-2.65)	1.50 (0.77-2.92)
Perinatal death	41/1170 (3.5)	50/1155 (4.3)	21/1102 (1.9)	**1.84 (1.09-3.09)**	**2.27 (1.37-3.76)**
SGA<10th percentile	127/1146 (11.1)	117/1124 (10.4)	117/1075 (10.9)	1.02 (0.80-1.29)	0.96 (0.75-1.22)
<5th percentile	57/1146 (5.0)	62/1124 (5.5)	59/1075 (5.5)	0.91 (0.64-1.29)	1.01 (0.71-1.42)
Superimposed Preeclampsia	562/1208 (46.5)	668/1200 (55.7)	461/1102 (41.8)	**1.11 (1.01-1.22)**	**1.33 (1.22-1.45)**
Gestational age at delivery (wks)	36.6±4.3	36.3±5.1	36.9±3.1	**-0.35 (-0.66, -0.04)**	**-0.59 (-0.94, -0.24)**
Preterm birth at <37 weeks	332/1208 (27.5)	377/1200 (31.4)	266/1102 (24.1)	**1.18 (1.03-1.35)**	**1.36 (1.19-1.56)**
Birth weight <2500 g	231/1208 (19.1)	277/1200 (23.1)	193/1102 (17.5)	1.13 (0.95-1.34)	**1.37 (1.16-1.61)**
NICU Admission	368/1208 (30.5)	402/1200 (33.5)	298/1102 (27.0)	1.13 (0.99-1.28)	**1.24 (1.09-1.40)**

*Outcomes based on abstractions of records without centralized adjudication

1031 Premature rupture of membranes after serial amnioinfusions in fetuses with anhydramnios due to renal agenesis/dysplasia

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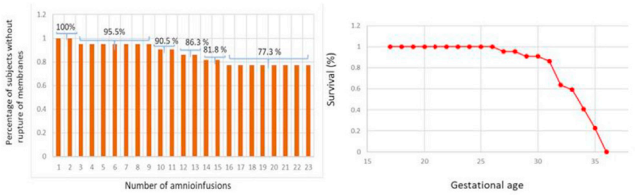
OBJECTIVE: To estimate the frequency of preterm premature rupture of membranes (PPROM) in fetuses with anhydramnios managed with serial amnioinfusions (AIs).

STUDY DESIGN: Nineteen fetuses with anyhydramnios due to dysplastic kidneys or bilateral renal agenesis were treated in utero with serial AIs to prevent lung hypoplasia and Potter sequence. Fetuses with associated structural or chromosomal anomalies were not included. The first AI was performed for detailed anatomic evaluation; the amount of fluid infused targeted an amniotic fluid index (AFI) of 15-20 cm. Subsequent AIs were performed when AFI was between 5-8 cm. The initial goal was to reach 32 weeks of gestation. Patients with PPROM were managed expectantly until 32 weeks or until labor, fetal distress, or signs of clinical chorioamnionitis were noted.

RESULTS: 279 AIs in 19 fetuses were performed (median n=15, range 3-22). Median gestational age (GA) at first AI was 22 weeks (range 17-25) and at last AI was 33 weeks (range 26-35). Four patients (21%) had PPROM**:** two at 26 weeks, one at 28 weeks, and one at 29 weeks. Seventeen of 19 cases reached at least 28 weeks, and 15/19 reached at least 30 weeks of gestation without PPROM. Fig1 shows the percentage of fetuses without PPROM after each AI. All cases underwent at least two AIs without PPROM; 95.4% underwent 3 to 9 AIs without PPROM. After the 10th AI, the prevalence of PPROM increased by 4.5% for every two additional AI; 77.3% of subjects who underwent 16 or more AIs did not have PPROM. No women < 26 weeks of gestation had PPROM despite some having up to 6 AIs before that GA.

CONCLUSION: The risk of PPROM < 32 weeks of gestation after serial AIs is approximately 20%. The risk increases after 10 AIs or after 26 weeks of gestation, whichever comes first.



1032 The volume of fluid corresponding to each centimeter of amniotic fluid index changes throughout pregnancy

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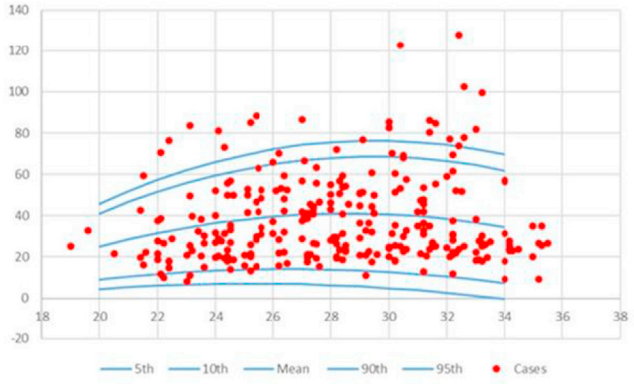
OBJECTIVE: The most frequently used metric to estimate amniotic fluid (AF) volume is the amniotic fluid index (AFI). Normal values range from 5-25 cm, using these same thresholds throughout pregnancy to define normal AF or oligo/polyhydramnios. However, a similar AFI may correspond to different AF volume at different gestational ages. Our aim was to estimate the amount of fluid corresponding to1 cm of AFI when a known amount of fluid is infused in the amniotic cavity as treatment of fetuses with anhydramnios due to bilateral renal agenesis or severe dysplastic kidneys.

STUDY DESIGN: Serial amnioinfusions (AIs) were performed to promote lung development and reduce fetal thorax compression. AFI was measured before and after AI and the difference (increment) was calculated in relation to the amount of infused fluid (Infused fluid/(AFI final-AFI initial). Mean and standard deviation were calculated and 5th, 10th 50th, 90th and 95th percentiles estimated using regression models.

RESULTS: *Results* 279 AIs in 19 fetuses were performed (median/case n=15, range 3-22). The volume of infused fluid ranged from 250 to 500 mL at 20-35 weeks, 700 to 800 mL at 27-29 weeks, and 800 to 1000 mL at 30-32 weeks. There was a mild increment in volume per AFI cm from 20 to 30 weeks, with a subsequent mild reduction at 34 weeks (Fig 1). The mean volume of fluid per cm of AFI at 20 weeks was (mean) 25.1 mL (10th 9.0 mL, 90th 41.2 mL), whereas at 30 weeks 1 cm of AFI corresponded to (mean) 40.6 mL (10th 12.8 mL - 90th 68.4mL). There was 66% increment in AF fluid per cm of AFI from 20 to 30 weeks of gestation. Extrapolating these calculations, a normal AFI at 20 weeks (5-25 cm) could range from 125 mL (AFI=5 cm) to 627 mL (AFI=25 cm), and at 30 weeks from 203 mL (AFI=5 cm) to 1015 mL (AFI=25 cm).

CONCLUSION: The volume of amniotic fluid per cm of AFI changes during gestation. The definition of poly or oligohydramnios based on the same AFI can vary up to 66% in fluid volume from 20-30 weeks of gestation



1033 Regional diffusion of the chronic hypertensive placenta

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OBJECTIVE: In placental disease, spiral artery remodeling is thought to be more aberrant at the periphery but remains normal in the central area near the cord. Considering this pathology, we aimed to investigate the impact of chronic hypertension (cHTN) during pregnancy on placental diffusion *in vivo*. Water diffusion is relatively stable against aging changes represented by connective tissue or calcifications, making diffusion mapping a tool to evaluate placenta pathology.

STUDY DESIGN: In this prospective study, pregnant individuals with and without chronic hypertension were imaged at 16-20 (visit 1) and 24-28 (visit 2) weeks gestation on a Phillips 3T Ingenia MRI. Sagittal diffusion weighted-imaging (DWI) was obtained during free breathing with 7 b-values - 0, 50, 100, 150, 400, 700, 1000 sec/mm2. Apparent diffusion coefficient (ADC) map was generated using mono-exponential fit.

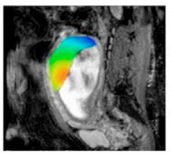
Placental volumes and cord location region of interests (ROIs) were drawn on the ADC maps. The Euclidian distance between center of mass of the cord insertion and placental image voxels was calculated. Association between the distance and ADC value for each patient was evaluated using linear regression. The slope coefficient (change in ADC value per mm away from cord insertion) was estimated and compared between those with and without cHTN for each visit using Wilcoxon rank sum test.

RESULTS: Analysis included 33 pregnant individuals. At time point 1, 17 had cHTN, and 15 did not; at time point 2, 18 had cHTN, and 14 did not. Subjects with cHTN had significantly lower slope values at visit 2 compared to those without cHTN, with matched gestational age (P = 0.049). At visit 2, we observed a decrease in ADC value in tissue farther from the cord insertion, indicating an increase in tissue diffusivity (reduced tissue compactness) in placental periphery.

CONCLUSION: Regional diffusion may correlate with placental health changes in pregnancies with chronic hypertension. Regional differences may implicate pathology for fetal/neonatal findings. Further study is needed to determine if ADC mapping may be useful indicator of placental pathology.

Figure. (A) Sagittal ADC map of a 27-week gestational age pregnant chronic hypertension patient with overlayed placenta ROI. Heat map demonstrates distance from cord insertion location. Red indicates closer to cord insertion; blue indicates furthest away from cord insertion. (B) Summary statistics for the association between distance from cord insertion to ADC value.

(A)



(B)

Visit	cHTN (Y/N)	Number of patients	Mean Slope	Standard Deviation	P value with versus without cHTN
1	N	15	-0.00226	0.00417	1
1	Y	17	-0.00210	0.00260	
2	N	14	-0.00120	0.00266	0.049
2	Y	18	-0.00107	0.00338	

1034 Predictors of fetal growth in patients with maternal cardiovascular disease- cardiac medications are protective

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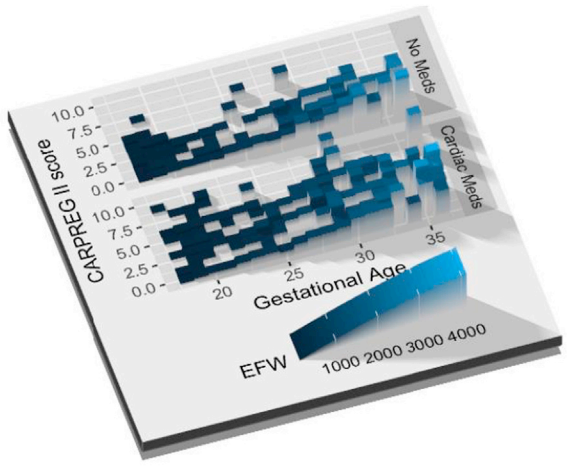
OBJECTIVE: Fetal growth restriction is a possible complication of maternal cardiovascular disease. It remains unclear what characteristics of a given cardiac condition confer risk: lesion, severity, or functional status. The role of cardiac medications in mediating risk is also poorly understood. We aim to assess the impact of maternal cardiac disease and use of cardiac medications on fetal growth.

STUDY DESIGN: We conducted a retrospective cohort study of singleton gestations managed in a high volume Cardio-Obstetrics program from 2018-2022. Cardiovascular variables (primary lesion type, lesion severity [CARPREG II score], functional status [NYHA class], cardiac medications) and all 2nd and 3rd trimester Hadlock estimated fetal weights (EFW) along with their respective gestational ages at collection were reviewed for this cohort. Multivariate linear regression was used to model EFW, the primary outcome, as a function of lesion type, lesion severity, functional status, the use of any cardiac medication, and gestational age (GA). Interactions were stipulated between (GA), functional status, and lesion severity. Lesion type was modeled separately from severity due to concern for collinearity.

RESULTS: We identified 250 pregnancies and 935 ultrasounds. There were significant main effects on EFW from GA (P< 0.01), CARPREG II score (P=0.02), and use of cardiac medications (P=.005). Interactional effects were significant for: 1) GA and CARPREG II score (P=.004), 2) CARPREG II score and NYHA class (P=0.05), 3) GA, CARPREG II score, and NYHA class (P=0.02). Worse functional status and increasing lesion severity had a negative impact on fetal growth; taking cardiac medications (most commonly beta blockers) was protective (Fig 1).

CONCLUSION: Maternal functional status significantly impacts the influence of CARPREG II score on fetal growth. Importantly, use of cardiac medications is associated with more normal fetal growth. Cardiac medications used to optimize maternal functional status may improve both maternal and neonatal outcomes.



A multi-dimensional plot of fetal growth (EFW, z-axis) by gestational age (GA, x-axis), CARPREG II score (y-axis), and the use (lower pane) vs non-use (upper pane) of cardiac medications. The slope of increasing fetal weight with gestational age is steeper for those on cardiac medications, representing relatively preserved fetal growth in this cohort compared to those not on any cardiac medications in pregnancy.

CONCLUSION: Racial disparities were present in initial therapy for GDM, with NHW more likely to receive insulin and Hispanic more likely to receive oral therapy. Initial insulin therapy was associated with a higher risk of preeclampsia, which may reflect underlying health status.

Table 1. **Sociodemographic, medical factors, and outcomes among race/ethnicity stratified by initial treatment (oral vs insulin) for gestational diabetes**

Total population (n=543)	Non-Hispanic White (referent) (n=242)	Non-Hispanic Black (n=161)	Hispanic (n=80)	Asian (n=60)	P- value
Sociodemographic and medical factors ([ ] indicates 95% confidence interval)					
Age at delivery	32.7 [32.0-33.3]	32.8 [31.8-33.7]	33.9 [32.7-35.2]	39.4 [29.4-49.3]*	< 0.0005
Medicaid	85 (35.12%)	125 (77.64%)*	62 (77.50%)*	28 (46.67%)*	< 0.0005
Obesity (BMI > 35)	158 (65.29%)	97 (60.25%)	38 (47.50%)*	7 (11.67%)*	< 0.0005
GA at treatment initiation	27.6 [26.6-28.5]	29.2 [28.1-30.3]	28.8 [27.5-30.1]*	29.6 [28.0-31.2]	0.035
Treatment start < 20 week	44 (18.18%)	18 (11.18%)	8 (10.00%)	7 (11.67%)	0.160
Pregnancy outcomes, initial insulin treatment [n, (percent)]					
Preterm birth	10 (18.87%)	10 (26.32%)	0 (0.00%)	3 (27.27%)	0.398
GHTN /preeclampsia	22 (34.92%)	18 (47.37%)	1 (16.67%)	2 (18.18%)	0.216
Neonatal hypoglycemia	15 (24.59%)	9 (25.00%)	0 (0.00%)	3 (30.00%)	0.595
NICU admission	16 (25.81%)	11 (30.56%)	0 (0.00%)	3 (30.00%)	0.510
Large for gestational age	9 (14.29%)	8 (21.05%)	1 (16.67%)	2 (18.18%)	0.878
Birth injury**	0 (0.00%)	1 (2.78%)	0 (0.00%)	1 (9.09%)	0.278
Cesarean delivery	33 (52.38%)	24 (63.16%)	1 (16.67%)	3 (27.27%)	0.108
Pregnancy outcomes, initial oral treatment					
Preterm birth	19 (10.61%)	14 (11.38%)	9 (12.16%)	1 (2.04%)	0.362
GHTN/preeclampsia	38 (21.23%)	30 (24.39%)	12 (16.22%)	4 (8.33%)	0.164
Neonatal hypoglycemia	43 (24.57%)	21 (17.07%)	16 (21.62%)	10 (20.41%)	0.651
NICU admission	28 (16.00%)	25 (20.66%)	12 (16.67%)	4 (8.33%)	0.422
Large for gestational age	44 (24.58)	19 (15.45)	17 (22.97)	2 (4.08)*	0.007
Birth injury**	4 (2.27%)	7 (5.69%)	6 (8.11%)*	1 (2.04%)	0.144
Cesarean delivery	92 (51.40%)	64 (52.03%)	22 (29.73%)*	19 (38.78%)	0.010

[ ] 95

*Statistically significant (P < 0.05) difference from referent group

GA = gestational age; GHTN = gestational hypertension, NICU = neonatal intensive care unit

**Birth injury included birth injury (neonatal fracture, subdural hematoma, cephalohematoma, and shoulder dystocia)

1035 Racial and ethnic disparities in treatment strategies and pregnancy outcomes of women with gestational diabetes

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OBJECTIVE: Rate of gestational diabetes (GDM) is disparate among racial and ethnic backgrounds (R/E). Guidelines vary regarding oral medication as first-line therapy. We investigated R/E disparities in GDM by initial treatment and pregnancy outcomes.

STUDY DESIGN: Single-institution retrospective cohort of 543 patients with GDM, 2015—2019. Patients were stratified by R/E based on self-report: non-Hispanic white (NHW, referent), non-Hispanic Black (NHB), Hispanic, and Asian. Diet-treated GDM and pre-pregnancy diabetes were excluded. Pregnancy outcomes and initial therapy regimen (insulin versus oral) were compared between R/E using generalized linear modeling. Multinomial logistic regression was used to determine relative risk (RR) of pregnancy outcomes after adjusting for relevant factors (aRR).

RESULTS: Cohort was 44.6% NHW, 29.7% NHB, 14.7% Hispanic, and 11.1% Asian. Highest rate of initial insulin therapy was in NHW (26%), compared with 24%, 8%, and 18% in NHB, Hispanic, and Asian R/E, respectively, RR: 1.4 (1.03-2.0). Initial oral therapy was highest in Hispanic (93%), compared with 74%, 76%, and 82% in NHW, NHB, and Asian R/E, RR: 1.3 (1.1-1.4).

Pregnancy outcomes were compared after stratifying by initial treatment and R/E (Table 1). Cesarean and large for gestational age differed significantly between R/E (p=0.010 and 0.007, respectively) in those with oral therapy. Hispanic with oral treatment had greater risk of birth injury, RR: 3.6 (1.04-12.3) compared to other R/E.

Compared to oral treatment, initial insulin treatment was associated with greater risk of preeclampsia (aRR: 1.75, 1.1-2.8) after adjusting for tobacco, obesity and chronic hypertension. When included in the logistic model, R/E did not significantly impact this outcome. Chronic hypertension was a significant predictor of insulin therapy, aRR: 2.7 (1.7-4.4).

1036 The impact of social vulnerability data while utilizing machine learning to predict preeclampsia

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OBJECTIVE: We aimed to develop a machine learning model that utilizes social vulnerability data along with clinical information to predict the risk of preeclampsia. Additionally, we sought to analyze the impact social vulnerability data has in determining risk.

STUDY DESIGN: A multi-center analysis of patients who received prenatal care at Northwell Health from January 2018 to August 2023. Medical and social vulnerability data collected at the initial prenatal visit were used for the prediction models. Social vulnerability data included both individual demographics and neighborhood-level factors based on census tracts and social vulnerability index (SVI) published by the CDC in 2022. All data was available at the initial prenatal care visit. The algorithms to predict preeclampsia were trained using a gradient boosted decision tree model.

RESULTS: The dataset comprised of 106,626 patients, of whom 7.3% were diagnosed with preeclampsia during their pregnancy. The algorithm was fixed with a 10% false positive rate to enable comparison of predictive ability (Table 1). This predictive algorithm both with and without social vulnerability data (AUROC 0.8 vs. 0.82) exceeds the performance of current clinical guidelines (AUROC 0.68) as well as previously published models (the Mount Sinai — Sema4 consortium (AUROC = 0.70) and the Karolinska — Uppsala joint study (AUROC = 0.69)). Including social vulnerability data improves the specificity of the model by six percentage points leading to 74 fewer false positives in the test set of 1,281 patients. This difference is statistically significant with a p-value of 0.0017.

CONCLUSION: By using machine learning models that employ both clinical and social vulnerability data, preeclampsia can be predicted with greater accuracy than by using clinical information alone. These models could be applied to personalize risk assessment following a routine first prenatal office visit, without additional workup. Utilizing this model could allow for the targeting of high-risk patients with appropriate antepartum monitoring and counseling.

TABLE 1:

	EXCLUDING SOCIAL VULNERABILITY DATA	INCLUDING SOCIAL VULNERABILITY DATA
TP	91	91
TN	653	727
FP	628	554
FN	10	10
ACCURACY	54%	59%
SENSITIVITY	90%	90%
SPECIFICITY	51%	57%
PPV	0.127	0.141
NPV	0.985	0.986
LIKELIHOOD RATIO+	1.839	2.086
POST-TEST PROBABILITY	0.127	0.141

Table 1
Patient Demographics

Characteristic	Successful ECV (n=111)	Unsuccessful ECV (n=143)	P
Parity			
0	33 (29.7)	98 (68.5)	
1	37 (33.3)	22 (15.4)	<.001
≥ 2	41 (36.9)	23 (16.1)	
Gestational age at ECV			
34-36 weeks	11 (9.9)	8 (5.6)	.162
37-38 weeks	73 (65.8)	109 (76.2)	
39-41 weeks	27 (24.3)	26 (18.2)	
Gestational age at delivery			
34-36 weeks	6 (5.4)	8 (5.6)	.353
37-38 weeks	38 (34.2)	61 (42.7)	
39-41 weeks	67 (60.4)	74 (51.7)	
Delivery mode			
Vaginal (spontaneous)	76 (68.5)	0 (0.0)	<.001
Vaginal (operative)	3 (2.7)	0 (0.0)	
Cesarean	32 (28.8)	143 (100)	
Birth weight			
≤ 2500 grams	5 (4.5)	11 (7.7)	.352
2500 – 3500 grams	66 (59.5)	101 (70.6)	
3500 – 4500 grams	39 (35.1)	30 (21.0)	
≥ 4500 grams	1 (0.9)	1 (0.7)	
Fetal sex			0.704
Male	53 (47.7)	64 (44.8)	
Female	58 (52.3)	79 (55.2)	

Statistics Presented as N (column %).
ECV, external cephalic version

1037 Screening for developmental dysplasia of the hip following external cephalic version

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OBJECTIVE: Breech presentation in the third trimester is an indication for screening for developmental hip dysplasia (DDH); however, external cephalic version (ECV) can obscure this information. The objective of this study was to identify whether a successful ECV delivered in cephalic presentation impacts rate of screening for and time-to-diagnosis of DDH compared to those delivered in breech presentation following an unsuccessful ECV.

STUDY DESIGN: IRB approval number NMCP.2023.0002. We performed a retrospective cohort study of all patients undergoing ECV at a single tertiary-care military treatment facility from 2016 to 2022 and assessed screening rates and time-to-imaging for DDH. The primary outcome for this analysis was whether a screening imaging study for DDH was ordered before six months of age.

RESULTS: Successful ECV was associated with a decreased likelihood of appropriate screening imaging study being ordered (60.7% vs 95.6%, $p < .001$). However, in those circumstances in which appropriate screening was ordered, there was no difference in completion rates (P=.42) or age at completion of the screening imaging study (P=.13). Nor was there a difference in rates of DDH diagnosed in either cohort (P=.67).

CONCLUSION: In a cohort of ECV procedures performed for a singleton fetus 34 weeks gestation or more, we found that a successful ECV was associated with a reduced rate of appropriate screening for DDH. This may be due to silos in care limiting transmission of relevant clinical information from the maternal care team to the pediatric care team, likely exacerbated by divides in data access within the electronic medical record.

1038 Population-based incidence of obstetric anal sphincter injuries and associated risk factors

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OBJECTIVE: Although systematic reviews and meta-analyses have provided insight on the incidence and risk factors of obstetric anal sphincter injuries (OASIS), there are few contemporary population-based studies. Our aim was to assess the population-based incidence of OASIS and its associated risk factors.

STUDY DESIGN: We performed a retrospective case-control study using birth certificate data from the National Vital Statistics System from 2016 to 2021, which encompasses all recorded births in the United States. The incidence of OASIS among vaginal births was determined. Logistic regression was used to assess the relationship between risk factors and OASIS. The pseudo-R^2 (pR^2) was used to estimate the goodness of fit of univariate models, enabling a comparative assessment of the factors' association with OASIS.

RESULTS: A total of 15,413,957 were vaginal births were analyzed after excluding a negligible proportion (30,211; < 0.01%) for unknown data. The overall incidence of OASIS was 1.1%. The factors that exhibited the strongest predictability for OASIS were birth history (pR^2 5.8%) and operative birth (pR^2 4.8%), followed by infant weight (pR^2 1.5%); all other factors had a pR^2 of 0.5% or lower. Compared to primiparous patients, multiparous patients with a history of only cesarean birth(s) had a higher likelihood of OASIS (aOR 1.11, 95% CI 1.08-1.15), while those with any history of vaginal birth were approximately five times less likely to have an OASIS. Compared to spontaneous births, forceps-assisted births had the highest risk of OASIS (13.0% vs. 0.9%; OR 14.51, 95% CI 14.24-14.79), and this risk remained substantially elevated in a multivariable regression model (aOR 8.76, 95% CI 8.58-8.93). Vacuum-assisted births were also associated with an increased risk of OASIS (aOR 3.73, 95% CI 3.68-3.79).

CONCLUSION: In this population-based study of over 15 million vaginal births, birth history and operative birth were most strongly

predictive of OASIS, which occurred in 1.1% of births. Notably, use of forceps was independently associated with a 9-fold increase in the risk of OASIS, higher than previously cited.

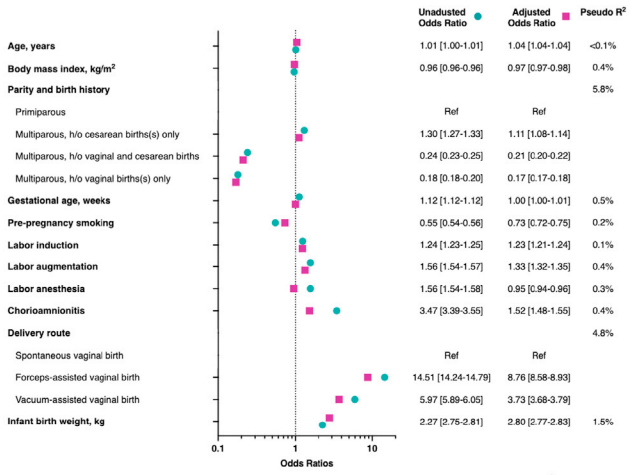

Figure 1. Odds ratios for obstetric anal sphincter injury following univariable and multivariable logistic regression modeling. The pseudo R^2 represents the proportion of overall variability that can be explained by each univariable model (ie, goodness of fit) and enables comparative assessment between risk factors.

1039 Resolution of low lying placentas:Does the distance matter?

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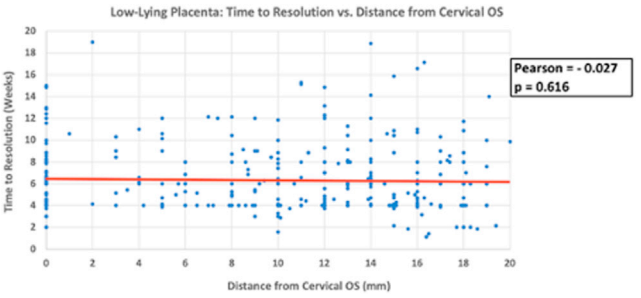
OBJECTIVE: Most pregnant women undergo a 2nd-trimester trans-vaginal ultrasound (US) that often includes a trans-vaginal scan to determine cervical length and placental location relative to the cervix. A low-lying placenta (edge measuring ≤2cm from the cervix) is a frequent finding. Although most low-lying placentas will resolve by term, there is limited information on whether the distance from the cervical os at time of diagnosis affects time to resolution. The objective of this study was to test the hypothesis that the distance from the edge of a low-lying placenta to the cervical os at time of diagnosis is inversely correlated with the time to resolution**:** the shorter the distance, the longer it takes for the low-lying placenta to resolve.

STUDY DESIGN: IRB approved retrospective cohort study of singleton pregnancies who had a transvaginal US between 16-0/7-24-0/7 weeks gestation from 1/2019-12/2022. Subjects were identified by querying the US database for ICD-10 code O44.42. Patients were included if they had follow-up transvaginal scans until resolution (placental edge >2cm from the cervix) or within 4 weeks of delivery. Patients were excluded if their low lying placenta resolved before 20 weeks. Statistical analysis included Pearson correlation.

RESULTS: 626 patients were identified, of which 350 patients met inclusion criteria. Three (3) patients had an unresolved low lying placenta by time of delivery, leaving 347 patients with a resolved low lying placenta (99.14%). The mean (± SD) gestational age at diagnosis was 20-3/7 (±1-5/7) weeks, and the mean (±SD) time to resolution was 6-3/7 (± 3-2/7) weeks. The mean distance (±SD) of the placental edge from the cervical os at diagnosis was 9.6mm (±6.4mm), with a median distance of 11mm [range 0-20mm]. Pearson correlation showed no correlation between the distance and time to resolution (r = -0.027, p=0.616).

CONCLUSION: The vast majority of low lying placentas will resolve by time of delivery, but the distance from the placental edge to the cervical os at time of diagnosis does not impact time to resolution.



1040 The relation between maternal spiral artery perfusion in early pregnancy and subsequent adverse pregnancy outcomes

Rebecca Horgan[1], **Elena Sinkovskaya**[1], **Erkan Kalafat**[2], **George R. Saade**[1], **Alfred Abuhamad**[1]
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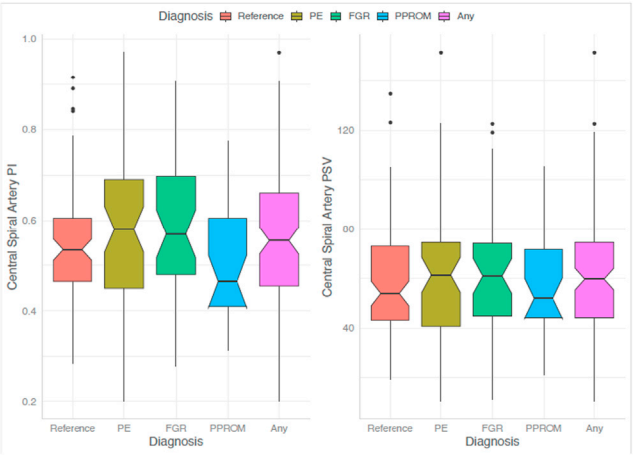
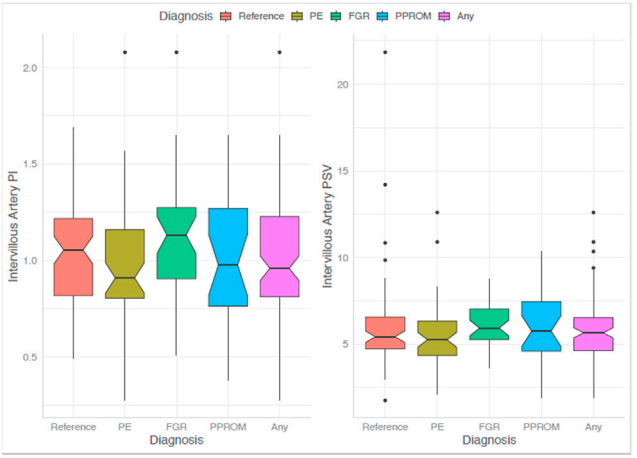
OBJECTIVE: To evaluate the relation between maternal spiral artery perfusion in early pregnancy and subsequent adverse pregnancy outcomes.

STUDY DESIGN: Patients with non-anomalous pregnancies at < 13+6 weeks gestation without umbilical cord or placental abnormalities were enrolled in a longitudinal cohort study to evaluate the relation between placental novel sonographic markers and pregnancy outcomes. Ultrasounds were performed and data were ascertained by certified and trained sonographers and research coordinators. Superb Microvascular Imaging (SMI®) ultrasound technology was used to obtain spiral artery pulsatility index (SA-PI) and peak systolic velocity (SA-PSV) on first trimester ultrasound. Data was compared between patients who developed subsequent adverse pregnancy complications including preterm prelabor rupture of membranes (PPROM), fetal growth restriction (FGR) or pre-eclampsia (cases) and normal low risk patients (controls aged 18-35 years, with a body mass index (BMI) < 30, without existing comorbidities, who conceived spontaneously and had an uncomplicated pregnancy, with delivery >37 weeks' gestation). Multinominal logistic regression tests were used for statistical analysis, with $p < 0.05$ used to denote statistical significance (R for Statistical Computing v.4.2.0).

RESULTS: Amongst the 610 included pregnancies, 125 patients (20.5%) developed one of our adverse pregnancy outcomes**:** PPROM (n=30), preeclampsia (n=60) and FGR (n=45).There was no difference in mean central spiral artery PI in the first trimester amongst patients who developed PPROM 0.46 (p=0.29), FGR 0.57 (p=0.10) or preeclampsia 0.58 (p=0.24) compared to the controls. There was no difference in mean central spiral artery PSV in the first trimester amongst patients who developed PPROM 52.0 cm/sec (p=0.78), FGR 61.0 cm/sec (p=0.71) or preeclampsia 61.4 cm/sec (p=0.63) compared to the controls.

CONCLUSION: Mean SA-PI and SA-PSV in the first trimester are not associated with subsequent PPROM, FGR or preeclampsia.





1041 The relation between placental intervillous perfusion in early pregnancy and subsequent adverse pregnancy outcomes

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OBJECTIVE: To evaluate the relation between placental intervillous perfusion in early pregnancy and subsequent adverse pregnancy outcomes.

STUDY DESIGN: Patients with non-anomalous pregnancies at < 13+6 weeks gestation without umbilical cord or placental abnormalities were enrolled in a longitudinal cohort study to evaluate the relation between placental novel sonographic markers and pregnancy outcomes. Ultrasounds were performed and data were ascertained by certified and trained sonographers and research coordinators. Superb Microvascular Imaging (SMI®) ultrasound technology was used to obtain intervillous arteriole pulsatility index (IA-PI) and peak systolic velocity (IA-PSV) on first trimester ultrasound. Data was compared between patients who developed subsequent adverse pregnancy complications including preterm prelabor rupture of membranes (PPROM), fetal growth restriction (FGR) or preeclampsia (cases) and normal low risk patients controls (aged 18-35 years, with a body mass index (BMI) < 30, without existing comorbidities, who conceived spontaneously and had an uncomplicated pregnancy, with delivery >37 weeks' gestation). Multinominal logistic regression tests were used for statistical analysis, with $p < 0.05$ used to denote statistical significance (R for Statistical Computing v.4.2.0).

RESULTS: Amongst the 610 included pregnancies, 125 patients (20.5%) developed one of our adverse pregnancy outcomes**:** PPROM (n=30), preeclampsia (n=60) and FGR (n=45). There was no difference in mean IA-PI in the first trimester amongst patients who developed PPROM 0.98 (p=0.60), FGR 1.13 (p=0.20) or preeclampsia 0.91 (p=0.15), compared with controls(n=90). There was no difference in mean IA-PSV in the first trimester amongst patients who developed PPROM 5.75 cm/sec (p=0.77), FGR 5.92 cm/sec (p=0.79) or preeclampsia 5.25 cm/sec (p=0.26) compared with controls (n=90).

CONCLUSION: Mean IA-PI and IA-PSV in the first trimester are not associated with subsequent PPROM, FGR or preeclampsia.

1042 Racial disparities in maternal transfusion in the United States by mode of delivery

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OBJECTIVE: To assess racial disparities in maternal transfusion in the United States (US) overall and stratified by mode of delivery.

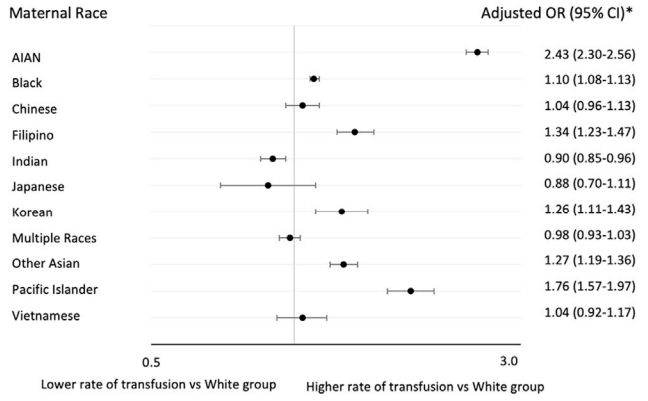
STUDY DESIGN: We performed a population-based, retrospective cohort study of full term, live births in 2016-2021 using CDC US Natality Files. Regression models were constructed to estimate adjusted odds ratios (aORs) and 95% confidence intervals (CIs) of maternal transfusion by self-identified maternal race in the total population, as well as among subgroups stratified by mode of delivery. Model adjustments are described in Figure 1.

RESULTS: The study included 16,339,947 patients; maternal transfusion occurred in 3.7 per 1000 deliveries. Compared with White patients (3.5 per 1000 transfusion rate), higher odds of transfusion were seen among American Indian and Alaska Native (AIAN), Black, Filipino, Korean, and Pacific Islander patients, while lower odds were found among Indian patients (Figure 1).

Rates of transfusion varied by mode of delivery**:** 2.3, 9.2, 5.3, 9.2, 5.1 per 1000 among spontaneous vaginal delivery (SVD), forceps, vacuum, cesarean deliveries (CD) with labor, and CD without labor, respectively. Among forceps deliveries, compared with White patients (9.1 per 1000 transfusion rate), Chinese patients had a nearly two-fold higher rate of transfusion (aOR 1.93, 95% CI 1.30-2.87), while Black patients had a nearly 30% lower rate of transfusion (aOR 0.71, 95% CI 0.56-0.91). Lower rates of transfusion in Black vs White patients were also observed in the SVD (2.2 vs 2.3 per 1000; aOR 0.93, 95% CI 0.90-0.97), vacuum (4.4 vs 5.3 per 1000; aOR 0.82, 95% CI 0.72-0.94), and CD with labor (9.0 vs 9.1 per 1000; aOR 0.91, 95% CI 0.87-0.95) groups, while a higher rate was shown among CDs without labor (7.0 vs 4.6 per 1000; aOR 1.39, 95% CI 1.34-1.44).

CONCLUSION: Racial disparities in maternal transfusion in the US are evident and vary by mode of delivery. Disaggregation by mode of delivery showed the increase in transfusion among Black vs. White patients was confined among CDs without labor; Black patients had lower rates of transfusion in all other mode of delivery groups.

Figure 1. Maternal transfusion by maternal race compared with White race, full term, live births, United States, 2016-2021



OR, odds ratio; CI, confidence interval; AIAN, American Indian and Alaskan Native.
*Adjusted for maternal age, body mass index, parity, previous cesarean, pregestational hypertension, gestational hypertension, preeclampsia, eclampsia, gestational diabetes, multifetal pregnancy, chorioamnionitis, labour induction, and labour augmentation.

1043 Magnesium sulfate administration in preeclampsia without severe features and perinatal outcomes

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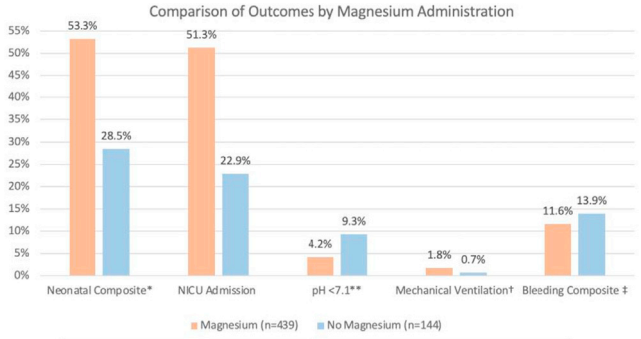
OBJECTIVE: Magnesium sulfate (Mg) for seizure prophylaxis is recommended for patients with preeclampsia with severe features. There is no consensus for preeclampsia without severe features (mild preeclampsia), and thus is often left to the discretion of the provider. Our objective was to evaluate neonatal outcomes according to whether Mg was administered for seizure prophylaxis in patients with mild preeclampsia.

STUDY DESIGN: Retrospective cohort study of patients with mild preeclampsia who delivered at our institution between November 2021, and May 2022. Patients with fetal anomalies and those delivering at < 32 weeks gestation, given Mg for cerebral palsy prophylaxis, were excluded. The primary outcome was a composite of adverse neonatal outcomes (Figure*). Secondary outcomes included the individual components of the neonatal composite and a maternal bleeding composite (Figure†). Outcomes were compared using chi-squared test and multivariable logistic regression estimated the association between Mg and the outcomes, adjusting for baseline characteristics that were unbalanced between groups.

RESULTS: Of 583 patients included, 439 (75%) received Mg and 144 (25%) did not. Patients receiving Mg were more likely to have public insurance, comorbidities (cHTN, GDM), aspirin use, earlier GA at delivery, and chorioamnionitis. The composite adverse neonatal outcome was more frequent in patients who received Mg (53% vs. 29%, aOR 1.85, 95% CI 1.13-3.04) than those who did not receive Mg. This was primarily driven by an increase in NICU admission (Figure). While rates of neonates with pH < 7.1 was higher in the no Mg group, there was no difference in other secondary outcomes including maternal bleeding outcomes (Figure).

CONCLUSION: We found an increase in adverse neonatal outcomes, primarily NICU admission, in patients receiving Mg for mild preeclampsia. While this data is limited by undetermined indications for NICU admission, further studies are warranted regarding the short and long-term benefits and risks of Mg for mild preeclampsia given the potential for adverse neonatal consequences.



Outcome	aOR (95% CI) No magnesium as referent group
Neonatal Composite*	1.85 (1.13-3.04)
NICU admission	2.46 (1.46-4.14)
pH <7.1**	0.36 (0.15-0.88)
Base excess > 12**	0.60 (0.10-3.54)
5-minute Apgar < 3**	0.19 (0.03-1.15)
Mechanical ventilation**	1.30 (0.15-11.34)
Bleeding Composite†	0.88 (0.47-1.66)

*Neonatal composite: NICU admission, pH <7.1, base excess > 12, 5-minute apgar <3, neonatal death, culture proven sepsis, mechanical ventilation
**Baseline characteristics used in adjusted models include public insurance, married, BMI, alcohol use, aspirin use, cHTN, pregestational DM, GA at delivery, and chorioamnionitis
†Bleeding composite: EBL >1L, transfusion of pRBC

1044 Predicting fetal weight with umbilical cord and umbilical vessel diameter

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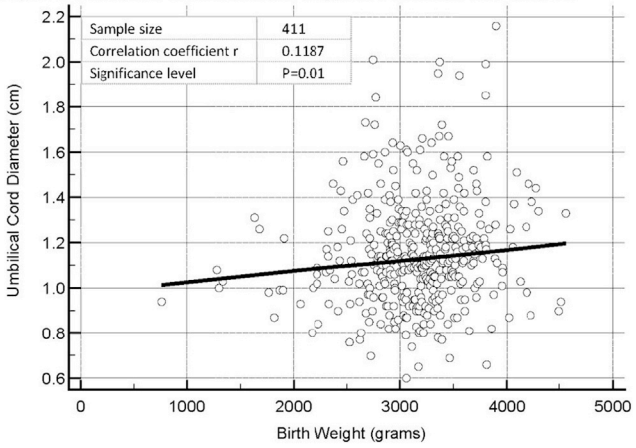
OBJECTIVE: Fetal growth and development depends on the delivery of nutrients by the placenta from the mother to the fetus. Accordingly, the size of the umbilical cord has the potential to predict fetal outcomes. We sought to evaluate the association between umbilical cord diameter and birth weight.

STUDY DESIGN: A free floating umbilical cord cross-section was evaluated in all patients from June 2021 to June 2022 during the standard second trimester anatomy ultrasound. The entire umbilical cord diameter, individual umbilical arteries and vein diameters were measured in the sagittal view. Only patients who delivered a live infant and had a fetal anatomy ultrasound performed at our institution were included. Patients with two vessel cords, fetal demise, aneuploidy and twin gestations were excluded. Demographic and clinical data were extracted from the electronic medical records. Umbilical vessel diameters to newborn birth weight were compared using linear regression. Statistical significance was set at $p < 0.05$.

RESULTS: During the study period, 1043 patients with a second trimester anatomy ultrasound performed between 18-22 weeks (Mean: 21.4; SD: +2.11) were evaluated with 410 patients having the umbilical vessels measured and met inclusion criteria. There was a positive correlation between umbilical cord diameter and birth weight (r-value: 0.118, p-value 0.01). Figure 1. In the linear regression model, umbilical cord diameter was a significant independent predictor of newborn birth weight (β=225.3; p=0.023). Individual cord vessels, umbilical vein diameter (r-value: 0.10; p-value 0.05), and umbilical artery (r-value: 0.02, p-value 0.73) did not correlate with birth weight.

CONCLUSION: There is a significant positive correlation between umbilical cord diameter and birth weight, and a potential for a second trimester variable to predict newborn birth weight.

Figure 1. Correlation of newborn birth weight and umbilical cord diameter



1045 The dose-dependent effect of obesity on maternal and neonatal outcomes

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[1]University of Texas Southwestern Medical Center, Dallas, TX, [2]Parkland Hospital, Dallas, TX

OBJECTIVE: To evaluate the prevalence of adverse maternal and neonatal outcomes associated with obesity. We hypothesized that obesity confers a dose-dependent risk for these outcomes.

STUDY DESIGN: This was a retrospective cohort study of singleton pregnancies delivered between 24 and 42 weeks gestation at an urban county hospital between 2013 and 2021. Body mass index (BMI) at first prenatal visit was used as a proxy for pre-pregnancy weight. Patients were excluded if no first trimester BMI was available.

RESULTS: During the study period, 58497 patients delivered a singleton infant, of which 12365 (21.1%), 5429 (9.3%), and 3482 (6.0%) had class I, II, and III obesity, respectively. Non-obese patients were more likely to be younger and nulliparous with a mean delivery gestational age of 39 weeks across all groups. Increasing obesity was associated with a dose-dependent increase in cesareans (27% for non-obese versus 46% for class III obesity). There was an association between increasing obesity and peripartum complications, including severe preeclampsia (8% in non-obese versus 19% in class III obesity) and gestational diabetes (5% in non-obese versus 15% in class III obesity). Infants born to patients with class III obesity versus non-obese patients were more likely to develop grade III-IV intraventricular hemorrhage (RR 4.58, 95%, CI 2.10-9.99), sepsis (RR 3.76, 95% CI 2.00-7.06), respiratory distress syndrome (RDS) (RR 2.66, 95% CI 2.15-3.29), and have an initial cord gas pH < 7 (RR 2.48, 95%CI 1.68-3.66) (Figure).

CONCLUSION: Increasing BMI is associated with a dose-dependent increase in associated adverse maternal and neonatal outcomes. Infants born to patients with higher classes of obesity have significant associated morbidity including a 2 to 4 times increased risk of neonatal acidosis, grades III-IV IVH, sepsis, and RDS.

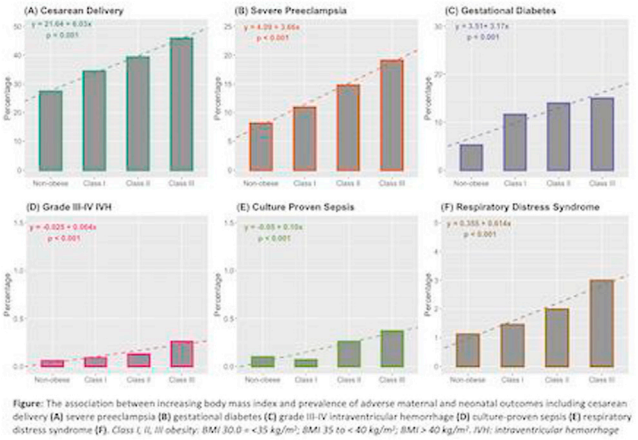

Figure: The association between increasing body mass index and prevalence of adverse maternal and neonatal outcomes including cesarean delivery (A) severe preeclampsia (B) gestational diabetes (C) grade III-IV intraventricular hemorrhage (D) culture-proven sepsis (E) respiratory distress syndrome (F). *Class I, II, III obesity: BMI 30.0 = <35 kg/m²; BMI 35 to < 40 kg/m²; BMI > 40 kg/m². IVH: intraventricular hemorrhage*

1046 Socioeconomic insecurity and pregnancy outcomes: A case for comprehensive social services to improve obstetric care

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OBJECTIVE: Social determinants of health (SDoH) impact risk for maternal and perinatal morbidity and contribute to health inequity. Systematic screening for SDoH in routine pregnancy care could target "wrap around" services to improve long-term wellness and short-term obstetric outcomes. This study investigates the association between SDoH and pregnancy outcomes.

STUDY DESIGN: This retrospective cohort study evaluated all patients who delivered 1/1/18-6/30/23 in a multi-hospital health system in a single metropolitan area and underwent SDoH screening. The primary exposure, "socioeconomic insecurity" (SEI) was a composite of SDoH elements from the screening template including housing instability, poor access to transportation, financial strain, food insecurity, and intimate partner violence. The primary outcome was preterm birth < 37 weeks (secondary outcomes in Table). All data were extracted from the EMR, patient demographics and clinical characteristics were compared in univariable analysis, and multivariable logistic regression was used to evaluate the association of SEI with outcomes.

RESULTS: 15,763 patients had comprehensive SDoH screening (23.4% of deliveries, with 20.2% screening positive for at least one element of the composite). Patients with SEI were more likely to be younger, Black, Hispanic, insured by Medicaid, and multiparous, and to have higher pregravid BMI (mean 30.0 [8.1] vs 27.6 [6.8]) and a high obstetric co-morbidity index (≥ 6; 6.9 vs 4.3%) [$p < 0.01$ for all]. Adjusted analysis demonstrated higher odds of preterm birth < 37 weeks for patients with SEI, even when accounting for other relevant health determinants, though not for the other outcomes [Table].

CONCLUSION: Socioeconomic security may independently increase risk for preterm birth and could amplify the risks levied by other social determinants such as race. Universal SDoH screening in pregnancy could better identify patients at risk of preterm birth and direct appropriate social services to optimize outcomes.

Table. Association of Socioeconomic Insecurity with Preterm Birth and Other Obstetric Outcomes

	aOR*	95% Confidence Interval	P-Value
Preterm delivery < 37 weeks	1.24	1.07 – 1.42	**< 0.01**
Preterm delivery < 34 weeks	1.11	0.87 – 1.43	0.40
Severe preeclampsia	0.84	0.65 – 1.09	0.18
SMM without transfusion	0.91	0.57 – 1.45	0.70
Maternal ICU admission	1.09	0.56 – 2.14	0.79
Postpartum length of stay ≥ 5 days	0.90	0.63 – 1.31	0.59
NICU admission**	1.10	0.94 – 1.27	0.23

*Adjusted Odds Ratio: Model adjusted for race, ethnicity, insurance type, diabetes, chronic hypertension, and obesity (BMI ≥ 30) based on results of univariable analyses
**Model also adjusted for gestational age at delivery (unadjusted OR of NICU admission 1.34, 95% CI 1.20-1.53, p < 0.01)

1047 The role of incorporating MFM physicians onto labor and delivery in reducing maternal morbidity

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OBJECTIVE: With expertise in complex deliveries, maternal-fetal disease, and obstetric emergencies, MFM physicians can contribute meaningfully to labor and delivery (L&D) care. There is variability in the role of MFM physicians on delivery units. This study evaluated the impact on severe maternal morbidity (SMM) of a health system change to add an MFM physician to the L&D team.

STUDY DESIGN: This is a retrospective cohort study of all deliveries > 20 weeks from 1/1/2018-12/31/2022 at 2 academic hospitals in a large health system. Both hospitals previously had consultative-only MFM involvement on L&D, but added an MFM attending to the L&D team 4/2021. Patient-level clinical data were extracted from the medical record and compared pre/post. The only other systemic change during this time was adoption of a hypertension care bundle, so a planned sensitivity analysis excluding patients with chronic hypertension/preeclampsia was conducted. The primary outcome was SMM without transfusion (Table). Multivariable logistic regression was used to evaluate SMM pre- and post-MFM presence on L&D.

RESULTS: There were 31,680 deliveries in the pre-MFM period and 21,292 in the post-period with no differences in patient characteristics across period including race/ethnicity, insurance status, pregravid BMI, parity, plurality, gestational age at delivery, or mode of delivery – other than higher mean maternal age [31.9 (SD 5.3) v. 29.7 (5.6), $p < 0.01$] and higher OB-CMI in the post-period (Table). There were significantly decreased odds of SMM, hemorrhage, and maternal ICU admission in the post-period on adjusted analysis (Table), with similar findings excluding patients with hypertension/preeclampsia.

CONCLUSION: Adding an MFM physician to L&D was associated with reduced SMM, despite increased maternal age and co-morbidities in the post-group. These findings suggest the impactful role that the perspective and knowledge of MFM physicians can have in reducing morbidity in real-time on L&D.

Table. Impact of MFM Coverage of Labor & Delivery on Severe Maternal Morbidity & Other Maternal Outcomes

	Full Cohort			Cohort Excluding Patients with Chronic Hypertension/Gestational Hypertension/Preeclampsia+		
	aOR*	95% CI	P-Value	aOR*	95% CI	P-Value
SMM without transfusion**	0.74	0.58 – 0.93	**0.01**	0.70	0.51 – 0.95	**0.03**
Postpartum hemorrhage (EBL ≥ 1L)	0.90	0.84 – 0.96	**<0.01**	0.89	0.82 – 0.96	**< 0.01**
Maternal ICU admission	0.62	0.42 – 0.92	**0.02**	0.59	0.37– 0.95	**0.03**
Postpartum length of stay ≥ 5 days	0.82	0.67 – 1.00	0.05	0.78	0.59 – 1.04	0.09

+N = 46,197
*Adjusted odds ratio: Model adjusted for OB-CMI, which incorporates maternal age (Easter SR, Bateman BT, Sweeney VH, Manganaro K, Lassey SC, Gagne JJ, Robinson JN. A comorbidity-based screening tool to predict severe maternal morbidity at the time of delivery. Am J Obstet Gynecol. 2019 Sep;221(3):271.e1-271.e10. doi: 10.1016/j.ajog.2019.06.025. Epub 2019 Jun 20. PMID: 31229427.)
**CDC definition: https://www.cdc.gov/reproductivehealth/maternalinfanthealth/smm/severe-morbidity-ICD.htm

1048 Population attributable risk proportion of modifiable and non-modifiable risk factors for stillbirth

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OBJECTIVE: Many risk factors are attributed to stillbirth, however, the exact proportion of stillbirths explained by these factors are unknown. We examined the proportions of stillbirths that are attributable to established modifiable and non-modifiable risk factors.

STUDY DESIGN: This is a retrospective case-control study. Eligible cases include women with stillbirths from January 2013 to July 2022. The cases were matched to controls based on the year of stillbirth and gestational age at the time of delivery. Stillbirths at or greater than 20 weeks gestation and fetal weight greater than or equal to 350 g if the gestational age is not known are included. Stillbirths with congenital anomalies and chromosomal abnormalities and miscarriages before 20 weeks of gestation were excluded.

The risk factors selected for analysis were women less than 20 and greater than 35 years of age, non-Hispanic black race, BMI greater than 30, nulliparity, short inter pregnancy interval (less than 18 months), insufficient prenatal care (less than 3 prenatal visits), illicit substance use (alcohol and drug), smoking, preexisting medical conditions such as diabetes, hypertension and anemia and In vitro fertilization. The main outcome measure is the population attributable risk proportion (PARP) of stillbirth. The PARP is calculated for individual risk factors.

RESULTS: There are 44,286 livebirths and 175 stillbirths (0.40%). 175 stillbirths and 154 controls were studied. Most of the women with stillbirths are between 20 to 35 years of age (77.7%), predominantly Caucasian (44.6%), 38% were between 20 to 25 weeks and 24% were between 36 to 40 weeks at diagnosis. When considering modifiable risk factors, insufficient prenatal care has the highest PARP% followed by age less than 20 , illicit substance use and diabetes (Table 1). The most important non- modifiable risk factor is nulliparity (Table 1).

CONCLUSION: Changes to modifiable risk factor profiles especially focusing on insufficient prenatal care, teenage pregnancies, substance use disorders and diabetes could potentially reduce stillbirth rates.

Table 1: PARP for Combination of Risk Factors	
2 Risk Factors	Cases (stillbirths) N = 175 PARP % (95%CI)
Age <20, Non-Hispanic Black Race	2.78 (-2.29 - 7.85)
Age >35, Non-Hispanic Black Race	-68.5 (-71.9 - -65.2)
Age <20, BMI >30	-147.2 (-155.2 - -139.1)
Age >35, BMI >30	40.7 (39.1 - 42.3)
Non-Hispanic Black Race, BMI >30	-2.4 (-4.0 - -0.8)
Age <20, Smoking	NA: NO PATIENTS
Age >35, Smoking	NA: NO PATIENTS
BMI >30, Smoking	-69.7 (-73.1 - -66.3)
Age <20, Illicit Drug Use	NA: NO PATIENTS
Age >35, Illicit Drug Use	-107.9 (-116.2 - -99.6)
Age >35, IVF Pregnancy	27.5 (22.6-32.4)
BMI >30, IVF Pregnancy	-101.2 (-107.5 - -94.8)
BMI >30, Primiparous	35.0 (34.2 - 35.8)
Age >35, Primiparous	3.4 (1.2 - 5.5)
IVF Pregnancy, Primiparous	-13.4 (-21.0 - -5.8)
Age <20, No Prenatal visits	74.8 (72.3 - 77.4)
Age >35, Short Interpregnancy Interval (<18 months)	NA: NO PATIENTS
Age >35, Hypertension	29.6 (27.0 - 32.1)
BMI > 30, Hypertension	37.1 (36.0 - 38.2)
Non-Hispanic Black Race, Hypertension	39.6 (37.9 – 41.3)
Primiparous, Hypertension	-131.4 (-137.3 - -125.6)
Age >35, Diabetes Mellitus	45.7 (43.6 – 47.7)
BMI >30, Diabetes Mellitus	30.5 (29.3 – 31.7)
Non-Hispanic Black Race, Diabetes Mellitus	-13.2 (-16.2 - -10.3)
Primiparous, Diabetes Mellitus	13.5 (11.1 – 15.8)

1049 The association between stillbirth and maternal serum analyte levels

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OBJECTIVE: Abnormal maternal serum analytes measured during prenatal screening have been associated with adverse pregnancy outcomes. We sought to examine the association between first and second trimester maternal serum analyte levels obtained for prenatal aneuploidy screening and stillbirth (fetal loss >20 weeks gestation).

STUDY DESIGN: Retrospective cohort study of all singleton, non-anomalous pregnancies with no known genetic disorders dated by first-trimester ultrasound with available serum analyte data who delivered between from 3/1/2017 to 12/31/2022. Multiple of the median (MoM) values for free beta-human chorionic gonadotropin (β-hCG), pregnancy-associated plasma protein A (PAPP-A), maternal serum alpha-fetoprotein (AFP), unconjugated estriol, and inhibin A) were compared between two groups**:** patients with stillbirths (i.e. study group) and those with live births (i.e. control group) using variable analyses. Standard cutoffs for abnormal analyte levels were also compared between the two groups. Multivariable analyses were performed to adjust for potential confounders.

RESULTS: Of the 5,092 pregnancies included in the study, 45 (1.1%) had a stillbirth. After adjusting for potential confounders, there were no statistically significant differences in mean serum analyte levels between the two groups (Table 1). Additionally, the proportions of abnormal analyte levels were similar between the two groups.

CONCLUSION: The results of this large cohort demonstrated no association between serum analyte levels and stillbirth. Our data does not support use of these biochemical markers as a screening tool for stillbirth.

Table 1: Serum Analytes in Patients with Stillbirth vs Livebirth

Baseline Characteristics			
	Stillbirth n=45	Livebirth n=5,047	P-value
Maternal age (y)	30.1±5.8	30.3±5.6	0.828
GA at delivery (wk.d)	**29.6±6.6**	**38.7±1.9**	**<0.001**
Birthweight (g)	**1205 (445, 2640)**	**3210 (2890, 3530**	**<0.001**
Body mass index (kg/m^2)	32.4±5.7 [44]	32.3±7.1 [4,972]	0.895
Chronic hypertension	12 (26.7%)	1,007 (26.7%)	0.997
Preeclampsia	7 (17.1%) [41]	622 (13.2%) [4,725]	0.462
Diabetes	5 (11.1%)	592 (15.7%)	0.400
Serum Analytes			
PAPP-A MoM	1.21 (0.60, 1.82) [24]	1.23 (0.83, 1.82) [2,665]	0.714
Abnormal PAPP-A	5 (20.8%) [24]	593 (22.3%) [2,665]	0.868
AFP MoM	1.09 (0.97, 1.43) [33]	1.09 (0.88, 1.37) [3,189]	0.417
Abnormal AFP	4 (12.1%) [33]	410 (12.9%) [3,189]	0.990
β-hCG 1st MoM	1.08 (0.81, 1.43) [23]	1.07 (0.80, 1.39) [2,636]	0.920
β-hCG 2nd MoM	1.12 (0.84, 1.72) [23]	1.09 (0.74, 1.52) [2,144]	0.549
Abnormal β-hCG	2 (4.4%)	234 (4.6%)	>0.99
Estriol MoM	1 (0.77, 1.26) [23]	1.01 (0.83, 1.21) [2,457]	0.979
Abnormal Estriol	0 (0%) [23]	25 (1.0%)	0.627
Inhibin MoM	1.06 (0.79, 1.53) [23]	1.02 (0.78, 1.35) [2,456]	0.742
Abnormal Inhibin	2 (8.7%) [23]	171 (7.0%) [2,456]	0.745

Abbreviations: AFP, alpha-fetoprotein; β-hCG, beta-human chorionic gonadotropin; GA, gestational age; MoM, multiple of the median; PAPP-A, pregnancy-associated plasma protein A. Data presented as mean±standard deviation, N(%) [N, if missing], or median (interquartile range)

*Adjusted for maternal age, body mass index, male fetal sex, gestational age at delivery.

1050 Stillbirth as a risk factor for dementia: a prospective population-based UK Biobank study

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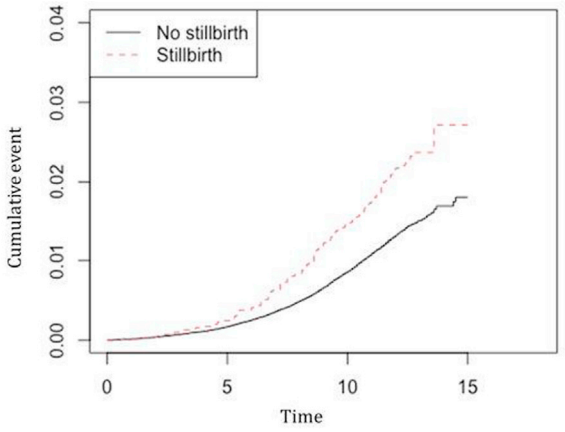
OBJECTIVE: Adverse pregnancy outcomes (APO) have been reported to increase the risk of long-term cardiovascular or metabolic disease later in life. In the current study, we tried to evaluate the risk of dementia in middle-aged women according to the history of APO.

STUDY DESIGN: The UK Biobank is a prospective cohort study from 2006 to 2010, encompassing > 500,000 individuals at 40-60 years from the United Kingdom. Among them, we included 220,395 women and compared the new onset of dementia according to the history of APO using the Cox proportional hazard model.

RESULTS: In middle-aged women, dementia has newly occurred in a total of 3,047 women (1.38%) during follow up. Among APOs, only history of stillbirth increased the risk of dementia whereas other APOs such as hypertensive disease in pregnancy, gestational diabetes mellitus, and recurrent spontaneous abortion was not associated with the risk of dementia. Even after adjusting the confounding variables, women who had a history of stillbirth increased risk of a new onset of dementia. (HR 1.1855, p=0.048).

CONCLUSION: History of stillbirth was associated with an increased risk of dementia and should be also considered as a risk factor for dementia.

Figure. Kaplan-Meier survival curves of dementia according to the history of stillbirth



1051 The burden of substance use associated stigma in pregnancy

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OBJECTIVE: Stigma is a predictor of the quality and quantity of prenatal care among patients with substance use disorder (SUD). The Substance Use Stigma Mechanism Scale (SU-SMS), a previously validated scale, measures 3 domains of substance use related stigma: enacted, anticipated, and internalized stigma. Our objective was to quantify the burden of stigma among a cohort of patients at a perinatal addiction medicine collaborative care clinic, evaluating differences by age, SUD type, and trimester of prenatal care initiation. Our hypothesis was that older patients, patients with stimulant use disorders, and those who delayed prenatal care will report higher levels of stigma.

STUDY DESIGN: This is a prospective cohort study of all patients who received prenatal care at our addiction medicine collaborative care clinic, were at least 18 years old, and completed the SU-SMS tool. ANOVAs were used to compare domain-specific stigma scores by age (> 25 years, 25-29.99, 30-34.99, equal or > 35), SUD type (opioid only, stimulant only, combined opioid/stimulant, all other SUD diagnoses), and trimester of prenatal care initiation.

RESULTS: 166 patients completed the SU-SMS tool and are included in this analysis. Patients reported highest levels of internalized stigma, (M =3.14, SD=1.06), followed by enacted (M=2.31, SD=1.0) and anticipated stigma (M=1.81, SD=0.90). Those who initiated prenatal care in the third trimester had significantly higher internalized stigma scores compared to those who initiated in the first trimester (3.76 vs 2.90, $p<0.01$). Patients with stimulant or combined opioid/stimulant use disorders reported significantly higher anticipated (F=3.48, p=0.02) and enacted (F=6.21, $p<0.001$) stigma when compared to patients with other SUD diagnoses.

CONCLUSION: This study supports previous research on the association between stigma and delayed entry to prenatal care and enhances understanding of differences in stigma by SUD type among pregnant individuals with SUD. Future research should explore ways to reduce community level stigma and incorporate patient care models that address different domains of stigma.

1052 Smoking Reduction in Gravid Patients with Substance Use Disorders (SIGS): A Randomized Controlled Trial

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OBJECTIVE: To determine if measuring exhaled carbon monoxide (eCO) at prenatal visits (PNV) is associated with cigarette smoking cessation or reduction as estimated by eCO.

STUDY DESIGN: Single-center, parallel randomized trial including pregnant individuals 14-45 years old < 24 weeks gestational age (GA) who self-reported smoking ≥10 cigarettes/day. Multiples, fetal growth restriction (FGR), anomalies/aneuploidy, demise, or e-cigarette use were exclusions. All participants measured eCO at PNV but were randomized 1:1 to either eCO disclosure or no disclosure (control). Primary outcome was prevalence of smoking ≥10 cigarettes/day at final measurement (FM) per eCO. With 90% power and 2-sided α of 0.05, a sample size of 74 was estimated to detect a 50% reduction in smoking ≥10 cigarettes/day from a rate of 90%. Secondary outcomes were self-reported smoking and average # of cigarettes smoked/day per eCO, average %fetal carboxyhemoglobin (% FCH) at FM, FGR, GA at delivery, birthweight (BW), and Apgars.

RESULTS: From 2/2021 to 2/2023, 74 patients were randomized. eCO values at randomization were higher in the intervention group (15.4±8.8 vs 11.3±5.6, p=0.02). Thirty in the intervention and 32 in the control arm had delivery data available for analysis. Prevalence of smoking ≥10 cigarettes/day at FM per eCO was not different (73% vs 50%, p=0.06). Prevalence of self-reported ≥10 cigarettes/day (39% vs 52%, p=0.30), average # of self-reported cigarettes/day (8.1±8.5 vs 7.8±5.2, p=0.90), average # of cigarettes per eCO (18.3±9.4 vs 14.6±9.6; p=0.12), and average %FCH (4.3±4.8 vs 2.6±1.9, p=0.08), all at FM, were not different between the intervention and control groups, respectively (Table). Clinical outcomes including FGR (3% vs 0%, p=0.49), GA at delivery (35±5.8 vs 36±4.0, p=0.29), BW (2396±1129 vs 2785±722g p=0.27) and 5-minute Apgars (7±3 vs 8±2, p=0.73) were not different. Despite this, most participants in the intervention and control arms (83% vs 60%, p=0.14) report planning future device use.

CONCLUSION: Exhaled carbon monoxide monitoring in pregnancy did not improve smoking cessation or clinical outcomes.

Table. Outcomes Among Pregnant Participants in the SIGS Randomized Trial

	Intervention (N = 30)	Control (N = 32)	*p* value
Primary outcome			
≥10 cigarettes/day per eCO	22 (73.3)	16 (50.0)	0.06
Secondary outcomes			
≥10 cigarettes/day per patient report	12 (38.7)	17 (51.5)	0.30
# of cigarettes/day per patient report	8.1 ± 8.5	7.8 ± 5.2	0.89
Average # of cigarettes smoked/day per eCO			0.12
Non-smoker	4 (13.3)	5 (15.6)	
Lighter smoker	4 (13.3)	11 (34.4)	
Heavy smoker	22 (73.3)	16 (50.0)	
Average % fetal carboxyhemoglobin per eCO	4.3 ± 4.8	2.6 ± 1.9	0.09
Hypertensive Disorders of Pregnancy	10 (28.6)	14 (38.9)	0.36
Gestational Hypertension	2 (5.7)	6 (16.7)	0.26
Preeclampsia	8 (22.9)	8 (22.2)	0.95
Gestational Diabetes			0.61
Yes	2 (5.7)	1 (2.8)	
No	33 (94.3)	35 (97.2)	
Fetal growth restriction	1 (2.9)	0 (0.0)	0.49
GA at delivery	34.9 ± 5.8	36.3 ± 4.0	0.29
Birthweight	2395.8 ± 1129.2	2785.2 ± 721.7	0.13
Small for gestational age at birth (<10%ile)	10 (35.7)	6 (22.2)	0.27
5-minute Apgar	7.4 ± 2.7	7.7 ± 2.3	0.73
Neonatal abstinence scoring completed			0.03
Yes	3 (10.3)	9 (34.6)	
No	26 (89.7)	17 (65.4)	
If yes, highest Finnegan score	7.0 ± 1.7	6.3 ± 5.1	0.83
IUFD or Neonatal death	3 (8.3)	2 (5.6)	1.00
Use eCO monitoring in the future?			0.14
Yes	19 (82.6)	12 (60.0)	
Unsure	4 (17.4)	6 (30.0)	
No	0 (0.0)	2 (10.0)	

All eCO smoking measurements and self-reported smoking values obtained at last prenatal visit or delivery.
eCO = exhaled carbon monoxide, GA = gestational age; IUFD = intrauterine fetal demise

1053 Postpartum visit timing and the effect on visit attendance: A randomized controlled trial

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OBJECTIVE: More than 60% of maternal deaths in the US occur postpartum (PP). Optimal PP care may reduce mortality, but ~40% of women do not attend the standard 6-week PP visit. We sought to examine if adding an early PP visit improves PP visit attendance.

STUDY DESIGN: We conducted a randomized controlled trial (RCT) at a single tertiary care center at which PP visits are scheduled prior to discharge from birth hospitalization. Patients were excluded if they planned to obtain PP care at non-hospital-based clinics or had pregnancies complicated by hypertension, 3rd- or 4th-degree lacerations, blood transfusion, intensive care unit admission or were prescribed anxiolytic or antidepressant medication in the antepartum period. Consenting patients were randomized to routine care (6-week PP visit) or to receive an additional visit 2-3 weeks PP. The primary outcome was attending any PP visit. Secondary outcomes included number of topics addressed in PP care, and PP Emergency Department (ED) visits or readmissions. To detect a difference of 20% in PP visit attendance with an alpha of 0.05 and power of 80%, 81 patients per group were required. Outcomes were compared between those randomized to two versus one PP visits via Fisher's exact test.

RESULTS: Among the 162 patients who were enrolled, those randomized to two PP visits were not more likely to attend any PP visit compared to those randomized to one PP visit (n=63 (78%) vs n=65 (80%), 0=0.85). Among participants who attended any PP care (n=128), there was no difference between groups in term of number of PP topics addressed (5 vs 5, p=0.49). Of patients randomized to 2 PP visits, 36% attended 1 visit and 37% attended both visits. There was no difference in PP ED visits (11% vs 9%, p=0.79) or PP readmission rates (3% vs 1%, p=0.99) between groups.

CONCLUSION: In this RCT, being scheduled for two PP visits was not associated with increased PP visit attendance, differences in number of PP topics addressed, or PP ED utilization. Thus, adding an additional PP visit does not facilitate improved PP outcomes in low-risk patients.

1054 Reassessing the strength and attributable fraction of clinical risk factors for preeclampsia: a nationwide study

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OBJECTIVE: Available evidence about risk factors for preeclampsia is limited by the study design, data source, lack of appropriate adjustment and outdated data. A better knowledge of the main subgroups at risk could help define preventive strategies. The study objective was to determine the strength and attributable fraction of clinical risk factors for preeclampsia.

STUDY DESIGN: Data from the French national perinatal surveys, repeated cross-sectional surveys including all women delivering during one week in all maternity units in France in 2016 (n=13896) and 2021 (n=13404) was used. After exclusion of women without data on the occurrence of hypertensive disorders of pregnancy (HDP), 25941 women were included. Multivariable Poisson regression models with adjusted relative risks (aRR) were used to identify risk factors in two steps: 1/present at antenatal care booking, 2/those emerging as pregnancy progresses. We calculated population attributable fractions (PAF) for each factor, to consider both its prevalence and aRR.

RESULTS: The incidence of preeclampsia was 2.0%(1.8-2.2)(n=508). Risk factors for preeclampsia present at antenatal care booking were: chronic hypertension (aRR(95%CI):11.1(7.3-16.8)), previous HDP (aRR:10.2(7.4-14.5)), chronic kidney disease (aRR:8.8(3.0-25.3)), non-spontaneous and spontaneous multiple pregnancy (aRR:4.8(2.9-8.1), aRR:4.2(2.7-6.6)) nulliparity (aRR:3.5(2.8-4.4)), diabetes (aRR:3.0(1.7-5.6)), previous neonatal complication (aRR:1.8(1.3-2.5)), obesity (aRR:1.7(1.3-2.3)), overweight (aRR:1.3(1.0-1.7)), Sub-Saharan Africa-born women (aRR:1.7(1.2-2.3)); and emerging during pregnancy: excessive weight-gain (aRR:1.6(1.3-2.1)). Risk factors with the higher PAF were nulliparity (43.8%), excessive weight gain (22.9%), obesity (10.8%).

CONCLUSION: Identifying the major risk factors based on the strength of the association makes it possible to identify the women most at risk at an individual level, which is different from prioritising the risk factors according to their PAF which can be taken into account to define preventive strategies in the population in a public health perspective

Table: Risk factors for preeclampsia (N = 25,941 women)

	Crude RR (95% CI)	Present at antenatal care booking Adjusted RR* (95% CI)	Emerge as pregnancy progresses-model1 Adjusted RR* (95% CI)	Emerge as pregnancy progresses-model 2 Adjusted RR* (95% CI)
Maternal socio-demographic characteristics				
Age (years)				
<35	Reference	Reference	Reference	Reference
≥35	1.3 (1.1-1.6)	**1.4 (1.1-1.7)**	**1.3 (1.1-1.7)**	**1.3 (1.1-1.7)**
Live alone	1.4 (1.1-1.9)	1.2 (0.9-1.7)	1.3 (0.9-1.7)	1.3 (0.9-1.7)
Region of birth				
France	Reference	Reference	Reference	Reference
Other european country	0.7 (0.4-1.3)	0.8 (0.4-1.4)	0.8 (0.4-1.3)	0.8 (0.4-1.3)
North Africa	0.8 (0.6-1.3)	0.8 (0.5-1.2)	0.8 (0.5-1.2)	0.8 (0.5-1.2)
Sub Saharan Africa	1.9 (1.5-2.6)	**1.7 (1.2-2.3)**	**1.7 (1.2-2.3)**	**1.7 (1.2-2.3)**
Other	1.4 (0.9-2.1)	1.4 (0.9-2.1)	1.3 (0.9-2.0)	1.3 (0.9-2.0)
Level of education				
Middle school or less	0.9 (0.7-1.2)	0.9 (0.7-1.3)	1.0 (0.8-1.3)	1.0 (0.8-1.3)
High school	Reference	Reference	Reference	Reference
Beyond high school	0.9 (0.7-1.2)	0.9 (0.7-1.2)	0.9 (0.7-1.2)	0.9 (0.7-1.2)
Post-graduate	0.8 (0.6-1.0)	0.8 (0.6-1.0)	0.8 (0.6-1.0)	0.8 (0.6-1.0)
Household resources				
Income from work	Reference	Reference	Reference	Reference
Social benefits	0.9 (0.7-1.1)	0.9 (0.7-1.1)	0.9 (0.7-1.1)	0.9 (0.7-1.1)
None	1.2 (0.6-2.5)	0.6 (0.3-1.4)	0.6 (0.3-1.4)	0.7 (0.3-1.4)
Smoking before pregnancy	0.7 (0.6-0.9)	0.8 (0.6-0.9)	1.0 (0.7-1.3)	0.9 (0.5-1.2)
Previous conditions				
Body mass index (kg/m²) before pregnancy				
<18.5	0.8 (0.5-1.3)	0.8 (0.5-1.3)	0.8 (0.5-1.3)	0.9 (0.5-1.4)
18.5 - 24.9	Reference	Reference	Reference	Reference
25 - 29.9	1.8 (1.4-2.2)	**1.6 (1.3-2.0)**	**1.6 (1.2-2.0)**	**1.3 (1.0-1.7)**
≥30.0	2.5 (2.0-3.2)	**2.1 (1.6-2.7)**	**2.0 (1.5-2.6)**	**1.7 (1.3-2.3)**
Chronic hypertension	17.4 (13.2-23.0)	**11.3 (7.5-17.0)**	**11.3 (7.5-16.8)**	**11.1 (7.3-16.8)**
Prepregnancy diabetes	5.5 (3.4-8.9)	**3.2 (1.7-6.0)**	**3.0 (1.6-5.6)**	**3.0 (1.7-5.6)**
Previous conditions				
Chronic kidney disease	17.9 (8.8-36.3)	**9.9 (3.8-26.0)**	**9.8 (3.8-25.5)**	**8.8 (3.0-25.3)**
Previous pregnancies				
Nulliparous	1.9 (1.6-2.3)	**3.5 (2.8-4.4)**	**3.5 (2.8-4.4)**	**3.5 (2.8-4.4)**
Previous neonatal complications**	1.9 (1.5-2.4)	**1.7 (1.2-2.4)**	**1.7 (1.3-2.4)**	**1.8 (1.3-2.5)**
Previous hypertensive desease of pregnancy	8.6 (6.5-11.4)	**11 (7.7-15.7)**	**11.1 (7.8-15.8)**	**10.2 (7.2-14.5)**
Previous gestational diabetes	1.2 (0.7-2.1)	1 (0.5-1.8)	0.9 (0.5-1.6)	0.9 (0.5-1.6)
Characteristics at the begining of pregnancy				
Single spontaneous conception	Reference	Reference	Reference	Reference
Single non spontaneous conception	1.4 (0.98-1.9)	1.1 (0.8-1.5)	1.1 (0.8-1.5)	1.1 (0.8-1.5)
Multiple spontaneous conception	4.9 (3.2-7.3)	**4.5 (2.9-7.1)**	**4.6 (2.9-7.1)**	**4.2 (2.7-6.6)**
Multiple non spontaneous conception	6.9 (4.2-11.3)	**5.4 (3.2-9.1)**	**5.3 (3.1-8.9)**	**4.8 (2.9-8.1)**
Characteristics during pregnancy				
Smoking during pregnancy	0.6 (0.4-0.8)	-	0.6 (0.4-0.9)	0.7 (0.5-0.9)
Weight gain during pregnancy* **				
Insufficient	0.9 (0.7-1.0)	-	-	0.9 (0.7-1.1)
Adequate	Reference	-	-	Reference
Excessive	1.9 (0.7-2.2)	-	-	**1.6 (1.3-2.1)**
Pregnancy complications				
Gestational diabetes	1.6 (1.3-2.0)	-	**1.3 (1.0-1.7)**	**1.4 (1.0-1.8)**

RR, relative risk; CI, confidence interval

* Each relative risk is adjusted for all other variables in the column and for the year of delivery, multilevel multivariable Poisson regression model, with imputed data

**Previous neonatal complications including: previous preterm birth, previous hypotrophia, previous in uterofetal death, previous neonatal death

***weight gain during pregnancy according to IOM guidelines

1055 The association of free fluid in the abdomen after cesarean delivery and postpartum pain

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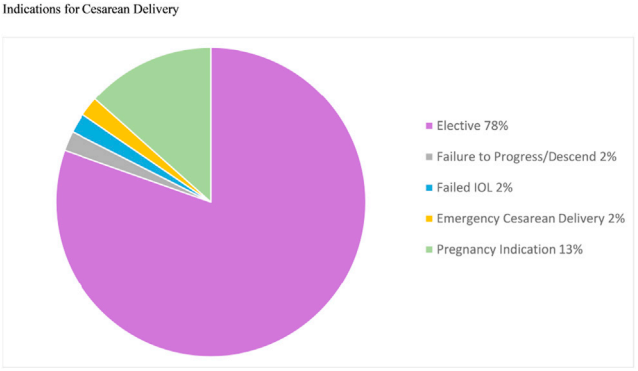
OBJECTIVE: The primary outcome is to evaluate the correlation between free fluid in the abdomen postop after cesarean delivery and postpartum opioid use. Secondary outcomes are correlation between free fluid levels postop and postpartum pain scores, and whether cleaning of the paracolic gutters intraop affects free fluid levels postop. We utilize a modified FAST scan to evaluate levels of free fluid in the abdomen after cesarean delivery.

STUDY DESIGN: This is a prospective observational study of women undergoing cesarean delivery for any indication (N=38). Patients are recruited and consented upon admission to labor and delivery or upon decision for C-section. Women are excluded from the study if they have a vaginal delivery followed by any surgical procedure, or if they are under 18 years. The sonographer of this study was trained and validated by a registered diagnostic medical sonographer. Patients undergo a modified FAST scan within 2 hours postop and again 36-48 hours postop.

RESULTS: In this small cohort, the presence of free fluid did not correlate with the amount of opioid use while inpatient (immediate postop p=.319; delayed postop p=.166) or postpartum pain scores at 2, 24, or 48 hours postop (immediate postop p=.639, .981, .765 respectively; delayed postop p=.631, .459, .878 respectively). Cleaning of the paracolic gutters was not significantly associated with the presence of free fluid in the abdomen (immediate postop p=.728; delayed postop p=.449).

CONCLUSION: In our initial study population, free fluid in the abdomen detected by FAST scan does not correlate with postpartum opioid use or pain scores. Cleaning of the paracolic gutters is not associated with the amount of free fluid detected on FAST scan. The main strength of this study is that this is the first study to examine the relationship between free fluid in the abdomen postop and postpartum opioid use and pain scores. The main limitation of this study is the small sample size. Additionally, documentation of postpartum pain scores and operative report documentation on cleaning of the paracolic gutters is inconsistent in the EMR.



1056 The anti-inflammatory and antioxidant effects of exogenous oxytocin on human placental cells

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OBJECTIVE: Oxytocin (OXT) has been shown to ameliorate oxidative stress (OS) in non-placental cells such as cases of atherosclerosis and cisplatin-induced nephrotoxicity. No studies have demonstrated this effect in human placentas. The objective of this study was to investigate how OXT affects oxidative stress and inflammation in human placental cells using JAR and JEG-3 placental cell lines.

STUDY DESIGN: Inflammatory response**:** JAR and JEG-3 cells (ATCC) were plated at $2x10^5$ cells per mL**:** JAR cells were plated in RPMI 10% Fetal bovine serum (FBS) PSQ and JEG-3 cells were plated in DMEM 10%FBS PSQ. All assays were performed in triplicate and repeated three times. At confluence, cells were treated with vehicle (HBSS), OXT (,125500nM) or N-acetyl cysteine (NAC, 5mM). After 24 hours, the cells were then washed, collected, resuspended in 2 mL HBSS and labeled with 20 μM DCF-DA. After 24 hours, cells were treated with TNF (20ng/ml) to induce a pro-inflammatory response. After 24 hr., culture supernatants were analyzed for IL-6 by ELISA.

Oxidative stress**:** The cells were set up as described above and were then treated with vehicle (HBSS) or OXT (125-500nM). The plates were read in a VICTOR3™ plate reader after 10 min (basal reading). Hydrogen peroxide (H_2O_2) was then added to induce oxidative stress and the plates were re-read 1 hr. later.

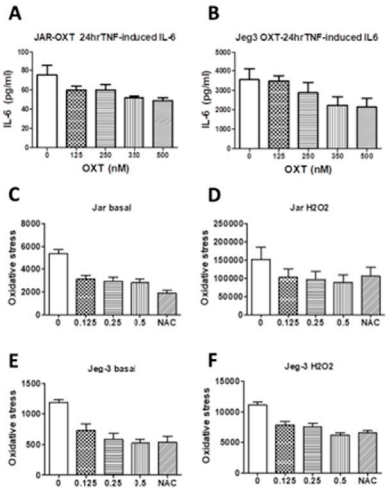
Cell viability**:** JAR and JEG-3 cells were plated in media as described above. The cells were then treated with vehicle (HBSS) or OXT (125-500nM) and cytotoxicity was measured using the neutral red assay 48 hr. later.

RESULTS: OXT does not induce cytotoxic effects on JAR or JEG-3 cells. OXT significantly reduced TNF induced IL-6 production by JAR (p=0.006) and JEG-3 (p=0.002) cells (Figure 1A-B). Similar to

NAC (a well-known antioxidant), OXT exerts dose-dependent antioxidant effects by JAR and JEG-3 cells under basal and following H_2O_2 stimulation ($p < 0.001$; Figure 1C-F). The anti-inflammatory and antioxidant effects of OXT are not accompanied by cytotoxicity.

CONCLUSION: Exogenous OXT has strong anti-inflammatory and antioxidant effects on human placental cell lines.

Figure: Effect of oxytocin (OXT) on placental cells: **A-B)** anti-inflammatory effect in JAR and Jeg-3 cells. **C-D)** anti-oxidative effect in JAR cells. **E-F)** anti-oxidative effect in Jeg-3 cells.



1057 Redefining birth weight centiles: Parity is more significant than gender

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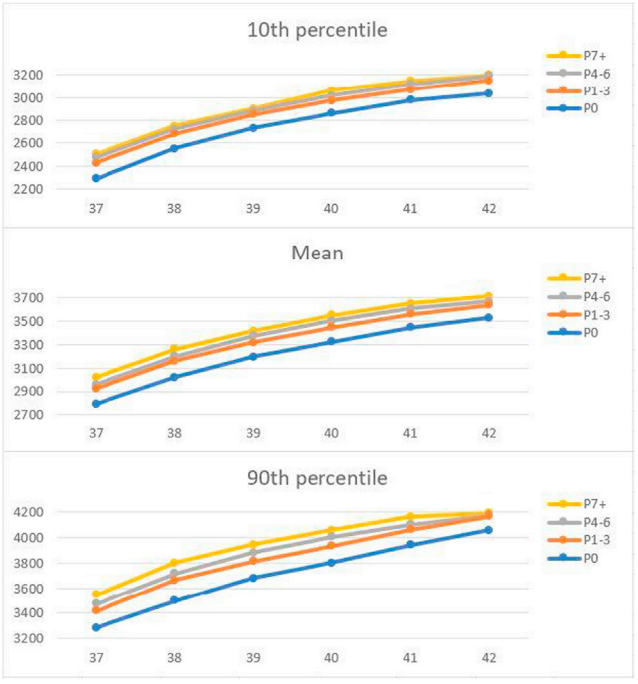
OBJECTIVE: To determine the impact of parity on birth weight patterns at term.

STUDY DESIGN: A retrospective cohort study was conducted between 2012-2023 at a single university-affiliated medical center characterized by a highly parous population with over 12,000 deliveries per year. The study group was comprised of patients who delivered liveborn singletons at term. The cohort was divided into 4 groups: Group 1—nulliparous patients, Group 2-parity of 1-3, Group 3-parity of 4-6 and Group 4-parity of ≥7. We calculated the 10th, 50th and 90th centile of birth weights for each of the study groups delivering at 37, 38, 39, 40, 41 and 42 weeks. Data was analyzed using ANOVA and Tukey-Kramer test for post-hoc analysis.

RESULTS: 129,752 patients were included in the study group. Group 1-23,331 patients, Group 2-56,240 patients, Group 3—31,779 patients, Group 4-14,740 patients.

Increasing parity was significantly associated with increasing neonatal birthweight across the 10th, 50th and 90th centiles ($p< 0.0001$). The results of the post-hoc analysis revealed statistically significant differences for all pairwise comparisons between the four groups ($p< 0.0001$) and these differences persisted when stratifying for each week of gestation (Graph). The mean birthweight for Nulliparas (Group 1) was 155g lower than Multiparas (3209g vs. 3364g) (95% CI 149-161 $p< 0.0001$). Similarly, the mean birthweight of male neonates was 128g greater than female neonates (3397g vs. 3269g) (95% CI 123-133 $p< 0.0001$).

CONCLUSION: There is a positive correlation between increasing parity and neonatal birthweight for each week of gestation at term across the 10th, 50th and 90th centiles This relationship is consistent across all parity groups. Moreover, birthweights for nulliparous women were significantly lower than their multiparous counterparts. The effect of nulliparity on birthweight is greater than that of fetal gender for which growth curves are commonly adjusted. Parity should be taken into consideration in the clinical decision-making process when a diagnosis of either growth restriction or Large for Gestational Age is established at term.



1058 PROMPT-AID: Predicting obstetric morbidity from postpartum hemorrhage through artificial intelligence

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OBJECTIVE: Postpartum hemorrhage (PPH) is a leading cause of maternal morbidity, complicating about 25% of deliveries. Most PPH patients lack identifiable risk factors (RF); when present, RF are not accurate predictors of severe morbidity from PPH. This study validates an AI model that makes continuous predictions using iterative data throughout a labor course to predict likelihood of severe morbidity from PPH.

STUDY DESIGN: An automated machine learning (AML) platform was used to develop a model to predict severe morbidity (defined as occurrence of unscheduled hysterectomy, uterine artery embolization, massive transfusion protocol, ICU admission, takeback to the operating room, or in-hospital death) using continuously updated data based on electronic health record for all delivering patients at a large academic hospital from 01/01/2013 through 12/31/2022. The primary outcome is ROC-AUC in predicting severe morbidity from PPH. A sequential approach was used to develop admission, intrapartum, and postpartum models using continuously updated data throughout a patient's hospital course. Time-series engineering was applied to transform individual timelines into statistics to describe trends during intrapartum and postpartum periods.

RESULTS: 12,807 patients were included in the study and used in the training algorithm with 386 events of severe morbidity from PPH identified. The features of highest importance (with the highest permutation index) for each model are described in Figure 1. Each model demonstrated continuous improvement through the postpartum period which showed the highest discriminatory ability (ROC AUC 0.88).
CONCLUSION: AI incorporating time-series engineering has improved AUC, precision, and sensitivity when compared to relying on patient risk factors alone for prediction of severe morbidity from PPH. AI-based predictions could identify patients at risk of severe morbidity and provides opportunity for proactive intervention to reduce morbidity associated with PPH.

1059 Maternal Angiogenic Imbalance & Placental Sexual Dimorphism

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OBJECTIVE: Sex-based responses to the in-utero environment & resultant infant outcomes are reported. While preeclampsia occurs more frequently in patients carrying a male fetus, carrying a female fetus is associated with higher odds of preterm preeclampsia. We hypothesize that fetal sex differences in maternal serum sFLT-1/PlGF contribute to differences in sex differences in preterm preeclampsia. We sought to compare maternal serum sFLT-1/PlGF ratio within 2 weeks of delivery in hypertensive patients between those with a male vs. female fetus.
STUDY DESIGN: This is a secondary analysis of data from a prospective cohort study in 18 US centers of hospitalized patients with hypertensive disorders of pregnancy & a singleton fetus between 24 & 35-weeks' gestation. We compared maternal characteristics with student t-test or chi-square tests. We calculated the median (95% CI) of maternal sFlt-1/PlGF ratios & compared between those with a female vs. male fetus using Mann Whitney U tests. All analyses were performed in R.
RESULTS: Of 551 patients without missing data, 260 (47%) had a male & 287 (52%) a female. Demographic and clinical characteristics were comparable by fetal sex. Compared to male group, maternal sFLT-1/PlGF ratio was significantly higher in the female group [224.7 vs. 181.8, P = 0.024]. Severe maternal adverse outcomes (HELLP syndrome, abruption, DIC, eclampsia, pulmonary edema) & severe fetal/neonatal adverse outcomes (fetal/neonatal death, birthweight < 3% percentile & delivery < 32 weeks) were not different between groups. Pregnancies with female fetuses were more likely than male to be delivered for worsening hypertension or non-reassuring fetal status (97.56 vs. 87.69%, P < 0.001).
CONCLUSION: Our data support that placental sexual dimorphism in angiogenic imbalance occurs in preterm preeclampsia. Further studies are needed to determine if sexual dimorphism impacts response to prevention or treatment strategies.

1060 Postnatal Incidence and Prenatal Detection of Twin Anemia Polycythemia Sequence (TAPS) among Monochorionic Twin Gestations

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OBJECTIVE: International screening recommendations for TAPS varyand are infrequently assessed by postnatal diagnostic criteria. Our study aims investigate the accuracy of prenatal sonography in the prediction of postnatal TAPS (pnTAPS) and serious neonatal morbidity in uncomplicated monochorionic, diamniotic (MCDA) twin gestations.
STUDY DESIGN: A retrospective cohort study was performed via EMR query of single, tertiary center. PnTAPS was defined as neonatal intertwin hemoglobin discordance ≥8g/dL within 24 hours of delivery and placental vascular anastomoses (≤1mm). Serious neonatal morbidity included respiratory distress, culture-proven sepsis, intraventricular hemorrhage (grade III/IV), necrotizing enterocolitis (Stage II/III), periventricular leukomalacia (III/IV) or neonatal death. Outcomes were compared using Student's *t*-test and Fisher's exact/Chi-square test where appropriate. Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were used to compared diagnostic accuracy of prenatal sonographic criteria.
RESULTS: 73 MCDA pregnancies were identified; 65 met eligibility criteria. Postnatal diagnostic criteria were available in 39/65 (60%). Two (5.1%) were diagnosed with postnatal TAPS; neither were diagnosed prenatally. Those with postnatal diagnostic criteria available delivered at an earlier gestational age (33.9 [30,25] weeks versus 36.3 [36,37] weeks, p< 0.05) and experienced higher rates of serious neonatal morbidity (49.4% versus 1.9%, p< 0.05). There were no differences in maternal, obstetric, or neonatal variables. There was no difference in serious neonatal morbidity between those with and without pnTAPS. Table 1 demonstrates sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of prenatal diagnostic criteria.
CONCLUSION: Of those with postnatal testing, the prevalence of pnTAPS is 5.1% of MCDA twin gestations. However, both the prevalence of pnTAPS and assessment of prenatal diagnostic accuracy are limited by inconsistent neonatal blood sampling. Prenatal screening criteria were poor predictors of pnTAPS.

Table 1. Diagnostic accuracy of prenatal diagnostic criteria in the prediction of pnTAPS

	Sensitivity	Specificity	PPV	NPV
MCA-PSV ≥ 1.5 MoM for the donor twin and MCA-PSV ≤ 1.0 MoM for the recipient twin	0% (0, 84.2)	95.8% (78.9, 99.9)	0%	92% (91.4, 92.6)
MCA-PSV ≥ 1.5 MoM for the donor twin and MCA-PSV ≤ 0.8 MoM for the recipient twin	0% (0, 84.2)	100% (86.8, 100)	0%	92.3% (92.3, 92.3)
Δ MCA-PSV MoM ≥ 1.0	0% (0, 84.2)	100% (86.8, 100)	0%	92.3% (92.3, 92.3)
Δ MCA-PSV MoM ≥ 0.8	0% (0, 84.2)	95.8% (78.9, 99.9)	0%	92% (91.4, 92.6)
Δ MCA-PSV MoM ≥ 0.5	0% (0, 84.2)	75% (53.3, 90.2)	0%	90% (87.7, 91.9)

1061 Short cervical length in asymptomatic twin pregnancies and optimal timing of antenatal corticosteroid therapy

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OBJECTIVE: Identification of an ultrasonographic short cervical length (CL) is useful to predict a spontaneous preterm delivery in asymptomatic twin pregnancies, but data are sparce regarding relation between short CL and risk of PB in the forthcoming 7 days. Therefore, there is no evidence that a diagnosis of short CL in asymptomatic twin pregnancy may justify the administration of antenatal corticosteroid (ACS) therapy. We aimed to assess whether a short CL in asymptomatic twin pregnancies was associated with a significant risk of delivery within 7 days following CL measurement.

STUDY DESIGN: We performed a retrospective cohort study of twin pregnancies followed and delivered in a referral university hospital from January 1, 2007, to December 31, 2017. Asymptomatic twin pregnancies had sequential ultrasound measurements of the CL every four weeks from 21 to 34 weeks of gestation. The primary outcome was the delivery in the forthcoming 7 days after first CL measurement < 25 mm. Secondary outcomes included interval between first CL measurement < 25 mm and delivery, and preterm delivery rate before 34 and 37 weeks of gestation. In addition to the 25 mm CL threshold, we evaluated theses outcomes according to the thresholds of 20, 15 and 10 mm.

RESULTS: Of 1,285 asymptomatic twin pregnancies, a short CL of $<$ 25 mm was observed in 28.1 % (n = 361) women at mean gestational age of 29.0 +/- 3.4 weeks, and was not associated with a significant rate of delivery in the forthcoming 7 days after first CL measurement < 25 mm (2.8 %). The mean interval between first CL measurement < 25 mm and delivery was 47 days (+/- 24). No difference was observed in theses outcomes for any of the thresholds. Moreover, 77.6 % of women followed for a CL of < 25 mm finally delivered after 34 weeks.

CONCLUSION: In this retrospective cohort study of asymptomatic twin pregnancies, CL measurement of < 25 mm by routine transvaginal ultrasound was not associated with a significant risk of delivery in the forthcoming 7 days (only 2.8 %). Therefore, we cannot recommend its use in routine follow-up in order to indicate properly ACS therapy.

Table 2. Primary and secondary outcomes for overall population of asymptomatic twin pregnancies according to the chosen threshold to define short CL

Twin pregnancies with short CL < 25 mm				
	CL < 25 mm n = 361 (100 %) n (%)	CL < 20 mm n = 170 (47.1 %) n (%)	CL < 15 mm n = 64 (17.7 %) n (%)	CL < 10 mm n = 20 (5.5 %) n (%)
Delivery < 7 days	10 (2.8)	10 (5.9)	1 (1.6)	0 (0)
Delivery < 14 days	29 (8.0)	18 (10.6)	5 (7.8)	2 (10.0)
Delivery < 34 WG	81 (22.4)	47 (27.6)	21 (32.8)	12 (60.0)
Delivery < 37 WG	236 (65.4)	121 (71.2)	46 (71.9)	17 (85.0)
Duration between short CL diagnosis and delivery (days)				
Mean +/- SD	45 +/- 23	43 +/- 24	43 +/- 22	40 +/- 22
Median [1st Q; 3thd Q]	42 [28; 60]	40 [27; 58]	39 [29; 54]	37 [25; 49]

Abbreviations: CL: Cervical length; PB: Preterm Birth; SD: Standard Deviation; WG: weeks of gestation.

1062 Prospective Study on the Duration of Cervical Ultrasound Measurement on the Prevalence of Short Cervix

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OBJECTIVE: To assess the impact of examination duration for mid-trimester cervical length (CL) assessment on the prevalence of short cervix (CL $\leq$ 25 mm).

STUDY DESIGN: A prospective study on asymptomatic nulliparous women with a singleton pregnancy at 20-23 weeks. Certified sonographers performed transvaginal ultrasound examination of the cervix (AIUM guidelines). After an initial CL measurement (T-0), the sonographer observed the cervix for 3 minutes and collected the shortest measurement (T-3min). For all cases with CL $\leq$ 30 mm, the observation was prolonged for another 3 minutes (total of 6 minutes, T-6min) along with 200 participants with CL $>$ 30 mm. A MFM subspecialist verified all measurements and performed his own assessment for all cases with CL $\leq$ 30 mm (T-MFM). We compared the proportion of CL $\leq$ 25mm according to the shortest CL obtained at T0, T3min and T6min. Vaginal progesterone was prescribed in case of CL $\leq$ 25mm and all participants were followed for spontaneous preterm birth (sPTB) $<$ 35 weeks.

RESULTS: We recruited 1644 participants at a median gestational age of 23 [interquartile (IQ): 22 − 23] weeks with a median CL of 35 (IQ: 32 − 39) mm and 100 (6.1%) cases of CL $\leq$ 25mm. The initial measurement (T0) would have identified 35 (2.1%) cases of short cervix, compared to 69 (4.2%) at T-3min and 95 (5.8%) at T-6min ($p < 0.001$). An extra 5 (0.3%) cases were observed by the MFM. ($p < 0.001$). No (0%) short cervix were observed at T-6min in the selection of participants with CL $>$ 30mm at T-3min. Of note, the rate of spontaneous PTB $<$ 35 weeks was 0.8% in women with CL $>$ 25 mm; 5.7% among women with CL $\leq$ 25mm at T0; 2.9% among women with CL $\leq$ 25mm at T-3min; 3.8% among women with CL $\leq$ 25 mm at T-6min, and 0/5 (0%) among those with CL $\leq$ 25mm according to the MFM only (p=0.01).

CONCLUSION: Midtrimester cervical examination duration influences the proportion of short cervixes. For optimal diagnosis, the examination should last 3 minutes after the first measurement and 6 minutes when CL $\leq$ 30 mm. Extending the examination beyond these limits is not necessary.

1063 Prenatal Exome in low-risk pregnancies and apparently normal fetuses — the rate of abnormal findings

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OBJECTIVE: This study aims to assess the diagnostic yield of prenatal exome sequencing (ES) in a clinical setting for structurally normal fetuses, without major/minor abnormalities or family history indicative of monogenic disease.

STUDY DESIGN: This retrospective analysis encompasses prenatal ES conducted at a single center between January 2020 and July 2023. Genetic counselling was provided to all couples, and detailed medical histories were obtained. The exome analysis focused on a curated list of ~2100 genes associated with Mendelian early-onset genetic disorders. Variant analysis and genetic counseling were conducted by a multidisciplinary team comprising bioinformaticians and clinicians.

Pregnancies with indications for monogenic disease, such as major ultrasound findings, sonographic soft markers, abnormal maternal biochemical screening, or suggestive family history, were excluded, as well as cases with abnormal chromosomal microarray (CMA) results. In all cases, CMA was done prior to ES. Only pathogenic and likely pathogenic (P/LP) variants, classified according to the American College of Medical Genetics and Genomics (ACMG) guidelines, were reported.

RESULTS: From January 2020 to July 2023, a total of 1910 fetal ES cases were conducted.

After exclusion, in 1029 prenatal ES cases, 20 fetuses (1.9%) were identified with P/LP variants, indicating the presence of known monogenic diseases. Among these cases, 9 fetuses (8%0.) had the potential for severe phenotypes, including shortened lifespan and intellectual disability, and 11 had the potential for milder phenotypes.

Out of the 20 cases, 11 (55%) were determined to be de novo. 19 cases (95%) showed dominant/X linked inheritance patterns.

CONCLUSION: The 1.9% diagnostic yield highlights the great contribution of ES in structurally normal fetuses. However, it necessitates rigorous analysis, and comprehensive genetic counseling before and after testing.

1064 Risks of hospitalization for cardiovascular disease in the first year after delivery of twin pregnancies

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OBJECTIVE: Compared to singletons, patients carrying twins face increased risks of hypertensive disorders of pregnancy (HDP). We hypothesized that the increased plasma volume and cardiac output in twin pregnancies pose a greater risk of cardiovascular complications. We determined the risk of cardiovascular disease (CVD) related hospitalizations within the year following delivery in relation to HDP, comparing twin with singleton pregnancies.

STUDY DESIGN: We performed a retrospective cohort study of hospitalized singleton and twin births in the United States from 2010-2018, using the Healthcare Cost and Utilization Project Nationwide Readmissions Database. Using ICD coding, we identified all hospitalizations for CVD complications during the same calendar year after delivery in singleton versus twin pregnancies with and without HDP. We calculated rates of CVD readmission and expressed associations based on a confounder-adjusted hazard ratio (HR) with a 95% confidence interval (CI).

RESULTS: Of a total of 30,606,363 delivery hospitalizations, 565,306 (1.8%) were twin births, of which 135,910 (24%) were affected by HDP. The rate of CVD readmission in twin and singleton pregnancies were 376.3 and 162.6 per 100,000 delivery admissions, respectively. Compared with singletons without HDP, the adjusted risk of CVD readmission was highest for twins with HDP (HR 5.12, 95% CI 4.43, 5.92), followed by singletons with HDP (HR 3.95, 95% CI 3.76-4.16) (Table). The increased risk of CVD readmission persisted among twins without HDP (HR 1.84, 95% CI 1.62, 2.09). The adjusted HRs for twins with HDP were substantially high for hypertensive heart disease (23.29, 95% CI 15.69, 34.57), heart failure (12.11, 95% CI 10.06, 14.58), and cardiomyopathy (9.47, 95% CI 6.72, 13.34).

CONCLUSION: Compared to singletons without HDP, twin pregnancies in general, and more so with HDP, are associated with increased risks for CVD complications in the first year postpartum. These findings underscore the increased strain twin pregnancies place on the maternal cardiovascular system and the need for short-term follow-up in this population.

Table
Maternal readmission within one year of delivery for cardiovascular disease complications for twin versus singleton pregnancies with and without hypertensive disorders of pregnancy (HDP) in the United States, 2010-2016

	Adjusted hazard ratio (95% confidence interval)			
	Singleton without HDP	Singleton with HDP	Twin without HDP	Twins with HDP
Any cardiovascular disease	1.00 (Reference)	3.95 (3.76-4.16)	1.84 (1.62-2.09)	5.12 (4.43-5.92)
Coronary heart disease	1.00 (Reference)	3.91 (3.69-4.13)	1.87 (1.64-2.12)	5.58 (4.79-6.49)
Acute myocardial infarction	1.00 (Reference)	3.73 (3.06-4.48)	1.75 (1.08-2.84)	5.40 (3.52-8.28)
Ischemic heart disease	1.00 (Reference)	3.73 (3.16-4.40)	1.40 (0.91-2.15)	5.28 (3.09-9.03)
Atherosclerotic heart disease	1.00 (Reference)	3.40 (2.63-4.40)	1.44 (0.72-2.89)	3.07 (1.62-5.84)
Hypertensive heart disease	1.00 (Reference)	11.59 (10.07-13.35)	3.48 (1.77-6.83)	23.29 (15.69-34.57)
Heart Failure	1.00 (Reference)	6.24 (5.76-6.76)	2.28 (1.91-2.73)	12.11 (10.06-14.58)
Cardiomyopathy	1.00 (Reference)	4.82 (4.19-5.56)	1.60 (1.21-2.13)	9.47 (6.72-13.34)
Cardiac arrhythmias	1.00 (Reference)	2.45 (2.26-2.65)	1.76 (1.49-2.08)	2.26 (1.64-3.11)
Any stroke	1.00 (Reference)	4.21 (3.75-4.73)	1.61 (1.17-2.23)	2.69 (1.90-3.81)
Ischemic Stroke	1.00 (Reference)	4.55 (3.92-5.28)	1.88 (1.27-2.78)	3.36 (2.21-5.09)
Hemorrhagic Stroke	1.00 (Reference)	3.24 (2.80-3.74)	1.29 (0.76-2.19)	1.56 (0.89-2.76)

HDP: Hypertensive disorders of pregnancy (Includes gestational hypertension, preeclampsia, eclampsia, and superimposed preeclampsia)
Hazard ratios were adjusted for maternal age, insurance status, income quartile, hospital bed size, hospital type, hospital teaching status, chronic hypertension, and pregestational diabetes in a weighted Cox-proportional regression model

1065 The risk of mortality from cardiovascular disease differs depending on the mode of delivery

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OBJECTIVE: Cardiovascular disease (CVD) mortality is responsible for up to 22% of maternal deaths and up to 4% of pregnancies are affected by pre-existing CVD. The purpose of this study is to determine if the mode of delivery affects a person's risk of CVD-related mortality in the year following delivery. We hypothesized that patients, both with and without prior CVD, that undergo a cesarean delivery will be at increased risk of CVD-related death.

STUDY DESIGN: We designed a retrospective cohort study utilizing the Nationwide Readmissions Database (2010-2018) to identify singleton births. ICD-9 and ICD-10 codes were used to identify patients with CVD mortality within the calendar year of index delivery. Associations between mode of delivery and CVD mortality were determined from Cox proportional hazards regression models before and after adjusting for potential confounders.

RESULTS: In persons without pre-existing CVD, CVD-related hospital mortality among the cesarean and vaginal delivery groups were 3.8 and 2.9 per 100,000 delivery discharges, respectively (hazard ratio [HR] 1.19, 95% confidence interval [CI] 0.97, 1.46) (Figure). The risk for CVD mortality was highest in the first 30 days after the delivery hospitalization (HR 1.58, 95% CI 1.01, 2.47) and diminished with time. Risk of stroke mortality increased two-fold in the first 30 days (HR 2.11, 95% CI 1.03-4.32) and remained elevated for one year after delivery. In patients with pre-existing CVD, CVD-related mortality among the cesarean and vaginal delivery groups were 231.8 and 157.9 per 100,000 delivery discharges, respectively (HR 1.35, 95% CI 0.44, 4.14), although the risk estimate was imprecise.

CONCLUSION: Persons without pre-existing CVD have an increased risk of CVD-related mortality after cesarean delivery. This may be due to the unmasking of undiagnosed CVD. Mortality risk in persons with prior CVD is not affected by the mode of delivery. These findings suggest that attempting vaginal delivery among persons

with and without a history of CVD may be beneficial insofar as mortality from CVD within the first year.

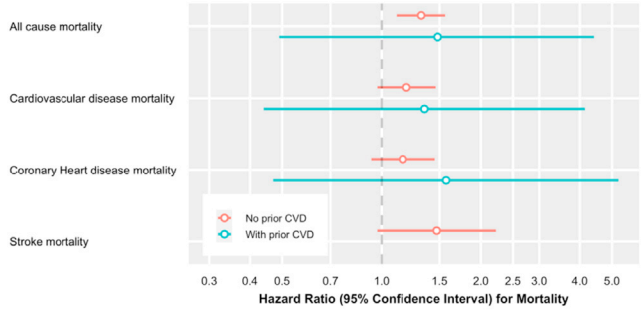

Figure 1: Associations between mode of delivery and cardiovascular disease mortality

1066 Serial measurements of ultrasonic dimensions of gravid maternal anatomy and aspirated cervical stiffness

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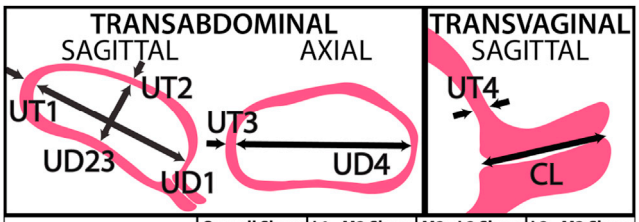
OBJECTIVE: Reproductive tissues grow and remodel during pregnancy to accommodate the developing fetus. With little known about this process in normal human pregnancy, delineating abnormalities in preterm birth (PTB) is challenging. This study serially assessed maternal anatomy size and cervical stiffness for patients at low risk for PTB.

STUDY DESIGN: This was a prospective observational study of patients at low risk for PTB. Patients (n = 47, all delivered at term) were asked to attend four research visits: late 1st (L1, 9^{3}-15^{3} weeks), middle 2nd (M2, 17^{3}-20^{5} weeks), late 2nd (L2, 23^{3}-27^{1} weeks), and middle 3rd trimester (M3, 33^{4}-38^{0} weeks). Cervical stiffness and maternal dimensions were measured via aspiration and ultrasound, respectively. The primary outcomes were linear regression slopes (accounting for patient correlation) for dimension measurements of intrauterine diameter (UD), uterine wall thickness (UT), cervical length (cm/week), and aspirated cervical stiffness (aCS, mbar/week) (fig. 1). The overall slope (all four visits) and slope between visits were found.

RESULTS: The inferior-superior UD increased fastest between L1 and M2 (slope = 0.80 cm/week). The anterior-posterior UD increased fastest between L2 and M3 (slope = 0.26 cm/week) and left-right UD between M2 and L2 (slope = 0.86 cm/week). The fundal and left/right UT increased during pregnancy (slope = 0.01 and 0.02 cm/week, respectively), whereas the lower uterine thinned (slope = -0.02 cm/week). No significant slope value was found for the anterior UT. The cervical length decreased (slope = -0.04 cm/week), with the largest rate of decrease between L2 and M3 (slope = -0.06 cm/week). aCS decreased as pregnancy progressed (slope = -3 mbar/week), with the largest decrease between L1 to M2 (slope = -5 mbar/week).

CONCLUSION: This novel dataset shows the rate of lower uterine segment thinning, cervical length shortening, and decreases in cervical stiffness are gestational age-dependent. These data is vital to further developing computational models to understand how the uterus and cervix function in normal and abnormal pregnancies leading to PTB.



	Overall Slope (cm/week)	L1 - M2 Slope (cm/week)	M2 - L2 Slope (cm/week)	L2 - M3 Slope (cm/week)
UD1 *inferior-superior UD*	0.80***	0.80***	0.76***	0.63***
UD23 *anterior-posterior UD*	0.21***	0.17**	0.16*	0.26***
UD4 *left-right UD*	0.61***	0.65***	0.86***	0.39***
UT1 *fundal UT*	0.01*	0.01	0.03	-0.01
UT2 *anterior UT*	0.01	0.01	-0.00	0.00
UT3 *left/right UT*	0.02***	0.02*	0.03	0.04*
UT4 *lower uterine segment UT*	-0.02*	-0.04	-0.03*	-0.02
CL *cervical length*	-0.04***	-0.02	-0.01	-0.06***
aCS (mbar/day) *aspirated cervical stiffness*	-3***	-5***	-2	-1

p-value > 0.05 ( ), p-value 0.01-0.05 (*), p-value 0.001-0.01 (**), p-value < 0.001 (***)

1067 Preeclampsia associated genetic variants near FLT1 are associated with elevated late pregnancy maternal serum sFLT1

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OBJECTIVE: It is hypothesized that increased placental release of soluble fms-like tyrosine kinase-1 (sFLT1) is causally related to the pathophysiology of preeclampsia (PE). Genome-wide association studies identified four PE-associated fetal variants near the *FLT1* gene: rs4769612, rs4769613, rs7318880, and rs12050029, but previous studies have failed to show associations between these variants in the mother and sFLT1 levels in the first and second trimester of pregnancy. We sought to determine the association between maternal or fetal carriage of these variants and maternal circulating levels of sFLT1 across all three trimesters of pregnancy.

STUDY DESIGN: We analyzed data from the Pregnancy Outcome Prediction study, a prospective cohort of nulliparous women, where 3,968 mother-child pairs passed genotyping quality control. Maternal serum sFLT1 levels were measured at 12-, 20-, 28-, and 36 weeks of gestational age (wkGA) using a Roche Cobas e411 analyzer. In cross-sectional and longitudinal regression models, the dependent variable was the z-score of log-transformed sFLT1 at each wkGA or the change in z-score between 28- and 36wkGA, adjusted for fetal sex, age, BMI, maternal race/ethnicity, alcohol use, smoking, deprivation index, and the top 10 genetic principal components.

RESULTS: There was no association between the maternal variants and sFLT1 levels at any individual wkGA ($P > 0.05$). There was no association between fetal variants and sFLT1 levels at 12, 20 or 28wkGA ($P > 0.05$). However, all four fetal variants were positively associated with the sFLT1 z-score at 36wkGA (Figure 1). All maternal and fetal variants except rs12050029 were associated with increased change in the sFLT1 z-score from 28 to 36wkGA. Fetal associations with third trimester sFLT1 z-score change were consistently stronger than maternal associations ($P < 1 \times 10^{-5}$).

CONCLUSION: Fetal variants near *FLT1* associated with an increased risk of PE are associated with higher maternal serum sFLT1 levels in the third trimester, supporting a causal role for placentally derived sFLT1 in the pathophysiology of PE.

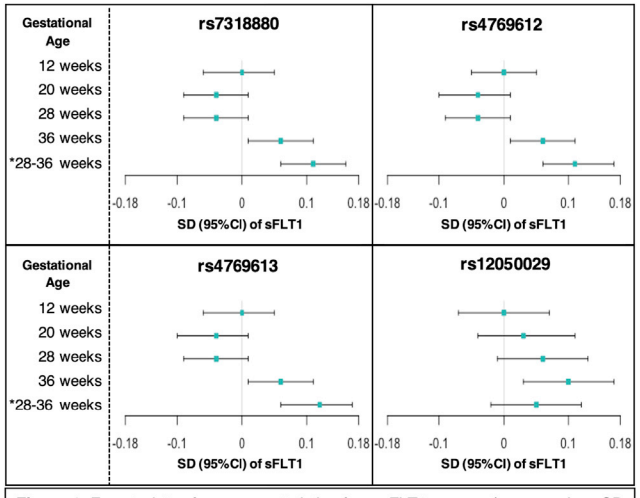

Figure 1. Forest plots of summary statistics from sFLT1 z-score (expressed as SD with 95% CI) and fetal genotype association across gestation for Pregnancy Outcome Prediction study participants without preeclampsia. Four genetic variants near the *FLT1* gene previously found to be associated with preeclampsia (SNP_Effect Allele): rs7318880_T; rs4769612_C; rs4769613_C; rs12050029_G. SD = Standard Deviation; CI = Confidence Interval; *change in z-score between 28- and 36-weeks' gestation

1068 Pregnancy Outcomes in Severe Early-Onset Fetal Growth Restriction: Results from the Multicenter PERIMETER Study

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OBJECTIVE: Severe, early-onset fetal growth restriction (EO-FGR) represents a particularly challenging obstetric cohort. There remains a paucity of data to address optimal timing of delivery, balancing the risk of fetal demise with the potential benefits of advancing gestation. This analysis describes pregnancy outcomes for all cases at one center of EO-FGR due to uteroplacental causes to assist in perinatal counseling.

STUDY DESIGN: The PERIMETER Study collected all singleton cases of EO-FGR confirmed by ultrasound between 18^0 and 27^6wks, at the three largest tertiary referral obstetric hospitals in one city from July 2016 to June 2020. FGR diagnosis was confirmed using electronically-stored ultrasound data, with international Delphi consensus criteria used for diagnosis, including biometry and Doppler data. Cases were considered to be uteroplacental in the absence of structural or genetic abnormality or infection, and in the presence of umbilical artery (UA) Doppler abnormality.

RESULTS: Severe EO-FGR was diagnosed in 250 cases, with uteroplacental cause identified in 154 (62%). Pregnancy outcomes were confirmed for 111 cases, including livebirth (99, 89%) and stillbirth (12, 11%). Liveborn cases were diagnosed later compared with stillbirth (mean (SD) 24.6 (2.4) v 22.2 (1.8) wks, p< 0.001). Liveborn infants < 34wks were more likely to be delivered for abnormal CTG or deteriorating Doppler parameters, and more likely to have UA AEDF or REDF and/or oligo- or anhydramnios pre-delivery, compared with those born later (Table). All but one liveborn infant < 34wks was delivered by cesarean (39/40, 98%), including 4 by classical CS. Amongst stillbirths (n=12), median gestation at confirmed fetal demise was 24.9wks (range 22.3-30.9), including 8 (67%) cases with EFW < 400g. Almost one third of patients required delivery in the maternal interest.

CONCLUSION: Almost 50% of severe EO-FGR cases deliver < 34wks, with no cases resulting in stillbirth thereafter. Most stillbirths occurred at previable weight. These data will be useful for counseling patients regarding the timing of delivery of EO-FGR pregnancies.

Table: Pregnancy outcomes for livebirths by gestational age at delivery

Pregnancy outcome	Gestational age at delivery (wks)			
	All gestations, n=99	<28wks, n=19	28^0 – 34wks, n=22	>34^0wks, n=58
Gestation at diagnosis (wks), mean (SD)	24.6 (2.4)	23.9 (2.5)	26.0 (1.9)	24.4 (2.3)
Gestation at delivery (wks), mean (SD)	34.0 (5.1)	26.6 (1.2)	30.5 (1.7)	37.8 (2.3)
Birthweight (g), mean (SD)	1847 (956)	626 (157)	1075 (304)	2513 (585)
Delivery indication				
Fetal condition	68 (69%)	15 (79%)	17 (77%)	36 (62%)
Abnormal CTG	25	6	10	9
Abnormal Dopplers	19	9	6	3
Other (FGR &/or oligohydramnios)	24	0	1	24
Maternal condition	31 (31%)	4 (21%)	5 (23%)	22 (38%)
UA EDF pre-delivery				
Normal	77 (78%)	9 (41%)	11 (50%)	57 (98%)
Abnormal	22 (22%)	10 (59%)	11 (50%)	1 (2%)
Intermittent absent	1	0	1	0
Absent	12	5	6	1
Reversed	9	5	4	0
AFI pre-delivery				
Normal	77 (78%)	11 (58%)	16 (73%)	50 (86%)
Oligohydramnios	16 (16%)	5 (26%)	4 (18%)	7 (12%)
Anhydramnios	4 (4%)	3 (16%)	1 (4.5%)	0 (0%)
Polyhydramnios	2 (2%)	0 (0%)	1 (4.5%)	1 (2%)
Onset of labour				
No labour	59 (60%)	17 (89%)	21 (95%)	21 (36%)
Spontaneous	15 (15%)	2 11%)	1 (5%)	12 (21%)
Induced	25 (25%)	0 (0%)	0 (0%)	25 (43%)
Mode of delivery				
Cesarean, lower segment	66 (67%)	14 (74%)	22 (100%)	30 (52%)
Cesarean, classical	4 (4%)	4 (21%)	0 (0%)	0 (0%)
Vaginal, unassisted	23 (23%)	0 (0%)	0 (0%)	23 (39%)
Vaginal, operative	6 (6%)	1 (5%)	0 (0%)	5 (9%)

1069 Risk of perinatal mortality associated with expectant management in patients who used nicotine products

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OBJECTIVE: Prior studies have demonstrated an association between maternal nicotine use and adverse neonatal outcomes. Balancing the risk of stillbirth and infant death with increasing gestational age (GA) is nuanced and an important aspect of decision making around delivery timing. There is limited guidance regarding timing of delivery and whether earlier delivery reduces overall perinatal mortality rate in patients who used nicotine products. Therefore, we sought to compare the risk of perinatal death associated with each additional week of expectant management to that of immediate delivery.

STUDY DESIGN: This was a retrospective cohort study of singleton non-anomalous term births in California between 2016 and 2019. We included patients who used nicotine products during any trimester of pregnancy. Pregnancies complicated by pre-existing diabetes and chronic hypertension were excluded. To determine the optimal GA for delivery, we compared the risk of delivery, which represented the risk of infant death at each week, with the fetal/infant mortality risk of expectant management for an additional week. The risk of expectant management was the sum of the risk of stillbirth during a subsequent week plus the risk of infant death in the subsequent week.

RESULTS: In this study, 24,895 births were included who had tobacco use during pregnancy. At 37 weeks' gestation, the risk of immediate delivery was greater than one week of expectant management (64.2 vs. 48.0 deaths per 10,000 births) (Table 1). At 38 weeks' gestation the risks were not different (42.1 vs. 41.0 deaths per 10,000 births). At 39 weeks, the risk of immediate delivery was lower than expectant management (30.8 vs. 54.7) and remained lower at 40 and 41 weeks' gestation.

CONCLUSION: In this study of those who used nicotine during pregnancy, we found that the risk of perinatal mortality was increased with expectant management at 39 weeks and beyond. These findings can be used to guide clinical counseling and care in the context of ongoing prenatal care.

Table 1 **Risk of infant death and stillbirth vs. composite perinatal mortality risk stratified by gestational age in patients who used nicotine products**

Gestational age (weeks)	Stillbirths per 10,000 ongoing pregnancies	Infant deaths per 10,000 live births	Composite perinatal mortality risk
37	5.96 (3.26, 10.00)	64.17 (38.07, 101.22)	48.03 (47.90, 48.16)
38	10.16 (6.21, 15.69)	42.08 (25.72, 64.92)	41.01 (40.91, 41.10)
39	19.32 (12.38, 28.74)	30.84 (20.82, 44.00)	54.68 (54.51, 54.86)
40	24.72 (12.78, 43.14)	35.36 (21.30, 55.17)	64.22 (63.73, 64.73)
41	69.86 (30.21, 137.20)	39.51 (17.07, 77.69)	69.89 (65.63, 74.30)

1070 Rising cesarean delivery rates in contemporary obstetric practice - Suboptimal obstetric practice or perfectly justifiable?

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OBJECTIVE: The WHO has suggested that the "ideal" cesarean delivery (CD) rate should be < 15%, and that CD rates >10% are not associated with mortality reduction. Obstetricians have been criticized for rising CD rates possibly being associated with higher uterine rupture (UtRu) during VBAC attempts, and higher peripartum hysterectomy (PH) due to placenta accreta spectrum. Our objective was to quantify the association between increasing CD rate, hypoxic ischemic encephalopathy (HIE), perinatal mortality rate (PMR), UtRu, and PH at a single tertiary obstetric unit over a 20-year time period.

STUDY DESIGN: A prospectively maintained database of all cases of HIE, perinatal mortality, uterine rupture and peripartum hysterectomy was interrogated for the 2003-2022 time period. HIE (grades 2 or 3) and corrected perinatal mortality rates (cPMR) were expressed per 1,000 births, and excluded cases with congenital malformation. UtRu and PH rates were expressed per 1,000 mothers delivered.

RESULTS: Over 20 years, 163,604 mothers delivered 167,005 babies, for an average of 8,180 mothers per year. The table demonstrates a significant increase in CD from 28.2% in 2003 to 39.0% in 2022 (38% increase), and was accompanied by a highly significant reduction in cPMR from 5.2 to 3.5 per 1,000, (33% decrease), with Spearman rank correlation of -0.83 ($p< 0.001$). Rates of UtRu and PH did not change significantly, at 0.00 and 0.30 per 1,000 in 2003, to 0.25 and 1.47 per 1,000 in 2022 respectively, with Spearman rank correlation of 0.33 ($p=0.154$). The rate of HIE did not change significantly, with a persistently low rate ranging from 1.47 to 1.21 per 1,000 from 2003 to 2022 respectively.

CONCLUSION: Contrary to some prior claims, the 38% increase in CD rate noted at a single maternity hospital was associated with a highly significant improvement in perinatal outcome (33% reduction in PMR, and persistently low HIE rate) but without any negative impact on uterine rupture or peripartum hysterectomy. A higher CD rate than an assumed WHO "ideal" of < 15% is in fact associated with persistently low rates of perinatal mortality and HIE.

Table 20 year trends in CD, HIE, corrected PMR, uterine rupture, and peripartum hysterectomy at a single large obstetric hospital.

Year	Number babies born	CD rate %	HIE rate per 1,000*	cPNM per 1,000*	UtRu rate per 1,000#	Hyst rate per 1,000#
2003	6,790	28.2	1.47	5.2	0.00	0.30
2004	6,731	26.6	1.63	6.1	0.46	1.06
2005	6,804	25.6	1.03	5.4	0.00	0.15
2006	7,325	27.7	0.68	4.4	0.28	0.84
2007	8,456	27.1	1.42	4.7	0.12	0.36
2008	8,799	26.0	1.48	5.3	0.23	0.35
2009	8,912	28.5	1.01	4.5	0.11	0.57
2010	8,792	27.9	1.59	5.2	0.12	0.35
2011	9,319	29.0	0.97	3.5	0.22	0.33
2012	9,041	29.0	1.22	4.6	0.11	0.79
2013	8,841	31.0	1.13	4.0	0.12	0.35
2014	8,980	31.0	0.89	4.3	0.00	0.11
2015	8,538	32.0	0.82	4.8	0.48	0.12
2016	8,589	35.0	0.35	4.1	0.36	1.07
2017	8,409	34.0	1.19	3.4	0.12	1.46
2018	8,514	34.0	0.94	3.0	0.36	0.72
2019	8,410	35.0	1.19	4.1	0.36	0.24
2020	8,316	37.0	2.16	2.9	0.12	0.74
2021	9,147	37.0	2.19	3.0	0.00	1.00
2022	8,292	39.0	1.21	3.5	0.25	1.47

*rate per 1,000 babies born; #rate per 1,000 mothers delivered

1071 Marked 21-year decline in infectious diseases in pregnancy at the busiest maternity hospital in Europe

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OBJECTIVE: As the busiest obstetric hospital in Europe, with an established multidisciplinary specialist Infectious Diseases Service, we sought to evaluate trends in incidence of selected infectious diseases in pregnancy and their rate of associated neonatal infection.

STUDY DESIGN: This hospital provides a specialist multidisciplinary service to manage pregnancies complicated by certain infectious diseases. We interrogated a prospectively collected database for prevalence of these infections in pregnancy, incidence of newly diagnosed cases, and data on infected neonates. Comparisons were made across a 21 year time period using the Cochran-Armitage Test of Trend.

RESULTS: Figure 1 demonstrates the incidence of new cases of Hepatitis B (HBV), Hepatitis C (HCV), syphilis and HIV in

pregnancy during the last 21 years of operation of this specialist clinic, while Figure 2 shows the prevalence of each infection (new and pre-existing). There has been a significant decrease in the prevalence of all infections, with HBV declining from 14.5/1,000 in 2002 to 4.2/1,000 in 2022 (p< 0.0001), HCV declining from 11.5/1,000 in 2002 to 2.0/1,000 in 2022 (p< 0.0001), syphilis declining from 5.6/1,000 in 2002 to 2.5/1,000 in 2022 (p< 0.0001), and HIV declining from 7.3/1,000 in 2002 to 1.4/1,000 in 2022 (p< 0.0001). Similarly, declines were noted in the number of newly diagnosed cases for all infections over the 21 year time period. The number of infected neonates has remained low, with only one case of a neonate infected with HCV and one with syphilis in the last five years from 2018-2022 and no cases of neonates infected with HBV or HIV.

CONCLUSION: There has been a marked reduction in incidence of HBV, HCV, syphilis and HIV in pregnancy over the last 21 years at the largest obstetric hospital in Europe. While it is reassuring to note such a significant drop in maternal infection, it is even more reassuring to see an almost complete absence of congenital infection with these infections. This likely underscores the critical importance of maintaining such a multidisciplinary specialist infectious diseases in pregnancy service.

Figure 1: Incidence of new cases of maternal HBV, HCV, syphilis and HIV in pregnancy, 2002-2022

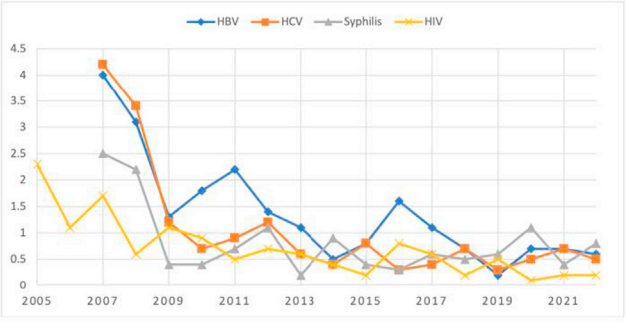
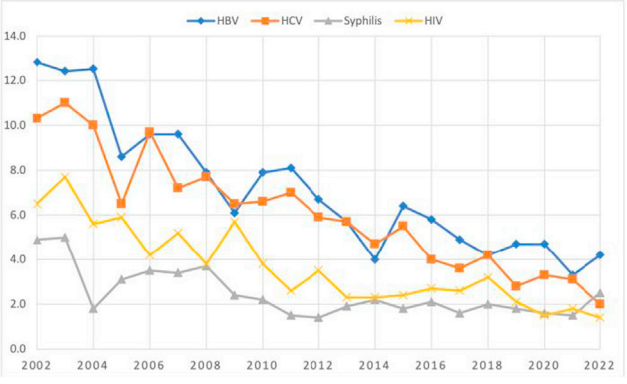


Figure 2: Prevalence of new and pre-existing cases of maternal HBV, HCV, syphilis and HIV in pregnancy, 2002-2022



1072 The association between maternal preeclampsia and long-term offspring respiratory disease- sibling matched analysis

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OBJECTIVE: To assess the association between maternal preeclampsia and long-term respiratory morbidity in offspring. While short-term neonatal complications of preeclampsia are well understood, its influence on long-term respiratory outcomes remains unclear. Prior research suggests an increased risk of respiratory diseases, but these studies lacked comprehensive control for confounding factors. Our sibling-matched analysis addresses this gap, providing insights into the long-term respiratory impact of preeclampsia.

STUDY DESIGN: A retrospective study was conducted, including parous women who were diagnosed with preeclampsia in one pregnancy. Using a sibling-matched analysis, we compared prenatally preeclampsia-exposed siblings with their unexposed counterparts. Incidence of the offspring's hospitalization with specific respiratory morbidities were compared between the siblings, as well as the time to first hospitalization with such a diagnosis. Multivariable generalized estimation equation (GEE) analysis was performed to adjust for confounding variables.

RESULTS: Our cohort included 8,544, half of whom were exposed to maternal preeclampsia. Higher cumulative respiratory hospitalization rates were noted in the preeclampsia group, using a Kaplan-Meier survival curve (log-rank, p< 0.019; Figure). However, crude rates of total respiratory hospitalizations were not statistically different between the groups, (5.2% vs 4.5% respectively; OR= 1.13; 95% CI 0.72-1.06, P=0.202; Table). The GEE model which adjusted for maternal and gestational age, and time of exposure, did not show a significant association between preeclampsia and offspring's risk for long-term respiratory hospitalization (adjusted HR = 1.11; 95% CI 0.91-1.33, P =0.305; Table).

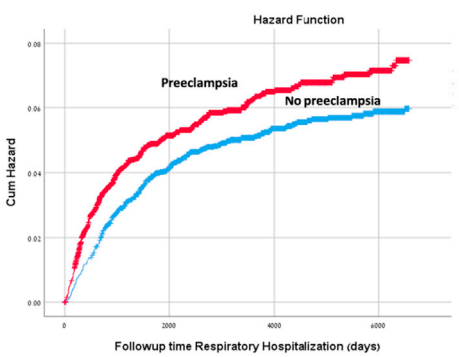
CONCLUSION: In this study, through sibling analysis and confounder adjustment, we discovered no increased risk of respiratory morbidity for offspring born from pregnancies complicated with preeclampsia. Our results underscore the importance of confounder consideration and sibling correlation when estimating the long-term impacts of preeclampsia on offspring's respiratory health.

Table – Crude and adjusted rates of respiratory hospitalizations by exposure to preeclampsia

Preeclampsia N= 4272 %(N)	No preeclampsia N= 4272 %(N)	OR; 95% CI	Adjusted HR[a]
5.2% (221)	4.5% (194)	1.13; (0.72, 1.06)	1.11; (0.91, 1.33)

[a] Adjusted for maternal age, gestational age, and time of exposure

Figure - Kaplan-Meier survival curve:



1073 Placenta Accreta Spectrum and Endometriosis

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OBJECTIVE: The chronic pelvic inflammation and endometrial dysfunction that characterize endometriosis may predispose those affected by it to placenta accreta spectrum (PAS). Prior small studies suggest there may be an association between endometriosis and PAS. We aimed to evaluate this association in a nationwide sample to better understand the etiology and risk factors for PAS.

STUDY DESIGN: We performed a retrospective cohort study using the U.S. National Inpatient Sample from 2017-2020 including individuals delivering after 20 weeks' gestation. ICD-10 codes were used to determine exposure and outcomes. A logistic regression model controlling for confounding variables was constructed. As placenta previa is a mediating effect, it was not included as a confounding factor in our main regression model. A mediation analysis was performed using the counterfactual approach. Data were weighted according to NIS reported sampling weights.

RESULTS: Of 14,154,044 (2,833,010 unweighted) individuals included, 0.12% had PAS and 0.15% had endometriosis. Baseline characteristics are shown in Table 1. In the unadjusted regression model, endometriosis was associated with an increased odds of PAS (OR 5.4; 95% CI 3.7-7.8) (Table). When controlling for confounding factors (age, prior cesarean section, and obesity) the odds of having PAS was higher in patients with endometriosis (OR 3.2, 95% CI 2.3-4.8, p=0.01). In the mediation analysis, placenta previa was found to be an indirect mediator (percent of the total effect that is mediated is 0.49). A second regression model including placenta previa as a covariate was constructed and included in the Table.

CONCLUSION: There is an association between endometriosis and PAS. Further research into the causal pathway between these two disease entities is warranted and may help shed further light onto the role of inflammatory mediators in the development of PAS.

	Endometriosis	
Weighted Unweighted	No (n = 14,144,049) (n = 2,828,811)	Yes (n = 20,994) (n = 4,199)
Age	29.0 (29.0 – 29.1)	32.2 (32.1 – 32.4)
Gestational age at delivery	38.4 (0.02)	37.9 (0.16)
Race/Ethnicity*		
White	7,137,471 (50.5%)	11,800 (56.2%)
Hispanic	2,864,674 (20.3%)	3,035 (14.5%)
Black	2,054,550 (14.5%)	2,345 (11.2%)
Asian or Pacific Islander	847,584 (6.0%)	2,065 (9.8%)
Other	624,884 (4.4%)	955 (4.7%)
Not specified	515,844 (3.6%)	720 (3.4%)
Placenta Accreta Spectrum	17,530 (0.12%)	140 (0.67%)
Placenta Previa	58,439 (0.4%)	650 (3.1%)
Prior Cesarean Section	2,521,829 (17.8%)	6,224 (29.6%)
BMI > 30	1,705,614 (12.1%)	2,929 (14.0%)
Outcomes	**Odds ratio**	**95% Confidence Interval**
Unadjusted regression	5.4	3.7 - 7.8
Regression Model 1 - Adjusted (age, prior cesarean, obesity)	3.2	2.3 - 4.8
Regression Model 2- Adjusted (age, prior cesarean, obesity, placenta previa)	1.9	1.2 – 2.9

Data are presented as weighted n (%) or mean (S.E.) as appropriate.
*Race/ethnicity reported here to demonstrate the demographic representation of the cohort.

1074 The impact of post-epidural hypotension requiring vasopressor treatment on mode of delivery

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OBJECTIVE: To investigate the impact of post-epidural hypotension on the risk of cesarean delivery and, secondarily, to assess the impact of post-epidural hypotension on perinatal outcomes.

STUDY DESIGN: Retrospective cohort study of intrapartum individuals with post-epidural hypotension requiring treatment with either ephedrine or phenylephrine between 2015-2021 at a single institution. A control group who received an epidural without need for vasopressors was randomly selected in a 4:1 ratio compared to the exposure group. Individual characteristics and perinatal outcomes were collected from the electronic medical record. A chi-square test was used to analyze categorical outcomes including the primary outcome of mode of delivery, and a logistic regression was performed to assess confounding by covariates including age, BMI, nulliparity, induction and premature rupture of membranes.

RESULTS: A total of 3474 subjects were included in the cohort with 694 having post-epidural hypotension and 2780 without hypotension. Post-epidural hypotension requiring treatment with vasopressors was associated with a nearly 3 times increased risk of cesarean delivery compared to no hypotension requiring vasopressors after epidural (24.6% vs. 8.2%; RR 2.99, 95% CI 2.5- 3.6). This finding persisted in the logistic regression model (aOR 3.29, 95% CI 2.6-4.1). Additionally, post-epidural hypotension increased the risk for adverse neonatal outcomes including NICU admission (RR 3.39, 95% CI 2.4-4.9) and neonatal oxygen requirement (RR 2.45, 95% CI 1.6-3.7) compared to no hypotension after epidural placement.

CONCLUSION: Individuals with post-epidural hypotension requiring vasopressor treatment have an increased risk of cesarean delivery compared to those who do not have epidural hypotension requiring treatment. These findings are relevant for patient counseling, and future studies are needed to develop strategies to prevent post-epidural hypotension.

1075 Male fetal sex associated with maternal respiratory failure in infection: a health records-based cohort study

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OBJECTIVE: Pregnancy is an immunologically complex state, requiring maternal adaptations to both tolerate the semi-allogeneic fetus and protect the dyad from infections. Biological evidence suggests that pregnancies carrying a male fetus may have altered inflammatory responses to immune challenges. We aimed to assess the impact of fetal sex on severe maternal respiratory morbidity as a proxy for severe immune response in pregnancies complicated by viral and/or bacterial infections.acute re.

STUDY DESIGN: This is a retrospective cohort study of pregnant individuals with a live singleton birth and known fetal sex occurring at two large academic medical centers in Boston between January 2020 and July 2023. We examined features associated with maternal respiratory failure (ICD-10 J96.*) or acute respiratory distress syndrome (ARDS, ICD-10 J80.*) in individuals with a diagnosis of viral respiratory infection (SARS-CoV-2, influenza, parainfluenza, rhinovirus, adenovirus), disseminated varicella, pneumonia, or upper urinary tract infection/pyelonephritis during pregnancy. The primary exposure of interest was fetal sex. Multiple logistic

regression was used to assess maternal and fetal factors associated with maternal respiratory failure/ARDS.

RESULTS: 3,903 pregnant individuals met inclusion criteria. Of 33 individuals with respiratory failure/ARDS, 26 (79%) had a male fetus, compared with 1,993/3,870 (52%) in those without respiratory failure/ARDS; unadjusted odds ratio (OR) 3.5, 95% CI: 1.8-6.8 (Fig. 1A). Male sex, pre-existing airway disease, and presence of a hypertensive disorder were significantly associated with maternal respiratory failure/ARDS in a logistic regression model (Fig. 1B); adjusted OR male sex: 4.5, 95% CI: 3.5-5.6, p< 0.001.

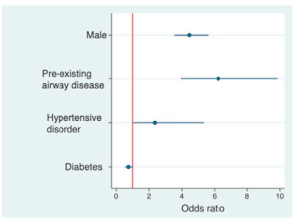
CONCLUSION: In this large retrospective cohort, male sex was a significant risk factor for severe maternal respiratory morbidity following both respiratory and urinary tract infections. These data add to the growing literature that fetal sex plays an important role in modulating the maternal immune response.

A Cohort clinical information by outcome.

	No respiratory failure	Respiratory failure	P*
N	3870	33	
Male fetal sex	1993 (52)	26 (79)	0.002
Maternal age	34 (30, 37)	36 (31, 40)	0.07
Pre-existing airway disease	406 (11)	14 (42)	<0.001
Hypertensive disorder	416 (11)	9 (27)	0.002
Diabetes	306 (8)	3 (9)	0.8

Data shown as N (%) or median (IQR). *Chi-square test.

B



Multiple logistic regression forest plot of maternal respiratory failure from infection in pregnancy.

1076 Risk Factors Predictive of Cesarean Section for Non-reassuring Fetal Heart Tracing among Inductions

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OBJECTIVE: To identify risk factors for patients needing a cesarean delivery for fetal distress while undergoing induction of labor.

STUDY DESIGN: In a retrospective case-control study design, every patient undergoing induction of labor and who delivered via a cesarean section for a non-reassuring fetal heart tracing (FHT) over a 12-month period at Brigham and Women's Hospital were included as cases. Patients who were attempting a trial of labor after a prior cesarean section were excluded. Controls were defined as the next scheduled induction who delivered either vaginally or via cesarean delivery for other indications. A multivariate logistic regression model was built based on significant univariate findings to identify risk factors for needing a cesarean delivery for fetal distress during induction.

RESULTS: A total of 142 cases and 148 controls were included. The significant associations are reported in the table below. Spanish speakers, nulliparity, need for cervical ripening, fetal growth restriction, and having a category II FHT within the first hour of induction were independent significant predictors of having cesarean delivery for fetal distress. When these risk factors were combined, it was found that nulliparous patients who require cervical ripening and have a category II FHT within the first hour of induction have an adjusted OR of 3.7 (95% CI 1.8-7.6, p< 0.001).

CONCLUSION: These findings suggest that certain maternal, fetal, and labor factors at the start of induction may be predictive of needing a cesarean delivery for fetal distress later in induction. Additionally, the cumulative effect of these factors suggests that a certain patient population (i.e. nulliparous patients with an unfavorable cervix and a category II FHT within the first hour of induction) may have a higher risk of ultimately needing a cesarean section during induction, which can help inform and guide patient counseling. These findings could be used to help build a predictive model that combines variables prior to induction of labor to identify pregnancies at increased risk of cesarean delivery for fetal distress.

Table 1: Factors predicting cesarean section for non-reassuring fetal heart tracing, multivariate logistic regression results

	OR	95% CI	P value
Race/ethnicity			
White	REF		
Black	0.44	0.17-1.17	0.100
Hispanic	0.25	0.06-1.06	0.061
Asian	0.34	0.09-1.23	0.100
Other	2.18	0.49-9.72	0.306
Language			
English	REF		
Spanish	9.85	1.27-76.28	0.029
Other	0.86	0.11-6.60	0.887
Gravidity, mean (SD), median (IQR)	0.97	0.74-1.25	0.788
Parity			
0	REF		
1+	0.14	0.06-0.35	<0.001
Cook Balloon or Misoprostol	3.21	1.27-8.10	0.013
Pitocin	0.46	0.25-0.84	0.012
Any HTN	0.76	0.37-1.56	0.448
Genetic or Anatomic anomalies	0.65	0.26-1.65	0.363
Any placental anomaly	0.39	0.12-1.33	0.133
FGR	3.76	1.26-11.23	0.018
UAD diminished, absent, or reversed	6.16	0.49-76.96	0.158
FHT category			
1	REF		
2	2.24	1.12-4.45	0.022

1077 Sphingolipid profile in human uterus at term.

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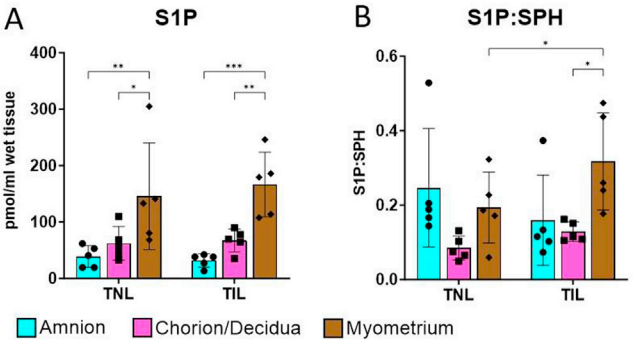
OBJECTIVE: Sphingolipids are a diverse class of bioactive lipids that have emerged with essential regulatory roles in various physiological and pathological processes. Prior work has shown that the bioactive sphingolipid, sphingosine-1-phosphate (S1P), activates a pro-inflammatory phenotype in human myometrium. This study examined the concentrations and distribution of sphingolipids in human term non-labor (TNL) and labor (TIL) amnion, chorion/decidua, and myometrium.

STUDY DESIGN: This prospective study included 5 term TNL and 5 term TIL tissue samples collected during cesarean at ^{3}37 weeks gestation. Samples were flash-frozen within one hour of delivery and stored at -80^{o}C until processing. Sphingolipids were extracted from the tissues and quantitated using high-performance liquid chromatography-mass spectrometry (HPLC-MS/MS). Two-way ANOVA was used to compare lipids between TNL and TIL samples. Tukey post-hoc test was used to adjust for multiple comparisons.

RESULTS: Concentrations of S1P were significantly more abundant in the myometrium compared to the chorion/decidua and amnion at TNL and TL (Fig A). There was no significant difference in S1P levels between TNL and TIL in any of the three tissue types. The levels of sphinganine (SPA), a ceramide and sphingosine (SPH) precursor, were higher in the chorion/decidua than in the amnion and myometrium in TNL and TIL. Levels of SPH, the direct precursor of S1P, were significantly higher in the chorion/decidua and myometrium compared to amnion in both TNL and TL. To understand the S1P turnover rate, we looked at the ratio of S1P to its

precursors. S1P:SPH (Fig B) and S1P:SPA ratios were both significantly higher in the TIL compared to TNL myometrium.

CONCLUSION: Our study presents a quantitative profile of the major sphingolipids in human uterine tissues at parturition. The active metabolite, S1P, is highest in the myometrium. Additionally, S1P:SPH and S1P:SPA ratios suggest a higher turnover rate of S1P during labor. These data suggest a potential role for S1P in myometrial contractility during parturition.



1078 The Association Between Driving Distance to Obstetric Care Centers and Perinatal Outcomes in Alabama

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OBJECTIVE: Maternal care deserts are increasing. We evaluated if driving distance to obstetric (OB) care is associated with perinatal morbidity and if this association differs based on social vulnerability.

STUDY DESIGN: Retrospective cohort of patients delivering a singleton ≥ 22 weeks at a tertiary care center in central Alabama (2014-2018). Patients were excluded if their home address was unavailable or outside Alabama. Driving distance from home address to the nearest OB center and our center was determined using ArcGIS Network Analyst. Patients were secondarily categorized by their social vulnerability index (SVI); high SVI defined as 1 standard deviation above our population mean. Co-primary outcomes were composites of adverse maternal and neonatal outcomes (Table). The odds of our outcomes by driving distance (kilometers) to nearest OB center and our center were estimated using logistic regression models. Tests of interaction explored differential effects on outcomes by SVI (high SVI vs. not).

RESULTS: A total of 12,697 patients were analyzed**:** 65% publicly insured, 46% Non-Hispanic Black, and 60% single. Median driving distance to nearest OB center was 11km (IQR 6-21) and to our center 19km (10-34). The maternal composite occurred in 32% and neonatal composite in 25% of our cohort. There was no association between driving distance to nearest OB center for either outcome in the overall cohort (Table). In the subgroup of patients with high SVI (n=2885) there was a 2.5-fold increased odds of neonatal morbidity (aOR 2.51 [95% CI 1.60-3.94]) for every 50km further from the nearest OB center. When examining distance to our center, there was a 5% increased odds of maternal and a 25% increased odds of neonatal morbidity for every 50km further from our center (Table); results did not differ by SVI.

CONCLUSION: Patients living further from our tertiary care center have higher odds of maternal and neonatal morbidity regardless of SVI. Additionally, living further from the nearest OB center increases neonatal morbidity for those with high SVI. Interventions for high SVI patients living in remote areas are needed.

Table. Logistic regression model for association of driving distance to obstetric center and tertiary care center with maternal and neonatal outcomes

Outcome	aOR (95% CI)[a,b]	Interaction p-value (high vs not-high SVI)
Nearest Obstetric Center		
Maternal Composite	1.02 (0.96-1.08)	0.22
Neonatal Composite	1.06 (0.99-1.14)	<0.001
Tertiary Care Center		
Maternal Composite	1.05 (1.02-1.08)	0.76
Neonatal Composite	1.25 (1.21-1.30)	0.30

Maternal composite: ICU admission, death, unplanned surgery, postpartum hemorrhage, blood transfusion, puerperal infection, wound complication, postpartum readmission or hospital encounter, abruption, fetal death
Neonatal composite: preterm delivery, NICU admission, neonatal death, Apgar < 4 at 5 min, umbilical artery pH < 7.0.
[a]Odds Ratio per 50 kilometer interval
[b]Maternal composite adjusted for race, alcohol use, and chronic hypertension. Neonatal Composite adjusted for race, chronic hypertension, fetal anomaly, and mode of delivery.

1079 The Impact of Physical Activity During Pregnancy on Peripartum Depression

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OBJECTIVE: Physical activity during pregnancy reduces perinatal depression in low risk patients, however, its effect in patients with medical co-morbidities is not known. We aimed to evaluate this association.

STUDY DESIGN: Retrospective cohort of patients included in the Nulliparous Pregnancy Outcomes Study Monitoring Mothers-to-Be with ≥1 medical comorbidity (Table footnote). Activity logs reporting type and amount of activity for the previous month were completed at 3 study visits**:** 6.0-13.6, 14.0-21.6, and 22.0-29.6 weeks. Patients were characterized based on if they met ACOG recommendation of 150 minutes of moderate or 75 minutes of vigorous activity per week averaged across all visits (active versus not active). The primary outcome was EPDS score >10 (indicating perinatal depression) at visit 3. Secondary outcomes included change in EPDS score between visit 1 and 3, treatment for depression, and perinatal outcomes. Outcomes were compared between groups and multivariable logistic regression was used to adjust for covariates.

RESULTS: Overall, 7,486 patients were included, 4092 (55%) were active and 3394 (45%) were not active during pregnancy. History and treatment of mental health disorder before pregnancy, chronic hypertension, and pregestational diabetes were less common in those

who were active compared to those who were not. EPDS score >10 was 15% less likely in those who were active compared to those who were not (aOR 0.85 [95% CI 0.72-0.99]; Table). The average change in EPDS score from visit 1 to 3, treatment for perinatal depression, and adverse perinatal outcomes including preterm birth and SGA did not differ by activity (Table).

CONCLUSION: Patients with medical co-morbidities who were active during pregnancy had lower odds of depression than those who were not active. Treatment of perinatal depression did not differ between groups, however there was not an increase in adverse perinatal outcomes with physical activity. Prospective studies are needed to evaluate the potential benefits of physical activity during pregnancy for perinatal depression in patients with medical co-morbidities.

Association between physical activity and peripartum depression in women with medical comorbidities[a]

Outcome	Active[b]	Not Active	aOR (95% CI)[c]
EPDS >10	371 (9%)	409 (12%)	0.85 (0.72-0.99)
Treatment for PD	279 (7%)	278 (8%)	0.94 (0.76-1.17)
Suspected FGR	103 (3%)	95 (3%)	0.92 (0.68-1.24)
Preterm birth	261 (7%)	282 (8%)	0.82 (0.68-0.99)
Oligohydramnios/ anhydramnios	171 (4%)	139 (4%)	1.02 (0.81-1.30)
SGA	130 (17%)	429 (13%)	1.09 (0.82-1.45)

[a]Medical co-morbidities include: chronic hypertension, pregestational diabetes, asthma, cardiac disease, systemic lupus erythematosus, renal disease, history of mental health disease, hyperthyroidism

[b]Active indicates average of 150 minutes of moderate or 75 minutes of vigorous activity per week

[c]Adjusted for age, insurance type, body mass index, chronic hypertension, pregestational diabetes, history of mental health disorder, treatment of mental health disorder prior to pregnancy.

EPDS, Edinburg Postnatal Depression Scale; PD, perinatal depression; FGR, fetal growth restriction; SGA, small for gestational age

1080 Provider-level disparities in delivery outcomes among patients with a history of Cesarean

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OBJECTIVE: The decision about whether to pursue a trial of labor after cesarean (TOLAC) or elective repeat cesarean delivery (ERCD) requires assessment of risks and benefits prenatally [1]. Providers play a central role in this counseling process [2, 3]. However, the influence of provider-associated characteristics on delivery methods remains unclear [4]. These include specific provider type, practice setting, and patients' cultural beliefs [5-11]. We aimed to address these knowledge gaps by analyzing the impact of provider-level differences on delivery choice and delivery outcome in a cohort of patients with a prior history of cesarean delivery (CD).

STUDY DESIGN: This was a retrospective cohort study of 1,661 deliveries between April 29, 2015 — April 29, 2020. Subjects were divided into either TOLAC or ERCD, and they either delivered a vaginal birth after Cesarean (VBAC) or a repeat CD. The primary outcomes were a cohort of delivery choice and delivery outcomes. Disparities in these outcomes were reviewed between different obstetric providers, examining proportional differences through Chi-squared tests. The delivering provider was determined from a breakdown of different providers delivering at the study site during the study period.

RESULTS: There were significant proportional disparities between patients in the TOLAC and ERCD groups, as well as between patients in the VBAC and repeat CD groups. Specifically, patients with a provider specializing in midwifery were significantly more likely to undergo TOLAC and deliver by VBAC, while patients seeing an OBGYN in private practice were more likely to deliver by elective repeat CD ($p < 0.001$).

CONCLUSION: Given the evidence of increased risk of morbidity with multiple CDs, examining factors that influence repeat CDs is critical. This study suggests that provider-level differences relating to specialty may be one such factor. These data also illuminate underresearched areas in which culture influences maternal and neonatal delivery outcomes. These findings help to guide future investigations to improve outcomes among patients with a history of CD.

Table:

	TOLAC Total = 1,294 *n (%)*	ERCD Total = 367 *n (%)*	χ^2	*p*
Delivering Provider			150.47	< 0.001
Private OB	369 (63.5)	212 (36.5)		
Refuah	303 (96.2)	12 (3.8)		
MFM	251 (78.2)	70 (21.8)		
Midwife	70 (98.6)	1 (1.4)		
House Staff	301 (80.7)	72 (19.3)		

	Repeat CD Total = 518 n (%)	VBAC Total = 1,017 n (%)	χ^2	*p*
Delivering Provider			172.03	< 0.001
Private OB	299 (51.5)	282 (48.5)		
Refuah	41 (13.0)	274 (87.0)		
MFM	115 (35.8)	206 (64.2)		
Midwife	3 (4.2)	68 (95.8)		
House Staff	169 (45.3)	204 (54.7)		

1081 The Impact of Removing Abortion Access to Patients with Chronic Kidney Disease: A Cost-Effectiveness Analysis

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OBJECTIVE: In the 2022 ruling in Dobbs v Jackson Women's Health, the United States Supreme Court returned abortion access back to where it was in 1973, constitutionally unprotected. This has had wide-reaching impacts on people capable of becoming pregnant, potentiates deadly outcomes, and inflicts costs on our health system. The current study focuses on how abortion access affects people who

are pregnant, have chronic kidney disease (CKD), and desire an abortion. With both maternal and fetal/neonatal health in mind, we will examine the outcomes and costs associated with providing or refusing in-state access to abortions for this population.

STUDY DESIGN: A decision-analytic model was built to compare the costs associated with providing abortions in-state compared to the costs associated with a statewide abortion ban. The model considers documented outcomes of pregnancy with CKD (preeclampsia, preterm birth, maternal mortality) and considers the progression of kidney disease. The model also considers the likelihood and costs associated with traveling to another state for an abortion.

RESULTS: In a cohort of 31,243 pregnant people with CKD, providing abortions resulted in 1,130 fewer cases of preeclampsia, 2,264 fewer preterm births, 6,411 fewer cases of chronic kidney disease stage progression, 731 fewer cases of ESRD requiring dialysis, and 139 fewer maternal deaths. Due to the increased incidence of perinatal complications and a progression of maternal chronic kidney disease, an absence of in-state abortion access was associated with an increased cost of $470,769,524 and a decrease of 14,997 QUALYs compared to those in states with abortion access.

CONCLUSION: Providing in-state abortion access to pregnant people with chronic kidney disease is a cost-effective strategy. Due to the direct decrease in preeclampsia, preterm birth, maternal mortality, and progression of kidney disease, allowing these patients to terminate their pregnancies saves a considerable amount of money. Jurisdictions that have restricted abortion access should consider implementing increased access to lower both medical and societal costs.

Table 1. Outcomes in a cohort of 31,243 pregnant people with CKD

Outcome	In-State Abortion Access	No in-State Abortion Access	Difference
Preeclampsia (cases)	0	1,130	-1,130
Preterm Birth (cases)	0	2,264	-2,264
CKD Progression (cases)	0	6,411	-6,411
ESRD (cases)	0	731	-731
Maternal Mortality (cases)	167	306	-139
Cost ($)	$549,189,454	$1,019,958,978	-$470,769,524
Effectiveness (QUALY)	490,828	475,831	+14,997

1082 Resolution of postpartum hypertension among Asian, Black, and Hispanic patients with hypertensive disorders of pregnancy

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OBJECTIVE: Persistent postpartum hypertension is a risk factor for maternal morbidity and future cardiovascular disease. We sought to (1) evaluate the time to resolution (TTR) of hypertension among patients with a hypertensive disorder of pregnancy (HDP) and (2) determine which characteristics were associated with resolution in a cohort of high-risk patients.

STUDY DESIGN: We conducted a secondary analysis of a prospective cohort study of Asian, Black, and Hispanic patients who delivered from April-October 2022 at 4 hospitals in Philadelphia and New York City. Participants reported postpartum blood pressures (BPs) twice daily through a texting platform until 10 weeks postpartum. We included participants diagnosed with HDP prior to discharge. Resolution of HDP was defined as BP< 140/90 for ^{3}48 hours within 10 weeks postpartum. Survival curves were generated to assess TTR and Cox proportional hazards was used to compute hazard ratios.

RESULTS: Of 419 patients in the cohort, 120 had HDP and were included. 80 (67%) achieved resolution of HDP. The median TTR among all participants was 7.0 days (SD**:** 3.4). A higher BMI and higher systolic BP at discharge were associated with a lower rate of resolution (Table). Non-Hispanic Black and "other" race were also associated with a lower rate of resolution compared to Hispanic patients. Participants with a high school degree/GED experienced a lower rate of resolution compared to those with a college degree. When adjusting for confounders (BMI and race and ethnicity), each 1 mmHg increase in systolic BP at delivery resulted in an approximately 2% lower rate of resolution (aHR**:** 0.98, 95% CI**:** 0.96, 0.99). Similarly, each 1 mmHg increase in diastolic BP resulted in an approximately 3% lower rate of resolution (aHR**:** 0.97, 95% CI**:** 0.95, 0.99).

CONCLUSION: In this high-risk cohort of Asian, Black, and Hispanic patients with HDP, BMI, race/ethnicity, education level and BP at discharge were all associated with lower rates of resolution of BP. Given the high maternal morbidity in this group, these factors should be considered when determining length of time for postpartum BP monitoring.

	n(%) resolved	Unadjusted Hazard Ratio (95% CI)	Adjusted Hazard Ratio[a] (95% CI)
Control covariates			
BMI (continuous measure)		0.97 (0.94-1.0)	0.96 (0.93, 0.99)
Race and ethnicity			
Black/African American (non-Hispanic)	37 (59.7%)	0.54 (0.33-0.88)	0.49 (0.29, 0.83)
Asian (non-Hispanic)	6 (66.7%)	0.63 (0.25-1.51)	0.37 (0.14, 0.94)
Other, including multiple/don't know/NR	7 (53.9%)	0.45 (0.20, 1.03)	0.37 (0.16, 0.86)
Hispanic/Latina	30 (83.3%)	Reference	
Education			
Less than High School	11 (78.6%)	1.06 (0.55, 2.06)	0.68 (0.33, 1.39)
High school or GED	25 (55.6%)	0.64 (0.39, 1.04)	0.50 (0.30, 0.84)
Some college or higher	44 (72.1%)	Reference	
Clinical Factors			
Delivery mode			
Cesarean	28 (63.6%)	0.97 (0.61, 1.54)	1.01 (0.62, 1.63)
Vaginal	52 (68.4%)	Reference	
Gestational diabetes			
Yes	17 (65.4%)	0.94 (0.55, 1.61)	0.86 (0.50, 1.49)
No	63 (67.0%)	Reference	
Highest systolic BP at delivery		0.98 (0.96, 0.99)	0.98 (0.97, 1.00)
Highest diastolic BP at delivery		0.97 (0.95, 0.99)	0.97 (0.95, 1.00)
Preterm birth			
Preterm (< 37 weeks)	12 (66.7%)	1.0 (0.55, 1.86)	0.95 (0.51, 1.78)
Not preterm (≥ 37 weeks)	68 (66.7%)	Reference	

Table. Control covariates and clinical factors associated with time to resolution of hypertension among patients with hypertensive disorders of pregnancy. *a. Adjusting for BMI, race and ethnicity, and education*

1083 Risk of Severe Maternal Morbidity in Polycystic Ovary Syndrome

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OBJECTIVE: Patients with Polycystic Ovary Syndrome (PCOS) are more likely to have preexisting medical comorbidities and experience pregnancy related complications. We aimed to describe and compare severe maternal morbidity (SMM) rates during the delivery

encounter in patients with and without a diagnosis of PCOS in a large national electronic health record database.

STUDY DESIGN: This is a retrospective cohort study of singleton deliveries from 2018-2022 using Epic's Cosmos platform. PCOS was defined by ICD-10 codes. The primary outcome was SMM, defined by CDC's criteria. Secondary outcomes were SMM types. We evaluated maternal age, race and ethnicity, insurance, social vulnerability index, obesity, smoking, preexisting and pregnancy related hypertension (HTN) and diabetes mellitus (DM), congenital and acquired heart disease, chronic renal disease, use of metformin, antihypertensives, and magnesium, and delivery mode. Logistic regression was used to calculate crude and adjusted odds of SMM by PCOS status.

RESULTS: Of 1,817,361 deliveries, 61,485 (3.5%) patients had PCOS. Those with PCOS were more likely to be White, commercially insured, and obese; have pre-existing and pregnancy related HTN and DM; and deliver by cesarean. The SMM rate among those with PCOS was 262.7 per 10,000 (95% CI 250.3-275.6) compared to 214.8 (212.7-216.9) among non-PCOS. Unadjusted odds of SMM in patients with PCOS was 1.24 (95% CI 1.18-1.30); however, after adjusting for confounders, this was no longer statistically significant (aOR 1.01, 95% CI 0.96-1.06). Types of SMM differed between those with PCOS and those without (Table).

CONCLUSION: Individuals with PCOS experience higher rates and differing types of SMM compared to those without PCOS. The association between PCOS and SMM appears to be driven by demographic factors and medical comorbidities and not as an independent effect of PCOS. To improve pregnancy outcomes in patients with PCOS, clinicians should target modifying these risk factors.

Table: Severe Maternal Morbidity (SMM) in those with versus without PCOS.

	PCOS *rate per 10,000 (95% CI)*	No PCOS *rate per 10,000 (95% CI)*
SMM	262.7 (250.3-275.6)	214.8 (212.7-216.9)
SMM without blood transfusion	141.1 (132.0-150.8)	95.1 (93.6-96.5)
Acute Myocardial Infarction	2.3 (1.3-3.9)	1.4 (1.2-1.6)
Acute Renal Failure	31.2 (27.1-36.0)	21.4 (20.8-22.2)
Adult Respiratory Distress Syndrome	19.4 (16.2-23.2)	13.9 (13.4-14.5)
Pulmonary Embolism – Air or Thrombus	12.7 (10.1-15.8)	6.9 (6.5-7.3)
Pulmonary Embolism – Amniotic Fluid	1.9 (1.1-3.5)	1.2 (1.1-1.4)
Aneurysm	1.3 (0.6-2.6)	0.6 (0.5-0.7)
Any Blood Product at Delivery	123.3 (114.9-132.3)	120.9 (119.3-122.5)
Cardiac Arrest or Ventricular Fibrillation	1.8 (1.0-3.2)	1.2 (1.0-1.3)
Conversion of Cardiac Rhythm	1.5 (0.7-2.8)	0.7 (0.6-0.8)
Disseminated Intravascular Coagulation (DIC)	30.9 (26.8-35.6)	26.0 (25.3-26.8)
Eclampsia	13.2 (10.6-16.4)	9.2 (8.8-9.7)
Heart Failure or Arrest	0.4 (0.1-1.5)	0.2 (0.1-0.25)
Hysterectomy	10.0 (7.8-12.9)	12.5 (12.0-13.0)
Puerperal Cerebrovascular Disorders	8.5 (6.4-11.1)	6.3 (5.9-6.7)
Pulmonary Edema or Acute Heart Failure	19.4 (16.2-23.2)	10.7 (10.2-11.2)
Sepsis	9.8 (7.6-12.6)	11.3 (10.8-11.8)
Severe Anesthesia Complication	0.7 (0.2-1.7)	0.8 (0.7-1.0)
Shock	12.2 (9.7-15.3)	10.4 (10.0-11.0)
Sickle Cell Crisis	0.2 (0.0-1.0)	1.8 (1.6-2.0)
Tracheostomy	0.4 (0.1-1.5)	0.4 (0.3-0.5)
Ventilation	34.0 (29.7-38.9)	19.1 (18.5-19.8)

1084 Physician and Hospital Characteristics Associated with Vaginal Delivery in Nulliparous Patients Receiving Magnesium Sulfate

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OBJECTIVE: Magnesium sulfate administration for preeclampsia with severe features during labor induction has been associated with increased risk of cesarean delivery (CD). We aim to evaluate provider and hospital associations with successful vaginal delivery (VD) in nulliparous patients undergoing labor induction while receiving magnesium sulfate.

STUDY DESIGN: This was a secondary analysis from the Consortium on Safe Labor, a multicenter cohort study of 228,438 deliveries in 19 U.S. hospitals. The analysis included nulliparous women $\geq$ 18 years old with singleton gestation undergoing induction of labor for preeclampsia with severe features and receiving magnesium sulfate. Primary outcome was physician and hospital characteristics associated with successful VD. Chi-square and independent samples t-test were used to compare groups. The study was deemed IRB exempt #20-000360.

RESULTS: Total 4,122 women met inclusion criteria, of whom 2256 (54.7%) had a successful VD. Patients who had a VD were more likely to have had a female physician ($p< 0.001$), midwife or resident involvement ($p< 0.001$), government, OB hospitalist, or university practice model over private practice ($p< 0.001$), and government or hospital insurance over group or self-pay model ($p=0.003$). Hospital type, level of care, or types of physician coverage (MFM, hospitalist, midwife) did not differ between groups. NICU level of care did not differ between groups. The number of hospital deliveries per year was slightly lower in those with successful VDs ($p< 0.001$).

CONCLUSION: Rates of cesarean delivery are high in patients undergoing induction of labor for severe preeclampsia receiving magnesium sulfate. Various physician and hospital characteristics are associated with increased rate of successful VD. These findings suggest the need to study practice patterns by different providers in various settings to appropriately manage labor in this high risk patient cohort.

Table 1: Physician and Hospital Characteristics between VD and CD

	Vaginal Delivery (n=2256)	Cesarean Delivery (n=1866)	p-value
Physician reported gender			
Female	1221/2133 (57.2%)	894/1762 (50.7%)	**<0.001**
Male	912/2133 (42.8%)	868/1762 (49.3%)	
Physician years out from training	10.6±10.1	11.4±9.8	0.26
Physician specialty			
Family Practitioner	65/2145 (3.0%)	35/1787 (2.0%)	**<0.001**
Fellow	2/2145 (0.1%)	6/1787 (0.3%)	
MFM	145/2145 (6.8%)	175/1787 (9.8%)	
Midwife	66/2145 (3.1%)	2/1787 (0.1%)	
OB/GYN	1612/2145 (75.2%)	1425/1787 (79.7%)	
REI	14/2145 (0.7%)	6/1787 (0.3%)	
Resident	221/2145 (10.3%)	121/1787 (6.8%)	
Other	19/2145 (0.9%)	17/1787 (1.0%)	
Physician practice model			
Clinic Physician	67/2140 (3.1%)	44/1774 (2.5%)	**<0.001**
Federal/State/County	121/2140 (5.7%)	79/1774 (4.5%)	
Hospitalist	38/2140 (1.8%)	20/1774 (1.1%)	
Private practice	1069/2140 (50%)	1013/1774 (57.1%)	
University faculty	690/2140 (32.2%)	523/1774 (29.5%)	
Other	155/2140 (7.2%)	95/1774 (5.4%)	
Physician insurance model			
Government	243/2003 (12.1%)	163/1703 (9.6%)	**0.003**
Group	457/2003 (22.8%)	406/1703 (23.8%)	
Hospital	497/2003 (24.8%)	406/1703 (23.8%)	
Self	549/2003 (27.4%)	544/1703 (31.9%)	
Other	257/2003 (12.8%)	184/1703 (10.8%)	
Hospital type			
University-affiliated	1108 (49.1%)	907 (48.6%)	0.40
Teaching community	1082 (48.0%)	916 (49.1%)	
Non-teaching community	66 (2.9%)	43 (2.3%)	
Hospital level of care			
Secondary	92 (4.1%)	82 (4.4%)	0.62
Tertiary	2164 (95.9%)	1784 (95.6%)	
24/7 MFM coverage	1961 (86.9%)	1648 (88.3%)	0.18
24/7 Hospitalist coverage	688 (30.5%)	558 (29.9%)	0.13
Midwife available	1468 (65.1%)	1173 (62.9%)	0.14
24/7 Neonatologist coverage	2190 (97.1%)	1823 (97.7%)	0.22
NICU level			
No NICU	25 (1.1%)	15 (0.8%)	0.08
Level 2	120 (5.3%)	128 (6.9%)	
Level 3	2111 (93.6%)	1723 (92.3%)	
Hospital number of deliveries	4243.5±1367.4	4391.0±1535.3	**<0.001**

1085 Remote Blood Pressure Monitoring for Postpartum Hypertension: A Cost-Effectiveness Analysis

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OBJECTIVE: Recognizing the importance of close follow-up after hypertensive disorders of pregnancy (HDP), many centers have initiated programs to support postpartum remote blood pressure monitoring (RBPM). We aim to evaluate the cost-effectiveness to inform scalability of these programmatic interventions.

STUDY DESIGN: We conducted a cost-effectiveness analysis of utilizing RBPM to manage postpartum hypertension versus usual care. The modeled RBPM included provision of home blood pressure (BP) cuff, guidance on warning symptoms, instructions on BP self-monitoring twice daily, and clinical staff to monitor population-level BPs and provide clinical recommendations. Usual care was defined as guidance on warning symptoms and recommendation for one outpatient visit for BP monitoring within a week of discharge. We designed a Markov model that ran over 14 one-day cycles. QALYs were calculated over the first year postpartum and reflected the short-term morbidities associated with HDP that, for most birthing people, resolve by two weeks postpartum. Sensitivity analyses were performed to assess strength and validity of the model. Primary outcome was incremental cost effectiveness ratio (ICER) defined as cost needed to gain one quality adjusted life year (QALY). Secondary outcome was incremental cost per readmission averted.

RESULTS: In the base case scenario, utilizing RBPM was the dominant strategy [Table 1a]. In univariate sensitivity analyses, the most cost-effective strategy was sensitive to baseline probability of normotensive BPs, mild range BPs, or severe range BPs [Table 1b]. Assuming a willingness-to-pay of $100,000 per QALY, utilizing RBPM was cost-effective in 99.96% of simulations in a Monte Carlo analysis. Using readmissions averted as a secondary effectiveness outcome, the incremental cost per readmission averted was $118.23.

CONCLUSION: Remote blood pressure management of postpartum hypertension is cost saving with better outcomes compared to usual care. These data support broad implementation of RBPMs for birthing people with hypertensive disorders of pregnancy.

Table 1a: Cost-Effectiveness Outcomes Based on Strategy Per Patient for Base Case

	RBPM	No RBPM
Total Cost (USD) over 14 days	$2,982.92	$4,213.99
Total QALYs over 14 days	15	14.99
ICER	Dominant strategy	--
Readmissions	0.01	0.05
Incremental cost per readmission averted	$118.23	--

Table 1b: Univariate Sensitivity Analyses Evaluating When the Most Cost-Effective Strategy Shifted to Usual Care

Baseline Parameter	Base Estimate	Range	One-Way Sensitivity Threshold
Probability of Normotensive BP	0.96	0.95-0.98	Less than 0.95
Probability of Mild Range BP	0.03	0.02-0.08	Less than 0.023
Probability of Severe Rane BP	0.008	0.006-0.012	Less than 0.0014

1086 Risk Factors for Post-Acute Sequelae of SARS-CoV-2 Infection (PASC) Symptoms Among Postpartum Birthing People

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OBJECTIVE: Approximately 10% of people with SARS-CoV-2 will experience PASC, which has been characterized by symptoms such as malaise, fatigue, and cough, among others. PASC symptoms are particularly difficult for postpartum people as they navigate their own physical and emotional transition to new parenthood. We sought to evaluate risk factors for PASC in postpartum people.

STUDY DESIGN: This secondary analysis of a randomized trial of a digital health intervention to support new parents. The parent trial recruited birthing people after delivery, prior to hospital discharge. At the time of consent, birthing people were asked to answer additional questions surrounding prior SARS-CoV-2 infection, its timing, vaccination status, co-morbidities, and whether they were experiencing any of the 44 symptoms of PASC described within the NIH RECOVER cohort. Those who reported prior SARS-CoV-2 infection were included. A PASC score was calculated using

previously published criteria and a cut-off of ≥ 12 used to define PASC. Multivariable models were used to identify risk factors for PASC.

RESULTS: Of the 284 postpartum people who met inclusion criteria, 137 (48.2%) reported prior SARS-CoV-2. A total of 27 (9.5%) met criteria for PASC. In multivariable models, non-Hispanic Black race was associated with having a lower PASC score whereas having a chronic medical condition was associated with a higher PASC score. For multivariable models with the outcome of PASC (i.e., PASC score ≥ 12), having a chronic medical condition was the only risk factor associated with PASC. Notably, SARS-CoV-2 infection during pregnancy (vs outside of pregnancy) was not associated with PASC. While point estimates for PASC score and PASC were lower for those vaccinated for SARS-CoV-2 compared to those unvaccinated, these estimates did not reach statistical significance.

CONCLUSION: For postpartum birthing people with SARS-CoV-2, having a chronic medical condition is a risk factor for PASC symptoms postpartum. Recognizing the particular burden of PASC on new parents, these data amplify the importance of ongoing public health prevention efforts.

Table: Multivariable analyses for the outcome of PASC score and PASC

	PASC Score		Screen-Positive for PASC (PASC Score ≥ 12)	
	aβ	95% CI	aOR	95% CI
Age > 35 years	-0.62	-3.24, 1.99	0.69	0.216, 1.99
Race/ethnicity				
Non-Hispanic White	ref	ref	ref	ref
Non-Hispanic Black	**-5.72**	**-10.50, -0.944**	-	-
Hispanic	-0.98	-3.93, 1.98	0.59	0.137, 2.06
Asian	1.66	-1.93, 5.25	2.06	0.555, 7.00
Middle Eastern or North African	11.90	-1.44, 25.20	-	-
Chronic medical condition	**2.86**	**0.47, 5.26**	**3.11**	**1.15, 8.89**
SARS-CoV-2 infection during pregnancy	0.03	-2.33, 2.39	0.964	0.356, 2.63
Vaccinated for SARS-CoV-2	-2.33	-8.95, 4.28	0.291	0.010, 8.14

1087 Placental histopathological lesions and adverse neonatal outcomes in patients with Inflammatory Bowel Diseases

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OBJECTIVE: To investigate the relationship between inflammatory bowel diseases (IBD), including Crohn's disease and Ulcerative Colitis, and adverse pregnancy outcomes by comparing neonatal outcomes and placental histopathology in two matched groups of patients with and without IBD.

STUDY DESIGN: In this retrospective study, data of all patients who gave birth between 2008-2021 in a single tertiary center and were diagnosed with IBD were reviewed and matched in a 2:1 ratio with a control group based on maternal age, gestational age, and pregnancy complications. Neonatal outcomes and placental pathology were compared between cases with and without IBD.

RESULTS: Compared to the control group (n=76), the placentas of patients with IBD (n=36) were characterized by significantly lower placental weight ($p < 0.001$), and higher rates of several placental lesions including lesions associated with maternal vascular malperfusion (MVM, $p < 0.001$) and maternal and fetal inflammatory response lesions ($p < 0.001$) – Table.

Small for gestational age (SGA) birthweight was more prevalent in the IBD compared with the control group (p=0.01). Additionally, neonates of patients with IBD suffered from an increased need for phototherapy ($p = 0.03$), increased respiratory morbidity and NICU admission rates (both $p < 0.001$).

Multivariate logistic regression analyses confirmed the independent association between IBD and composite MVM lesions (aOR 4.2, $p = 0.01$), maternal inflammatory responses (aOR 4.8, $p < 0.001$) and SGA infants (aOR 4.0, $p = 0.05$) after controlling for possible confounders.

CONCLUSION: IBD is associated with increased rates of placental histopathological lesions and adverse pregnancy outcomes, including SGA infants. These novel findings demonstrate the role of placental malperfusion and inflammatory processes in pregnancy complications of IBD patients, which should be followed accordingly.

Placental histopathological lesions and neonatal outcomes of the study groups

	IBD (n = 38)	Controls (n = 76)	p-value
Placental histopathological lesions			
Placental weight (grams)	405.08 ± 110.27	485.63 ±94.33	**< 0.001**
Placental weight < 10th percentile	20 (52.63%)	17 (22.37%)	**0.001**
Maternal vascular malperfusion (MVM) lesions			
Retroplacental hemorrhage	3 (7.89%)	3 (3.95%)	0.37
Vascular lesions of MVM	1 (2.63%)	2 (2.63%)	1.00
Villous lesions of MVM	19 (50%)	14 (18.42%)	**< 0.001**
Composite lesions of MVM	21 (55.26%)	17 (22.37%)	**< 0.001**
Fetal vascular malperfusion (FVM) lesions			
Vascular lesions of FVM	6 (15.79%)	4 (5.26%)	0.06
Villous lesions of FVM	4 (10.53%)	7 (9.21%)	0.82
Composite lesions of FVM	10 (26.32%)	11 (14.47%)	0.12
Inflammatory lesions			
MIR 1-3	16 (42.11%)	2 (2.63%)	**< 0.001**
Neonatal outcomes of the study groups			
FGR	11 (28.95%)	7 (9.21%)	**0.01**
Phototherapy	5 (13.16%)	2 (2.63%)	**0.03**
Respiratory	8 (21.05%)	3 (3.95%)	**0.004**
Sepsis	3 (8.11%)	3 (3.95%)	0.36
Cerebral	1 (2.63%)	0 (0%)	0.16
NICU	22 (57.89%)	8 (10.53%)	**< 0.001**
Composite adverse neonatal outcomes	23 (60.53%)	11 (14.47%)	**< 0.001**

IBD- inflammatory bowel disease; MIR- maternal inflammatory response; FIR- fetal inflammatory response; FGR- fetal growth restriction; NICU- neonatal intensive care unit. Continuous variables are reported as mean [standard deviation] and categorical variables as number (%)

1088 Single Institution Implementation of a Stillbirth Evaluation Quality Improvement Initiative

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OBJECTIVE: The relative infrequency of stillbirths and lack of uniform protocols leads to inconsistency in providing an optimal, cost-effective evaluation. We implemented a quality improvement (QI) initiative to standardize and optimize stillbirth evaluation.

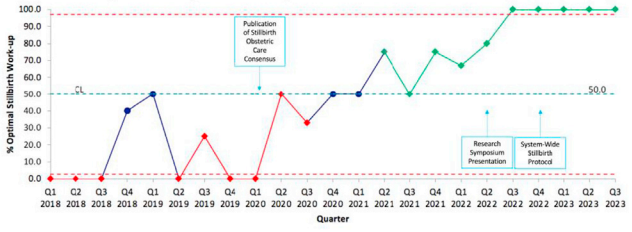
STUDY DESIGN: Two phase QI initiative targeting stillbirth evaluation at a single academic center between 1/2018 and 7/2023. Phase 1 was

a cohort study evaluating the proportion of optimal stillbirth evaluations before and after the publication of the ACOG/SMFM Obstetric Care Consensus (OCC) in 3/2020. Phase 2 involved presentation of findings to faculty and residents at our Annual Research Symposium in 6/2022. Publication of a hospital specific stillbirth protocol followed in 11/2022. Stillbirths included were singleton, non-anomalous fetuses > 20 weeks gestation or > 350 grams. Severe anomalies, spontaneously ruptured membranes, and stillbirths diagnosed intrapartum were excluded. Primary outcome was optimal stillbirth evaluation, defined as placental pathology, counseling on genetic testing & autopsy, and antiphospholipid syndrome testing. Secondary outcome examined unnecessary testing (infectious titers and/or inherited thrombophilia work up). Analysis was performed using student's t test and chi square test.

RESULTS: There were 41 total stillbirths divided into three groups, with 26 stillbirths occurring in the pre-OCC group, 11 occurring in the post-OCC group, and 4 stillbirths occurring in the post-protocol group. Washout periods were observed following the OCC publication and from presentation of phase 1 to publication of the site wide protocol. The post-protocol group had a higher maternal age at delivery; there were no other differences between the three groups. We observed a stepwise improvement in the optimal stillbirth evaluation over time (15.4% vs 72.7% vs 100%, p=< 0.01, figure 1). Likewise, we saw a decline in unnecessary test performance over time (61.5% vs 0% vs 0%, p=< 0.01).

CONCLUSION: Our quality improvement initiative resulted in 100% compliance with optimal stillbirth evaluation and a reduction in unnecessary testing.

Figure 1: Proportion of Optimal Stillbirth Evaluation



1089 Smoking During Pregnancy in an Irish Obstetric Population: Prevalence, Maternal and Ethnic Factors

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OBJECTIVE: Maternal smoking during pregnancy is associated with fetal and maternal adverse outcomes. It has been reported that the prevalence of smoking during pregnancy in Ireland is one of the highest worldwide. While the prevalence of smoking during pregnancy in the USA has dropped in recent years, there are no recent data relevant to an Irish obstetric population. The aims of this study were: 1. To evaluate the prevalence of maternal smoking in Ireland during 2015-2022; 2. To investigate the maternal and ethnic factors associated with smoking.

STUDY DESIGN: The data were obtained from the Euroking Obstetric Database at Galway University Hospital. Data was entered prospectively for women booked at the hospital during 2015-2022. Maternal smoking was recorded at antenatal booking in the first trimester. Descriptive statistics were calculated and prevalence rates were compared using Chi^2 for proportions and trend.

RESULTS: The total number of pregnancies was 19,247. There was a stepwise reduction in the prevalence of smoking from 8.3% in 2015 to 6.0% in 2022 (P< 0.001). Smoking rates were 25.9% ≤20yrs, 13.3% aged 21-30 years, 4.2% aged 31-40 years, and 3.1% ≥41 years, with a significant downward trend with maternal age (P< 0.001). The greatest reduction in smoking was observed among those aged 21-30yrs, from 15.3% to 10.1% (P< 0.001). Increasing parity was associated with a higher prevalence of smoking as follows: PO 5.8%, PI 5.7% and P >1 10.8% (P< 0.001). The ethnic breakdown of smokers was: white Irish 69.1%, other white background 19.4%, white traveller 9.5%, and 2% for all other ethnic groups. Initiation of breastfeeding rates were 32.0% for smokers and 70.1% among non-smokers (P< 0.001).

CONCLUSION: These findings outline a reduction in maternal smoking during pregnancy in Ireland over the past decade, particularly in the 21-30 year age group. Maternal smoking during pregnancy is associated with younger age, higher parity, white race and lower breast feeding initiation rates. These data provide information for strategies aimed at prevention of smoking during pregnancy.

1090 The association of social vulnerability index and trial of labor after cesarean

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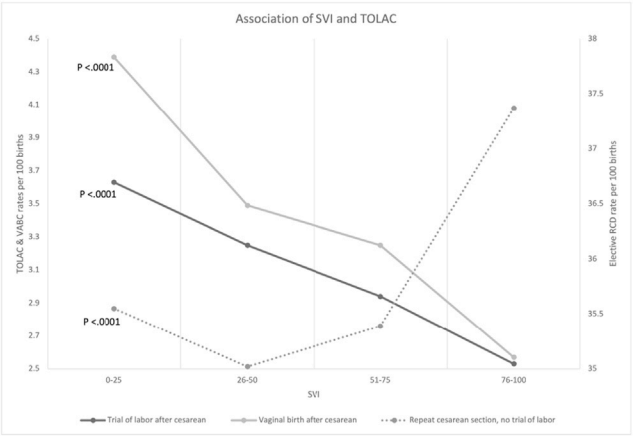
OBJECTIVE: The objective of this study was to evaluate the association of the social vulnerability index (SVI) and rates of trial of labor after cesarean section (TOLAC).

STUDY DESIGN: The number of births per mode of delivery were extracted from the publically available Center for Disease Control and Prevention (CDC) natality WONDER database from 2019-2021. Delivery county's were linked to nationally ranked county SVI scores from the CDC/SVI. SVI scores were stratified into quartiles with higher quartiles representing greater social vulnerability. Outcomes were rates of elective repeat cesarean (RCD), attempted TOLAC, successful vaginal birth after cesarean (VBAC), and unsuccessful TOLAC.

RESULTS: Patients who delivered in areas with the highest quartile SVI scores were significantly more likely to undergo an elective RCD (RR 1.04 CI 1.03- 1.05), less likely to achieve a VBAC (RR 0.60 CI 0.50- 0.61), and less likely to undergo a TOLAC (RR 0.71 CI 0.70- 0.72) compared to the lowest quartile. Tests for linear trend across quartiles were significant for RCD, successful VBAC, and attempted TOLAC (P < 0.0001). Rates of unsuccessful TOLAC were not different across SVI quartiles (Figure 1.).

CONCLUSION: This study demonstrates disparities in mode of delivery illustrated by increased rates of elective RCD and lower rates of VBAC and TOLAC among those delivering in areas of greater social vulnerability. In order to improve cesarean morbidity and increase equity, future studies should assess the cause of these disparities and develop interventions to address them.



1091 The effect of aspirin treatment on obstetric complications in twin gestations in a retrospective cohort

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OBJECTIVE: Pregnant persons with twin gestations are at increased risk for obstetric complications including preeclampsia, gestational hypertension, gestational diabetes, and preterm birth. Low dose aspirin (ASA) has been shown to decrease rates of preeclampsia in singleton pregnancies and recent studies suggest the benefits of ASA may extend beyond preeclampsia. We aimed to evaluate if ASA use reduces preeclampsia or other obstetric complications in twin gestations.

STUDY DESIGN: Planned secondary analysis of a 17-center, retrospective cohort of twin pregnancies aimed to study cell-free DNA screening performance. The primary exposure was ASA use at cell-free DNA blood draw. The primary outcome was preeclampsia. Secondary outcomes included preeclampsia< 34 weeks, preeclampsia with severe features, preterm birth, spontaneous preterm birth, fetal death and gestational diabetes. Those with unknown ASA use status, unknown chorionicity, and vanishing twins were excluded. Baseline characteristics and obstetric outcomes were compared amongst pregnancies taking vs not taking ASA. Outcomes were further analyzed using logistic regression.

RESULTS: Of the 1335 included subjects twin gestations, 320 took ASA and 1015 did not take ASA. Demographic and medical differences existed between the groups (Table 1). There was no difference in preeclampsia < 34 weeks, preeclampsia with severe features, preterm birth, fetal death, and gestational diabetes with respect to ASA exposure. There was a higher risk of preeclampsia in those who took ASA, however after adjustment for BMI, race, pre-gestational diabetes, cHTN and preeclampsia in a prior pregnancy, this association was no longer significant (RR 1.36 95% CI 1.04-1.77; aRR 1.11 95% CI 0.81-1.54).

CONCLUSION: In this cohort, prophylactic ASA did not significantly decrease risk for preeclampsia or spontaneous preterm birth. This information may prove to be helpful in counseling; additional prospective studies are indicated regarding ASA indications and benefits.

Table 1:Outomces in pregnancies who took aspirin (ASA) versus not

Outcome	ASA N (%) N=320	No ASA N (%) N=1015	p-value	RR	aRR*
Preeclampsia -No -Yes	 247 (79.42) 64 (20.58)	 823 (84.85) 147 (15.15)	0.03	1.36 (1.04-1.77)	1.11 (0.81-1.54)
Preeclampsia <34 wks	13 (20.31)	36 (24.49)	0.6	0.83 (0.47-1.46)	0.73 (0.32-1.67)
Preeclampsia w/ severe features	40 (62.50)	95 (64.63)	0.76	0.97 (0.77-1.21)	NC**
Preterm Birth	179 (58.31)	539 (56.62)	0.6	1.03 (0.92-1.15)	1.10 (0.95-1.27)
Spontaneous Preterm Birth -No -Yes	 115 (64.61) 63 (35.39)	 294 (56.11) 230 (43.89)	0.05	0.81 (0.65-1.01)	0.78 (0.59-1.04)
Fetal Death	1 (0.56)	12 (2.23)	0.2	NC**	NC**
Gestational Diabetes -No -Yes	 286 (89.94) 32 (10.06)	 879 (89.60) 102 (10.40)	0.86	0.97 (0.66-1.41)	1.12 (0.70-1.80)

*adjusted for BMI, black race, cHTN, Pregestational Diabetes, History of Preeclampsia Prior Pregnancy
**adjusted model not converged given N

1092 Postponing early intrauterine transfusion with IVIG treatment in severe hemolytic disease: Individual patient data meta-analysis

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OBJECTIVE: To determine whether maternal administration of intravenous immunoglobulin (IVIG) in high-risk red blood cell alloimmunized pregnancies is effective in delaying the gestational age (GA) at the first intrauterine transfusion (IUT) and the onset of severe hemolytic disease of fetus and newborn (HDFN).

STUDY DESIGN: We systematically searched Medline, Embase and Cochrane Library until June 2023. We included studies reporting on pregnancies with severe Rhesus alloimmunization which was defined as either a previous fetal or neonatal death as a result of HDFN or the need for IUT prior to 24 weeks' gestation in the previous pregnancy. Cases included pregnancies receiving IVIG aiming to delay IUT, while controls were pregnancies receiving IUT only. Following inclusion, individual patient data (IPD) were obtained and authors were contacted for missing data. Primary outcome was GA at first IUT. IPD Meta-Analysis was performed using the Bayesian framework.

RESULTS: 11 studies were included in the systematic review of which IPD were obtained for 9 studies. Data were available for 90 controls and 97 cases. GA at first IUT mean difference was significantly earlier in the IUT only group compared to IVIG group (MD -1.29, 95%

CI -2.49, -0.13). Hemoglobin level was significantly lower in the IUT only group compared to IVIG at time of first IUT (MD -2.19, 95% CI -3.18, -1.24). GA at delivery was also significantly different between groups reflecting earlier GA in the IUT only group compared to IVIG (MD -4.99, 95% CI -6.79, -3.23). There were no significant differences in numbers of IUTs, hemoglobin level at birth, or bilirubin level at birth between groups.

CONCLUSION: IVIG treatment in pregnancies at risk of severe early HDFN seems to have a potential clinically relevant beneficial effect on the course and severity of the disease.

Outcome	Number of studies	IUT-only Total N	IVIG+IUT Total N	Pooled RR or MD (95% CI)
GA at first IUT	9	90	97	-1.29 (-2.49, -0.13)
Hg level at time of first IUT	9	87	88	-2.19 (-3.18, -1.24)
Number of IUTs	9	90	97	-0.10 (-0.25, 0.06)
GA at delivery	9	46	50	-4.99 (-6.79, -3.23)
Hg level at time of delivery	9	46	50	-0.47 (-2.04, 1.04)
Bilirubin level at time of delivery	9	46	50	17.64 (-27.50, 61.77)

GA: gestational age, Hg: hemoglobin, IUT: intrauterine transfusion, IVIG: intravenous immunoglobulin, RR: relative risk, MD: mean difference

1093 Management and Core Outcomes Set of Fetal Lower Urinary Tract Obstruction: Delphi Consensus

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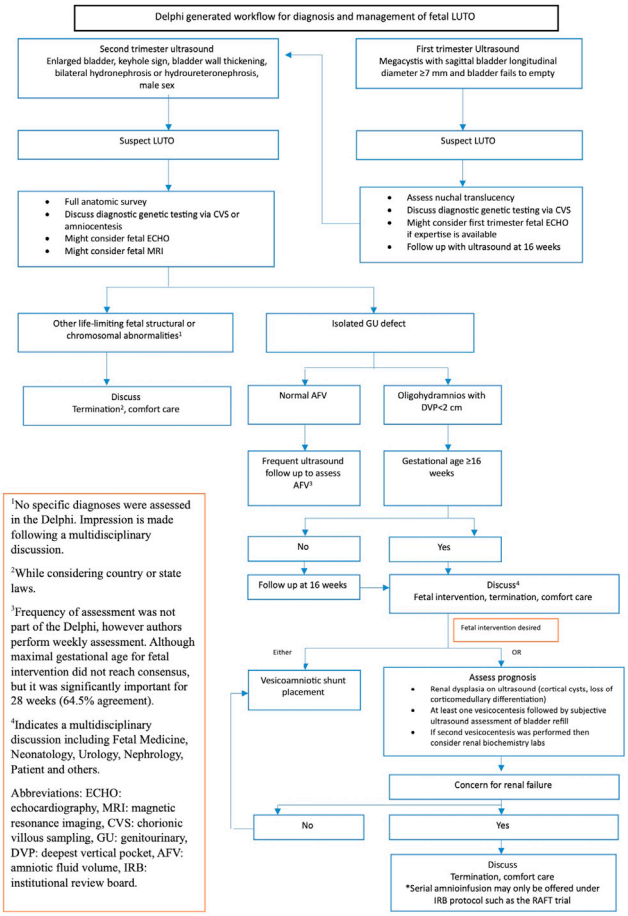
OBJECTIVE: We aimed to reach a Delphi-generated international expert consensus on the diagnosis, management and core outcomes set (COS) of Fetal Lower urinary tract obstruction (LUTO).

STUDY DESIGN: A three-round Delphi procedure was conducted among international panel of LUTO experts from Fetal Medicine and subspecialties of Pediatrics. Panel was provided with a list of literature review generated parameters for diagnosing and management. A parallel procedure was conducted along with patient groups to produce COS.

RESULTS: A total of 160 experts were approached, of whom 99 completed the first round and 80 (80/99, 80.8%) completed all three rounds. Regarding diagnosis, in the first trimester, objective assessment with a longitudinal bladder diameter of ≥7 mm should be used to suspect LUTO. While in the second trimester, imaging parameters of obstructive uropathy include enlarged bladder, keyhole sign, bladder wall thickening, bilateral hydronephrosis and male sex. There was lack of consensus on the current prognostic scoring literature, however, experts agreed on the value of amniotic fluid volume < 24 weeks to predict survival. While experts endorsed the role of sonographic parameters of renal dysplasia (cortical cysts, loss of corticomedullary differentiation), at least one bladder tap, and renal biochemistry for counselling, these items did not reach consensus for fetal intervention candidacy. Consensus for fetal intervention candidacy were absence of life-limiting fetal anomalies, imaging parameters of obstructive uropathy, minimum gestational age of 16 weeks, and oligohydramnios with DVP < 2 cm. If bladder refill was assessed, it should be assessed subjectively. In the presence of suspected renal failure, serial amnioinfusion should only be offered under IRB protocols. Core outcome set for future studies was agreed upon.

CONCLUSION: International diagnostic, prognostic and management criteria for fetal LUTO have reached consensus. Consensus-based criteria and the Core Outcome Set should inform clinical care and research to optimize perinatal outcomes.



1094 Postpartum Hemorrhagic Morbidity in Those With Versus Without Diabetes Mellitus

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OBJECTIVE: There is conflicting evidence on the role of hyperglycemia and postpartum hemorrhage. Due to vascular and perfusion abnormalities, we hypothesized that post-partum hemorrhagic morbidity would be higher among those with versus without diabetes mellitus (DM—gestational or pregestational). Our objective was to compare the composite of maternal hemorrhagic morbidity (CMHM) in those with and without DM.

STUDY DESIGN: This was a retrospective cohort study of all singleton deliveries ≥ 14 weeks at a Level IV center between March 2020 and February 2022. Inclusion criteria were those with known DM status. The primary outcome was a composite maternal hemorrhagic-morbidity (CMHM) defined as: blood loss ≥ 1000 mL, use of uterotonics (excluding prophylactic oxytocin), mechanical tamponade, surgical intervention for atony (O'Leary, B-Lynch, or uterine artery embolization), blood transfusion, venous thromboembolism, admission to the intensive care unit, hysterectomy, or maternal death. Multivariable Poisson regression models were used to estimate adjusted relative risks (aRR), adjusted with variables identified in the univariate analysis.

RESULTS: Of the 8,623 deliveries during the study period, 8,357 (97%) met the inclusion criteria. and among them 1,003 (12.0%)—632 (63%) with GDM and 371 (37%) with pregestational—had DM and the remaining 7,354 (88.0%) individuals did not. There were no significant differences in CMHM between the groups (without diabetes 20.6% vs. with diabetes 27.3%; aRR 1.08, 95% CI 0.96-1.22). In subgroup analysis comparing those without diabetes compared to those with gestational diabetes, there was no significant difference (20.6% v. 25.2%; aRR 1.09, 95% CI 0.95-1.26). Similarly, examining those without diabetes compared to those with pregestational diabetes, there was no significant difference (20.6% v. 31.0%; aRR 1.05, 95% CI 0.89-1.24) (Table 1).

CONCLUSION: In our population, pregnancies complicated by diabetes were not at a significantly higher risk of hemorrhagic-related morbidity compared to those without diabetes.

Table 1. Composite Maternal Hemorrhagic-Morbidity Outcomes Stratified by Diabetes Status

Outcomes	No Diabetes (N=7354)	Diabetes (N=1003)	Unadjusted RR (95% CI)	Adjusted RR [a] (95% CI)
Composite maternal outcome	1516 (20.6)	274 (27.3)	1.33 (1.19-1.48)	1.08 (0.96-1.22)
EBL/QBL ≥ 1000 mL	494 (6.7)	115 (11.5)	1.71 (1.41-2.07)	1.07 (0.88-1.32)
Uterotonic Use	1095 (14.9)	183 (18.2)	1.23 (1.06-1.41)	1.08 (0.93-1.26)
Transfusion	274 (3.7)	58 (5.8)	1.55 (1.18-2.04	1.23 (0.93-1.64)
Mechanical tamponade	31 (0.4)	6 (0.6)	1.42 (0.59-3.40)	1.04 (0.40-2.68)
Surgical technique	71 (1.0)	17 (1.7)	1.76 (1.04-2.97)	1.25 (0.69-2.25)
Hysterectomy	35 (0.5)	8 (0.8)	1.68 (0.78-3.60)	0.86 (0.38-1.93)
DVT/PE	12 (0.2)	0	-	-
Admission to ICU	49 (0.7)	14 (1.4)	2.09 (1.16-3.78)	1.35 (0.74-2.47)
Maternal death	4 (0.1)	0	-	-
	No Diabetes (N=7354)	**Pregestational DM (N=371)**	**Unadjusted RR (95% CI)**	**Adjusted RR [a] (95% CI)**
Composite maternal outcome	1515 (20.6)	115 (31.0)	1.50 (1.28-1.76)	1.05 (0.89-1.24)
	No Diabetes (N=7354)	**Gestational DM (N=632)**	**Unadjusted RR (95% CI)**	**Adjusted RR [a] (95% CI)**
Composite maternal outcome	1515 (20.6)	159 (25.2)	1.22 (1.06-1.41)	1.09 (0.95-1.26)

Data presented as N (%).

Bolded if significant.

* Stillbirths and malformations excluded for neonatal outcome analysis.

[a] Adjusted for: maternal age, race/ethnicity, marital status, prenatal care provider, nulliparity, body-mass index at delivery, hypertensive disorders, postpartum hemorrhage risk score, cesarean delivery, and gestational age at delivery.

1095 The Role of Long-Acting Antihypertensives in Preeclampsia with Severe Features

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OBJECTIVE: To determine whether initiation of long-acting antihypertensives achieves pregnancy prolongation in preeclamptic patients with severe features and, if so, whether there is significant neonatal benefit gained and maternal risk incurred by this prolongation.

STUDY DESIGN: This was a retrospective cohort study conducted at a single site between 2015-2022. The charts of preeclamptic patients diagnosed with severe features (de novo or superimposed) between 23w0d-33w6d were reviewed and separated into two cohorts: those diagnosed between 23-28 weeks gestation (extremely preterm, or EP) and those diagnosed between 28-34 weeks gestation (preterm, or P). Each cohort was then divided into a traditional subcohort who received only urgent short-acting antihypertensives and a novel subcohort who received both short-acting and long-acting antihypertensives. The primary outcome was pregnancy prolongation, defined as days elapsed between diagnosis of preeclampsia with severe features and delivery. The secondary outcomes were maternal composite outcome and neonatal composite outcome (Table 1). Two sample t-tests and Chi squared analyses with multivariate analysis were utilized.

RESULTS: A total of 288 patients were included. Demographics did not differ significantly. Long-acting antihypertensives prolonged pregnancy by 7 days in the EP cohort (9 days vs 2 days, $p < 0.0001$) and by 3 days in the P cohort (6 days vs 3 days, $p < 0.0001$). Further, use of long-acting antihypertensives provided clinical and statistical benefits in neonatal composite outcomes for the EP neonates (Table 1). Such was not seen in the P neonates, and no changes in maternal composite outcomes were noted in either cohort.

CONCLUSION: The initiation of oral long-acting antihypertensives for preeclamptic patients with severe features prolonged pregnancy sufficiently to improve newborn outcomes in the 23-28-week cohort but not in the 28-34 week cohort. Doing so did not result in maternal harm. Randomized-controlled-trial results are needed to confirm these findings and to potentially adopt this clinical approach.

EP Cohort (Diagnosis at 23w0d-27w6d)			
	Novel (n=25)	***Traditional*** (n=27)	***Adjusted Odds Ratio*** (95% CI, p value)
Neonatal Comp	*Cases (%)*	*Cases (%)*	
NEC, SIP, IVH, HIE, and IUFD	*4 (19.2)**	*16 (59.3)**	AOR = 0.13* (0.04-0.49, p=0.003)
Maternal Comp	*Cases (%)*	*Cases (%)*	
Eclampsia, HELLP, renal/hepatic injury, pulmonary edema, DIC, MI, death	*6 (24.0)*	*8 (29.6)*	AOR = 0.75 (0.22-2.58, p=0.70)
P Cohort (Diagnosis at 28w0d-33w6d)			
	Novel (n=58)	***Traditional*** (n=178)	
Neonatal Comp	*Cases (%)*	*Cases (%)*	
Intubation, NEC, SIP, IVH, HIE, and IUFD	*12 (26.1)*	*29 (19.5)*	AOR = 1.34 (0.62-2.87, p=0.46)
Maternal Comp	*Cases (%)*	*Cases (%)*	
Eclampsia, HELLP, renal/hepatic injury, pulmonary edema, DIC, MI, death	*17 (29.3)*	*53 (29.8)*	AOR = 0.76 (0.33-1.78, p=0.53)

1096 The HOME INDUCTION Randomized Controlled Trial – Logistics for achieving delivery

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OBJECTIVE: The ARRIVE Trial has resulted in an increased demand for 39 week induction of labour (IOL) in normal-risk nulliparous

patients, but this creates significant logistical challenges for already busy Labor Wards. A potential solution is commencing induction by means of outpatient cervical ripening at home (H-IOL), using vaginal prostaglandin (Propess/Cervidil) or osmotic cervical dilator (Dilapan-S). This secondary analysis evaluates the logistics of achieving vaginal delivery, including time taken and need for additional ripening modality.

STUDY DESIGN: We randomized healthy nulliparous women, who agreed to elective IOL at 39 weeks, to one of three forms of initial cervical ripening at home: 12 hours of Dilapan (D12), 24 hours of Dilapan (D24), or 24 hours of Propess/Cervidil (P24). Patients returned to the hospital after 12 or 24 hours for either amniotomy or, if the cervix remained unripe, additional doses of prostaglandin E2 gel (Prostin, 1mg). Time to delivery and need for additional Prostin were assessed as part of this secondary analysis.

RESULTS: Patients randomized to Dilapan (D12/D24) were significantly more likely to require an additional agent (Prostin, 1mg) prior to amniotomy being possible (64.5% vs 34%, $p< 0.001$). There was no difference in oxytocin use between groups. Table 1 also shows the timeframe of delivery for each group. 66% of all nulliparous women delivered within 48 hours after IOL commenced, and 94% delivered within 72 hours, inclusive of the time period spent at home.

CONCLUSION: Home IOL is an efficient and useful option for dealing with logistical challenges in busy Labor Wards, with the majority of nulliparous patients delivering within 48 hours. However, there are significant differences in performance characteristics of different modalities for H-IOL, with the majority of Dilapan patients requiring additional Prostin. Outpatient Propess appears to have the most favorable, successful vaginal delivery profile. These RCT data will be useful for Labor Ward planning, including optimizing staffing levels and bed availability.

Reason	All (N=271)	Dilapan 24hr (N=96)	Dilapan 12hr (N=88)	Propess (N=87)	P-value
Prostin given	149 (55%)	68 (71%)	51 (58%)	30 (34%)	<0.001
Oxytocin augmentation	202 (75%)	74 (77%)	67 (76%)	61 (70%)	0.511
Prostin subgroup	***N=149***	***N=68***	***N=51***	***N=30***	
Vaginal delivery rate	92 (62%)	48 (71%)	28 (55%)	16 (53%)	0.125
Time to delivery (hours)	47 [40,58]	49 [44,59]	39 [33,48]	52 [48,59]	<0.001
No Prostin subgroup	***N=122***	***N=28***	***N=37***	***N=57***	
Vaginal delivery rate	102 (84%)	24 (86%)	28 (76%)	50 (88%)	0.288
Time to delivery	34 [26,45]	42 [35,52]	30 [26,35]	34 [23,43]	<0.001
Vaginal delivery	**All**	**Dilapan 24hr**	**Dilapan 12hr**	**Propess**	**Difference: Dilapan - Propess (95% CI)**
Within 48 hours	180 (66%)	53 (55%)	72 (82%)	55 (63%)	-5% (-7%, 17%)
Within 72 hours	254 (94%)	85 (89%)	86 (98%)	83 (95%)	-2% (-8%, 3%)

Table 1 shows the need for second modality within groups; oxytocin use within groups; and the vaginal delivery rate as well as time from initiation of induction to delivery stratified by group/Prostin administration.
< 12 hours for Dilapan 12hr, < 24 hours for Dilapan 24hr and Propess

1097 Prediction of placental chorioamnionitis in active labor utilizing platelets and complete blood count indices

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OBJECTIVE: The complete blood count (CBC) has been utilized for decades in pregnancy, but only recently have indices and their ratios been studied for their association with intraamniotic infection and adverse pregnancy outcomes. Platelets actively engage in the immune response to acute infections and are anticipated to increase. This study aimed to describe the utility of platelet to white blood cell (PW), platelet to neutrophil (PN), and platelet to lymphocyte (PL) ratios in predicting chorioamnionitis identified on placental pathology. White blood cell (WBC), neutrophil, lymphocyte, and platelet counts were analyzed secondarily.

STUDY DESIGN: A retrospective electronic chart review was performed at an urban safety net hospital for 6 months from 2022-2023. Subjects in active labor beyond 20 weeks of gestation were included in the study if a CBC was performed at admission with placental pathology available. Exclusion criteria were extrauterine infection or platelet count of less than 100,000. Preterm labor (PTL) was defined as less than 37 weeks of gestation. Descriptive and Mann-Whitney U statistical tests were utilized for analyses.

RESULTS: One thousand seventy-nine subject charts were reviewed, with only 35.1% of those with placental pathology available. Of those, 37 subjects admitted with PTL and 81 subjects with term labor were included in the final analysis. There was a significantly higher PL ratio as well as neutrophil count in subjects admitted with PTL who had chorioamnionitis on placental pathology (Table 1). The PL ratio and neutrophil count were moderate predictors of chorioamnionitis in the PTL group, with an area under the curve of 0.724 (95% CI [0.559, 0.888]) and 0.720 (95% CI [0.528, 0.913]), respectively.

CONCLUSION: Platelet to lymphocyte count ratio and neutrophil count may serve as more effective indicators of histopathologic chorioamnionitis in preterm labor patients less than 37 weeks of gestation compared to the traditional use of the WBC count. Larger studies that include neonatal outcomes are warranted to examine if targeted treatment can improve maternal and neonatal outcomes.

Table 1: Complete blood count indices at admission in preterm and term labor analyzed by placental pathology*

	Preterm Labor			Term Labor		
	Without CA (n=23)	With CA (n=14)	p value	Without CA (n=61)	With CA (n=20)	p value
Counts						
Platelet	245.0 (217.0-286.0)	269.0 (247.0-314.2)	0.13	223.0 (194.5-270.5)	247.0 (190.5-279.5)	0.99
WBC	9.3 (8.8-10.7)	12.4 (8.3-14.6)	0.05	9.8 (8.3-12.4)	12.1 (8.2-14.5)	0.07
Neutrophil	6.7 (6.2-8.3)	9.6 (6.3-11.9)	0.03	6.8 (5.4-9.2)	8.9 (5.6-10.2)	0.12
Lymphocyte	1.8 (1.3-2.2)	1.3 (1.2-2.0)	0.17	1.9 (1.6-2.3)	1.7 (1.4-2.1)	0.34
Ratios						
PW	24.0 (22.0-33.0)	25.5 (18.2-32.0)	0.51	23.0 (20.0-30.0)	20.0 (14.0-23.5)	0.06
PN	34.0 (29.0-47.0)	32.5 (23.0-40.5)	0.26	33.0 (25.5-47.0)	28.0 (19.2-36.2)	0.08
PL	132.0 (109.0-174.0)	178.5 (135.2-233.7)	0.02	119.0 (91.5-159.5)	128.0 (104.0-173.5)	0.38

*Median and (interquartile ranges) reported, platelet count value reported x 10^3
CA: Chorioamnionitis, WBC: White blood cell
PW: Platelet to white blood cell count, PN: Platelet to neutrophil count, PL: Platelet to lymphocyte count

1098 Pregnancy related acute kidney injury leads to chronic kidney disease in the postpartum

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OBJECTIVE: Rates of Pregnancy Related-Acute Kidney Injury (PR-AKI) and hospitalizations due to PR-AKI have increased in the past two decades in the United States. Acute kidney injury (AKI) outside

the context of pregnancy has been associated to the progression of chronic kidney disease (CKD). This study has two objectives. The first is to test the hypothesis that PR-AKI leads to the development CKD (Study 1). The second is to test the hypothesis that treatment of AST-120, oral carbon absorbent of uremic toxin precursor, will slow the development of CKD in rats following PR-AKI (Study 2).

STUDY DESIGN: Time pregnant Sprague Dawley rats arrive on gestational day (GD) 11, and PR-AKI is induced on GD18 via a 45-min bilateral renal ischemic reperfusion surgery. Animals are allowed to delivered without intervention on GDs 21-22. Throughout the study, animals had their urine collected via metabolic cages. These measurements were collected at the following timepoints**:** GD15. GD19, Postpartum week (PPW 1), PPW5, PPW9, PPW12, and PPW16. Urinary protein and creatinine were measured via commercially bought assays. For the second objective, animals followed a similar time course with the exception that AST-120 treatment began on PPW2 until PPW11.

RESULTS: Study 1 results urine output is decreased in PR-AKI animals at GD19, PPW1 and at PPW16 compared to normal pregnant (NP). In addition, urinary protein was increased at GD19, PPW1, and PPW16. Compared to NP, at PPW12 and PPW16 PR-AKI animals had a decrease in NP. Study 2 results showed that AST-120 treatment improved urine output at PPW16 compared in PR-AKI animals compared to untreated PR-AKI animals. AST-120 treatment decreased urinary protein in PR-AKI animals at PPW16. AST-120 treatment doesn't affect urinary creatinine values at PPW16.

CONCLUSION: PR-AKI led to evidence of long-term effects of renal damage through decreased urine output, increased urinary protein, and decreased urinary creatinine. AST-120 was able to improve 2 of 3 outcomes by increasing urine output and decreasing urinary protein.

1099 Placenta accreta spectrum (PAS) diagnosis timing and its effect on maternal and neonatal outcomes

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OBJECTIVE: Expert opinion exists that antenatal diagnosis results in improved maternal and neonatal outcomes. Our aim was to retrospectively compare perinatal outcomes in antenatally diagnosed PAS cases versus those identified at the time of delivery.

STUDY DESIGN: Multicenter retrospective cohort study of 400 histopathologically confirmed PAS cases 1/1/2013 - 6/30/2022 at four New York academic institutions diagnosed both antenatally and at the time of delivery. The primary outcomes were composite maternal morbidity (≥4 RBC units, vasopressor use, organ injury, ICU admission, and mechanical ventilation/intubation), and composite neonatal outcome morbidity (necrotizing enterocolitis (NEC), respiratory distress syndrome (RDS), Intraventricular hemorrhage (IVH), and seizures). Univariate analysis was done using Wilcoxon rank sum analysis and chi-square. Odds ratio (95% CI) P< 0.05 was considered significant. Multivariate logistic regression was used to control confounders.

RESULTS: Of 400 cases, 223 (56%) were found prenatally and 177 (44%) at the time of delivery. Those diagnosed prenatally were less likely to receive vasopressors (aOR 3.5 [95%1.2-10.3]), p=0.02). However, the overall maternal composite morbidity showed no significant difference in the two groups (aOR 2.1 [95% 0.5-8.4]), p=0.31). Neonatal composite morbidity was found to be significantly worse in patients with known PAS (OR 3.2 [95% 1.8-5.5]), p< 0.01). Of note, prenatally diagnosed cases of PAS were delivered more preterm. (33 w SD +/- 3.9 vs 36 SD +/- 3.3 w), p< 0.001.

CONCLUSION: Our data confirms expert opinion that undiagnosed PAS cases have more "surgical" morbidity based on the increased use of vasopressors at the time of delivery. While there was no difference in the overall composite maternal morbidity, this could have been related to fact that these patients were delivered at large academic institutions. Even though there was a significant difference composite neonatal morbidity this could be secondary to the significant difference in gestational age at the time of birth.

Table 1

			Crude		Adjusted	
	Diagnosed prenatally (N=183)	Not Diagnosed prenatally (N=140)	Odds Ratio (95% CI)	P-values	Odds Ratio (95% CI)	P-values [a]
Maternal Composite: Yes	134 (73.2%)	96 (68.6%)	1.5 (0.9,2.6)	0.14	2.1 (0.5,8.4)	0.31
Transfusion of > 4 units of blood	76 (41.5%)	49 (35.0%)	0.7 (0.5,1.2)	0.19	1.0 (0.4,2.7)	0.99
Vasopressor use	41 (22.4%)	38 (27.1%)	0.6 (0.4,1.0)	0.05	3.5 (1.2,10.3)	0.02*
Mechanical ventilation or intubation	84 (45.9%)	71 (50.7%)	0.2 (0.1,0.5)	<.01*	2.5 (0.3,22.5)	0.43
Admission to ICU	80 (43.7%)	49 (35.0%)	1.2 (0.8,2.0)	0.36	0.5 (0.2,1.4)	0.19
Surgical injury to organs	31 (16.9%)	6 (4.3%)	0.8 (0.5,1.2)	0.28	0.5 (0.2,1.3)	0.16
	Diagnosed prenatally (N=213)	Not Diagnosed prenatally (N=172)	Odds Ratio (95% CI)	P-values	Odds Ratio (95% CI)	P-values [a]
Neonatal Composite: Yes	60 (28.2%)	19 (11.1%)	3.2 (1.8,5.5)	<.01*	3.0 (1.7,5.3)	<.01*
NEC (necrotizing enterocolitis)	1 (0.5%)	0 (0.0%)	NA	0.37	NA	0.90
RDS (Respiratory distress syndrome)	59 (27.7%)	19 (11.1%)	3.1 (1.8,5.4)	<.01*	3.0 (1.7,5.2)	<.01*
IVH (intraventricular hemorrhage)	3 (1.4%)	1 (0.6%)	2.4 (0.3,23.7)	0.43	2.3 (0.2,22.5)	0.47

1100 Major congenital malformation in an experimental mouse model of COVID-19

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OBJECTIVE: We recently reported the first-ever case of maternal second-trimester SARS-CoV-2 infection resulting in severe neonatal brain damage and associated placental abnormalities (Pediatrics, 2023). We, therefore, explored whether we could induce major congenital malformation (MCM) in our established murine hepatitis coronavirus (MHV-1) mouse model of COVID-19 using a high viral load.

STUDY DESIGN: Pregnant A/J mice (N=26, Jackson Laboratories, ME, USA) were divided into 2 groups**:** Group 1, control (CON), pregnant mice without virus inoculation (N=14), and Group 2, pregnant mice which were inoculated at day 15 of pregnancy (equivalent to second trimester in humans) with 5000 PFU MHV-1 intranasally (N=12) (Viruses, 2021). On days 20 and 21 of pregnancy (expected delivery timepoint), pups delivered spontaneously, and were collected from CON and MHV-1-infected pregnant mice. Clinical evaluation was performed on the mother and pups for MCM, and the MCM and survival rates for the pups were calculated. Data were analyzed by unpaired t-test (two-tailed) using GraphPad 9.5.1 software. Four independent examiners performed clinical evaluation postnatally.

RESULTS: CON mice had higher live birth rates compared to MHV-1 infected mice (39/62, 62.9% in CON, vs. 5/12, 41.6% in MHV-1, $p< 0.008$) (Fig. 1). MHV-1 infected mice pups had MCM when compared to no MCM in the CON group (7/12, 58.3% in MHV-1-infected vs. 0/62, 0% in CON, $p< 0.0001$). In the MHV-1 infected group (N=12), pups with MCM were all stillborn (6/6, 100%), compared to stillborn pups without MCM (1/7, 14.3%, $p< 0.0001$) (Fig. 1). Interestingly, of the 6 MCM, there were 3 cases central nervous system malformations (brain/face, craniothoracopagus twinning, and neural tube defect), and 2 abdominal wall defects (gastroschisis/omphalocele).

CONCLUSION: Our findings strongly suggest that MCM can be induced in the second trimester in our established MHV-1 mouse model of COVID-19, which replicates both acute and long COVID in Biosafety Level 2 conditions. Our model is useful to evaluate pathophysiology in COVID and affords an opportunity to evaluate therapeutic agents.

Major congenital malformation (MCM) in MHV-1-infected mice

Animal#	Live	Dead	Congenital Malformation
1		X	Facial and brain malformation, bilateral nephromegaly
2		X	Craniothoracopagus conjoined twins, lower limb hypoplasia
3		X	Craniothoracopagus conjoined twins, lower limb hypoplasia
4		X	Sacral agenesis, intestinal atresia
5		X	Omphalocele, diaphragmatic hernia
6		X	Pulmonary and intestinal atresia, aortic dilation, bilateral nephromegaly, right lower limb hypoplasia
7		X	No anomalies
8	X		Gastroschisis
9	X		No anomalies
10	X		No anomalies
11	X		No anomalies
12	X		No anomalies

Examples of MCM in MHV-1-infected mice

Face/brain malformation | Sacral agenesis | Omphalocele | Gastroschisis

1101 Physical activity among pregnant inpatients and outpatients and associations with anxiety

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OBJECTIVE: Physical activity is linked to lower anxiety, but little is known about the association during pregnancy. This is especially important for antepartum inpatients, who are known to have increased anxiety during hospitalization. We compared physical activity between pregnant inpatients and outpatients and explored correlations with anxiety.

STUDY DESIGN: This was a prospective cohort between 2021 and 2022 of pregnant people aged 18-55 years carrying singleton gestations ≥16 weeks. Three exposure groups were matched for gestational age**:** 1) outpatients from low-risk obstetric clinics (LOPA); 2) outpatients from high-risk obstetric clinics (OPA); and 3) antepartum inpatients (IPA). Participants wore Actigraph accelerometer watches for 7 days to measure physical activity. The primary outcome was mean daily step count. Secondary outcomes were metabolic equivalent tasks (METs), hourly kcals, moderate to vigorous physical activity (MVPA), and anxiety (State-Trait Anxiety Inventory [STAI]). Physical activity parameters were compared using Wilcoxon rank sum tests, then using multivariable generalized estimating equations adjusting for maternal age and body-mass index. Spearman correlations were used to correlate STAI scores with step counts.

RESULTS: 59 participants were analyzed. Inpatients had significantly lower mean daily steps (adjusted beta -2394, 95% Confidence Interval [CI] -3381, -1407, $p< 0.001$), METs (adjusted beta -0.20, 95% CI -0.26, -0.13, $p< 0.001$), and MVPA (adjusted beta -43.6, 95% CI -61.2, -25.9, $p< 0.001$) than outpatients (Figure 1). Over the course of the week, steps progressively decreased for inpatients (p-interaction 0.009). Lower steps correlated with higher STAI scores ($r=0.30$, $p=0.02$).

CONCLUSION: We present antenatal population norms and variance for step counts, METS, and MVPAs as well as correlation with STAI scores. Antepartum inpatients had significantly lower physical activity than outpatients, and lower step counts correlated with higher anxiety. Physical activity may be a potential target for anxiety reduction interventions.

Figure 1. Summary of physical activity parameters among general Ob/Gyn low-risk outpatients (LOPA), Maternal-Fetal Medicine clinic high-risk outpatients (OPA), and antepartum inpatients (IPA, total N=59).

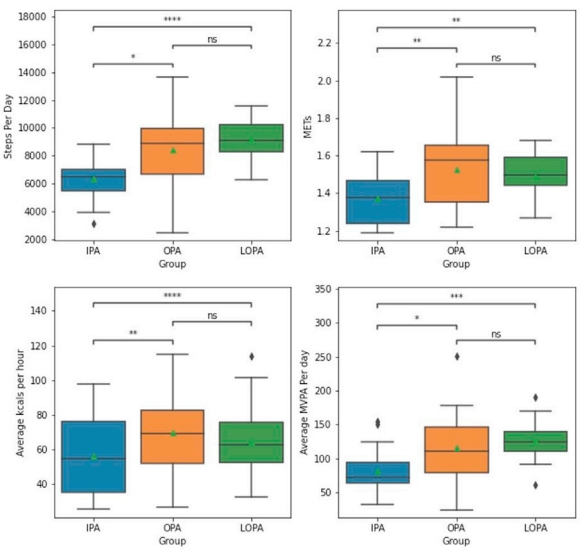

Figure legend. Metabolic equivalent task=METs, moderate to vigorous physical activity amounts=MVPAs. Pairwise Wilcoxon rank sum p=value legend: not significant le: 5.00e-02 < p <= 1.00e+00 , *: 1.00e-02 < p <= 5.00e-02 , **: 1.00e-03 < p <= 1.00e-02 , ***: 1.00e-04 < p <= 1.00e-03 , ****: p <= 1.00e-04)

1102 Prenatal Mobile Self-Operated Home Ultrasound Service Impact on Birth Outcomes

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OBJECTIVE: A leading HMO (Clalit Health Services, Israel) launched a home-ultrasound service (Pulsenmore's Ltd.) enabling parturients to perform a basic sonographic assessment and to have it interpreted by a clinician via asynchronous teleconsultation.

Our aim was to examine whether the use of the device and its adjunct medical service can enhance pregnancy outcomes.

STUDY DESIGN: Retrospective cohort study between 2021 and 2023, comparing 4,460 women using Clalit's home ultrasound service with a control group of 102,707 pregnant women with an equal HMO status, who did not obtain this service. Demographic characteristics, obstetrical and neonatal outcomes were compared between the groups.

RESULTS: Compared to the control group, women in the study group were older, more likely to be primiparous, had higher incidence of chronic illness, were more often considered to be at high risk pregnancy and were of higher socio-economic score as presented in the univariate analysis (Table 1). Body mass index (BMI) did not differ between the groups, although more women in the study group had a normal BMI category. Univariate analysis demonstrated no significant difference in early preterm birth (PTB $<$ 32 and $<$ 34 weeks gestation) and high risk for PTB$<$ 37 weeks gestation ($p<$ 0.0007). However, multivariate analysis adjusted by age, BMI, parity, socio economic score, and chronic illness demonstrated lower risk of PTB in the study group compared to controls at $<$ 37, 34 and 32 gestational weeks (adjusted OR 0.51, 95% CI 0.42-0.63 aOR 0.46, 95% CI 0.30-0.69, aOR 0.47, 95% CI 0.26-0.84, respectively) as well as lower risk of small gestational age neonates (aOR 0.64, 95% CI 0.49-0.83), birthweight $<$ 2500g (aOR 0.49, 95% CI 0.40-0.59) and $<$ 1500g (aOR 0.38, 95% CI 0.20-0.74).

CONCLUSION: Prenatal mobile self-operated home ultrasound may provide a feasible solution for remote fetal surveillance. In a large-scale utilization, the service may potentially reduce the risk for adverse pregnancy outcomes

Table 1: Baseline characteristics and adverse pregnancy outcomes, stratified according to prenatal utilization of Home Ultrasound

Variable	Control n=102,707	Study n=4460	p-value
Maternal Age, years	32.0±5.4	32.5±4.9	<0.0001
Body Mass Index, Kg/m^2	24.6±4.9	24.5±4.9	0.2133
Underweight	2862 (7.01%)	276 (6.40%)	
Normal	21603 (52.91%)	2390 (55.41%)	0.0150
Overweight	10129 (24.81%)	1009 (23.39%)	
Obese	6239 (15.28%)	638 (14.79%)	
Primiparous	4643 (4.52%)	522 (11.7%)	<0.0001
Chronic Disease*	48167(46.9%)	2579(57.83%)	<0.0001
Socioeconomic Score (1-20)	4.9±2.6	6.0±2.5	<0.0001
High Risk Pregnancy **	4683 (4.56%)	341(7.65%)	<0.0001
Birth Week	38.0±1.7	39.0±1.7	<0.0001
Birth Weight, grams	3233.5±498.0	3191.5±482.9	<0.0001

Data presented as frequency, n (%) for categorial variables and mean±standart deviation (SD) for continuous variables
#Data for BMI was derived from 45,146 women from the entire cohort.
*Chronic Disease- Asthma, Thrombophilia, Inflammatory Bowel Disease, Chronic Hypertension, Diabetes Mellitus, Thyroid Disorders, Lupus
**includes: hypertensive disorders in pregnancy, gestational diabetes, amniotic fluid volume disorders and placental abruption

1103 Prenatal Mobile Self-Operated Home Ultrasound Service Impact on Heath Care Resources Utilization

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OBJECTIVE: Mobile medical devices for self-patient use are rapidly evolving. A leading HMO (Clalit Health Services, Israel) launched a home-ultrasound (Pulsenmore Ltd.) service enabling a basic sonographic assessment interpreted by a clinician via asynchronous teleconsultation.

We aimed to examine whether the use of the device and its adjunct medical service can provide financial benefits for both patients and the healthcare system.

STUDY DESIGN: Retrospective cohort between 2021 and 2023, comparing 4,460 women using Clalit's home ultrasound service with a control group of 102,707 women with an equal HMO status, who did not obtain this service. Demographic characteristics, number (№) of emergency room (ER) visits, № of hospitalizations, № of hospital stay days and № of OBGYN primary caregiver visits were compared between the groups as well as composite outcome of these variables.

RESULTS: Women in the study group were older, more likely primiparous, had higher incidence of chronic illness, more often considered to be at high-risk pregnancy and had higher socio-economic score in comparison to controls (Table 1). Univariate analysis demonstrated lower rates of ER visits, hospitalizations and in-hospital days in favor of the study group ($p<$ 0.0001). № of OBGYN primary caregiver visits were higher among the study group ($p<$ 0.0001), however it embodies administrative and phone call appointments, making it difficult to estimate the exact in-person visits. Furthermore, higher rates of chronic illnesses and high-risk pregnancies likely requires closer surveillance. In a multivariate analysis for age, BMI, parity, socioeconomic score, and chronic illness the calculated adjusted value of ER visits, № of hospitalization, № of in-hospital days and a composite score of ER visits and in-hospital days were all lower in the study group compared to controls (2.24 vs 2.38, p=0.0268; 0.34 vs 1.53, $p<$ 0.0001; 0.95 vs 4.75, $p<$ 0.0001 and 3.17 vs 7.6, $p<$ 0.0001).

CONCLUSION: Prenatal mobile self-operated home ultrasound service may ease the burden of healthcare resource utilization, mainly emergency visit and in-hospital stay

Table 1: Baseline characteristics and use of health care resources, stratified according to prenatal utilization of Home Ultrasound Service

Variable	N All	Control n=102,707	Study n=4460	p-value
Maternal Age, years	107,167	32.0±5.4	32.5±4.9	<0.0001
Body Mass Index, Kg/m^2	45,146	24.6±4.9	24.5±4.9	0.2133
Primiparous	107,167	4643 (4.52%)	522 (11.7%)	<0.0001
Chronic Disease*	107,167	48167 (46.9%)	2579 (57.83%)	<0.0001
Socioeconomic Score (1-20)	107,167	4.9±2.6	6.0±2.5	<0.0001
High Risk Pregnancy **	107,167	4683 (4.56%)	341(7.65%)	<0.0001
№ of Emergency Room Visits	64,692	2.3±1.7	2.2±2.4	<0.0001
№ of Hospitalizations	20,155	1.4±1.0	0.4±0.9	<0.0001
№ of Hospitalization days	20,149	4.1±11.7	1.0±5.3	<0.0001
№ of OBGYN primary caregiver visits	101,878	11.9±5.5	13.9±6.2	<0.0001
Composite Outcome‡	14,974	7.1±12.8	3.2±6.1	<0.0001

Data presented as frequency, n(%) for categorial variables and mean ± standard deviation for continuous variables
*Chronic Disease- Asthma, Thrombophilia, Inflammatory Bowel Disease, Chronic Hypertension, Diabetes Mellitus, Thyroid Disorders, Lupus
**includes: Hypertensive Disorders in Pregnancy, Gestational Diabetes, Amniotic Fluid Volume Disorders and Placental Abruption
‡ Composite Outcome includes - № of ER Visits and № of Hospital Stay days

1104 Personalized Machine Learning Model for Predicting Time to Delivery in Active Labor

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OBJECTIVE: Prolonged labor has significant associations with an increased rate of operative delivery and adverse maternal and neonatal outcomes. To optimize resource management, physicians should assess and predict the course of labor. We aim to develop a personalized machine learning model using real-time data to predict time to delivery in the active phase of labor.

STUDY DESIGN: Labor records from a single university affiliated tertiary hospital with approximately 12,500 deliveries annually were analyzed over a 10-year period. We trained logistic regression models using both "static features" (e.g demographics) and "dynamic features" (e.g cervical dilatation, efficacy, and newly derived features calculated as ratios between adjusted dynamic measures and time differences) to predict time to delivery (min). To assess the explainability of the model, we employed SHAP (SHapley Additive exPlanations) analysis.

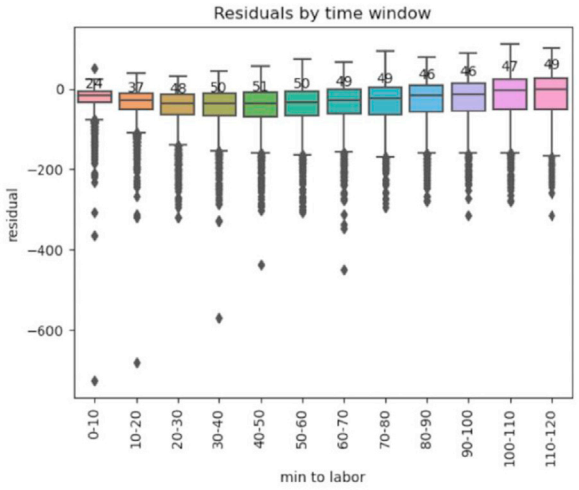
RESULTS: 1. A total of 94,386 cases in which a trial of labor was attempted were identified. Of them approximately 70,000 cases were admitted to the active phase of labor (6 cm dilatation).

2. Histogram-Based Gradient Boosting regressor trained on the dataset with the demographic, static, dynamic, and aggregative features achieved higher results in terms of overall MAE and R2 metrics than a baseline of Lasso linear regression model**:** The model scores were mean absolute error of 62.64, and R2 0.51.

3. Next, we present a residual box plot focusing on the time range between 0-120 minutes to labor (Figure).

4. Explainability of the best model was analyzed using SHAP. SHAP provides insights into the "why" behind a model's decisions, making it easier to interpret and trust the model's results. The features that contributed the most for the model prediction were**:** current cervical opening rate, maximal cervical opening rate and clinical fetal weight estimation.

CONCLUSION: Our personalized machine learning model holds promise in predicting time to delivery during active labor using real time data, aiding physicians in making informed decisions and potentially improving outcomes.



Figure

Residuals by time to labor range for Histogram Based Gradient Boosting model. The 'time to labor' continuous values were gathered into bins in the range of 10 minutes under the x-axis and the residual is presented for each range of minutes to labor on the y-axis. Mean absolute error is also presented for each time window box plot and was placed onto the Q3 upper edge of the box.

1105 Neonatal and Maternal Outcomes in Nulliparas According to Prepregnancy Body Mass Index: A Population-Level Analysis

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OBJECTIVE: To compare neonatal and maternal outcomes between BMI (body mass index kg/m^2) categories using population-level data and determine the impact lowering or increasing BMI would have on these outcomes.

STUDY DESIGN: This was a repeated cross-sectional analysis of US vital statistics Live Birth/Infant Death linked data from 2011 to 2020. We limited analyses to nulliparas with singleton pregnancies who delivered at 20 weeks or greater. Our primary outcome was a composite neonatal outcome defined as any neonatal death, neonatal intensive care unit (ICU), surfactant use, ventilation use, or seizure. Our secondary outcome was severe maternal morbidity defined as any maternal ICU, transfusion, uterine rupture, and hysterectomy. Outcomes were compared according to BMI category (< 18.5, 18.5-24.9, 25-29.9, 30-39.9, 40-49.9, 50-59.9, and 60-69.9) with each of the other categories as the referent. Adjusted relative risks (aRR) with 99% confidence intervals were calculated for each BMI category as a referent group, using modified Poisson regression.

RESULTS: Of 11,174,890 individuals, 537,541 had BMI < 18.5, 5,569,307 had BMI 18.5-24.9, 2,688,070 had BMI 25-29.9, 1,944,535 had BMI 30-39.9, 382,139 had BMI 40-49.9, 48,432 had BMI 50-59.9 and 4,866 had BMI 60-69.9. Table 1 shows the aRRs for a starting BMI category (referent, column) compared with each of the other categories (row). The following are a few comparisons provided to illustrate the use of the heatmap. Starting with a normal BMI (18.5-24.9), the aRR of the primary outcome increases from 1.02 (yellow) to 2.04 (red) as BMI increases. Starting with a BMI of 60-69.9 the aRR of severe maternal morbidity decreases from 0.51

(or 49% decrease; lime) to 0.34 (or 66% decrease; turquoise) with each decrease in BMI category.

CONCLUSION: We provide population-level estimates of the impact of policies to address the obesity epidemic on maternal and neonatal outcomes. Lowering the BMI by even one category would have a tremendous impact on obstetrical outcomes, likely larger than any other proposed intervention.

Table 1. Heat map

aRR (99%CI)	Referent (starting BMI)						
	BMI <18.5 (n=537,541)	BMI 18.5-24.9 (n=5,569,307)	BMI 25-29.9 (n=2,688,070)	BMI 30-39.9 (n=1,944,535)	BMI 40-49.9 (n=382,139)	BMI 50-59.9 (n=48,432)	BMI 60-69.9 (n=4,866)
Primary outcome, n (%)	50961 (9.5)	515546 (9.3)	283309 (10.5)	241180 (12.4)	57140 (15.0)	8811 (18.2)	1073 (22.1)
BMI <18.5	1.00 (1.00-1.00)	1.02 (1.01-1.03)	0.91 (0.90-0.92)	0.78 (0.78-0.79)	0.67 (0.66-0.68)	0.57 (0.56-0.59)	0.50 (0.47-0.54)
BMI 18.5-24.9	0.98 (0.97-0.99)	1.00 (1.00-1.00)	0.89 (0.88-0.89)	0.77 (0.76-0.77)	0.66 (0.65-0.66)	0.56 (0.55-0.58)	0.49 (0.46-0.52)
BMI 25-29.9	1.10 (1.09-1.12)	1.12 (1.12-1.13)	1.00 (1.00-1.00)	0.87 (0.86-0.87)	0.74 (0.73-0.75)	0.63 (0.62-0.65)	0.55 (0.51-0.59)
BMI 30-39.9	1.27 (1.26-1.29)	1.30 (1.29-1.31)	1.16 (1.15-1.16)	1.00 (1.00-1.00)	0.85 (0.84-0.86)	0.73 (0.71-0.75)	0.64 (0.59-0.68)
BMI 40-49.9	1.49 (1.47-1.52)	1.52 (1.51-1.54)	1.35 (1.34-1.37)	1.17 (1.16-1.19)	1.00 (1.00-1.00)	0.85 (0.83-0.88)	0.75 (0.69-0.80)
BMI 50-59.9	1.75 (1.70-1.80)	1.78 (1.74-1.83)	1.58 (1.54-1.63)	1.37 (1.34-1.41)	1.17 (1.14-1.20)	1.00 (1.00-1.00)	0.87 (0.81-0.94)
BMI 60-69.9	2.00 (1.87-2.15)	2.04 (1.91-2.19)	1.82 (1.69-1.95)	1.57 (1.47-1.69)	1.34 (1.25-1.44)	1.15 (1.06-1.24)	1.00 (1.00-1.00)
SMM, n (%)	2430 (0.5)	23519 (0.4)	11522 (0.4)	9044 (0.5)	2080 (0.5)	334 (0.7)	68 (1.4)
BMI <18.5	1.00 (1.00-1.00)	1.05 (0.99-1.11)	1.04 (0.98-1.10)	0.57 (0.91-1.03)	0.84 (0.77-0.90)	0.67 (0.57-0.78)	0.34 (0.25-0.46)
BMI 18.5-24.9	0.96 (0.90-1.01)	1.00 (1.00-1.00)	0.99 (0.96-1.02)	0.53 (0.90-0.96)	0.80 (0.75-0.85)	0.64 (0.55-0.74)	0.32 (0.24-0.44)
BMI 25-29.9	0.96 (0.91-1.02)	1.01 (0.98-1.04)	1.00 (1.00-1.00)	0.53 (0.90-0.97)	0.81 (0.76-0.86)	0.64 (0.56-0.74)	0.33 (0.24-0.45)
BMI 30-39.9	1.03 (0.97-1.09)	1.08 (1.04-1.11)	1.07 (1.03-1.11)	1.00 (1.00-1.00)	0.86 (0.81-0.92)	0.69 (0.60-0.79)	0.35 (0.25-0.48)
BMI 40-49.9	1.20 (1.11-1.29)	1.25 (1.18-1.33)	1.24 (1.17-1.32)	1.16 (1.09-1.24)	1.00 (1.00-1.00)	0.80 (0.69-0.93)	0.40 (0.29-0.56)
BMI 50-59.9	1.50 (1.29-1.74)	1.57 (1.36-1.81)	1.56 (1.35-1.80)	1.45 (1.26-1.68)	1.25 (1.08-1.46)	1.00 (1.00-1.00)	0.51 (0.36-0.71)
BMI 60-69.9	2.95 (2.15-4.06)	3.09 (2.26-4.22)	3.07 (2.24-4.20)	2.87 (2.10-3.92)	2.47 (1.80-3.39)	1.97 (1.40-2.78)	1.00 (1.00-1.00)

aRR: 2.00-4.99, 1.50-1.99, 1.01-1.49, 1.00, 0.99-0.67, 0.66-0.51, 0.5-0.1

Abbreviations: aRR (adjusted relative risk); BMI (body mass index kg/m²); CI (confidence interval); SMM (severe maternal morbidity)
Adjusted RR, controlling for race, age, insurance, infertility treatment, smoking, and fetal presentation.

1106 Preventing Hypothermia in Moderate and Late Preterm Neonates: A delivery room randomized controlled pilot trial

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OBJECTIVE: Neonatal hypothermia (< 36.5C) at admission has been associated with an increased risk of morbidity and mortality. This study evaluated the safety and efficacy of warming moderate and late preterm neonates delivered via cesarean during delayed umbilical cord clamping (dUCC).

STUDY DESIGN: Parallel group randomized controlled pilot trial with block randomization stratified for two gestational age groups–32w0d-34w6d and 35w0d-36w6d. The control and intervention groups underwent dUCC for 60 seconds at the time of cesarean; if considered safe by both pediatric and obstetric providers. Neonates in the intervention group were placed in a polyethylene suit above a chemical warming mattress during the dUCC period. The devices were removed at the resuscitation warmer. Axillary temperature was measured at arrival to the warmer, completion of resuscitation and arrival to the neonate's room. All providers were trained using a standardized video.

RESULTS: 52 patients were randomized, 26 to each group and two were excluded prior to delivery. Modified Poisson regression, adjusting for stratum and time from delivery to the warmer, demonstrated no difference in the risk of hypothermia at the warmer, RR 2.71 (95% CI 0.70-10.51). Of note, RR of hypothermia at arrival to the neonate's room was 0.60 (95% CI 0.28-1.29) and NICU admission was 0.81 (95% CI 0.64-1.02). The effect was mostly attributed to a lower risk of moderate hypothermia (< 36.0C) at arrival to neonate's room, RR 0.24 (95% CI 0.03-1.92). Other secondary outcomes including hypoglycemia, highest bilirubin level, form of respiratory support, pulmonary hemorrhage, hyperthermia (>37.5C), length of stay, and neonatal composite (outcomes of death, intraventricular hemorrhage and/or sepsis) did not reach significance and had wide confidence intervals.

CONCLUSION: While there was no difference in temperature at the warmer or safety signals, there may be an improvement in admission hypothermia and NICU admissions. These pilot results will inform the design of a well-powered multi-center trial for hypothermia prevention.

Table 1. Primary and secondary outcomes among patients treated with the warming intervention during delayed cord clamping compared to controls

Outcome	Treatment (n=25) n (%)	Controls (n=25) n (%)	Unadjusted Risk Ratio (95% CI)	Adjusted Risk Ratio* (95% CI)
Hypothermia at Warmer	6 (24.0)	2 (8.0)	3.00 (0.67, 13.46)	2.71 (0.70, 10.51)
Hypothermia at Completion of Resuscitation**	6 (28.6)	3 (15.8)	1.81 (0.52, 6.25)	1.78 (0.44, 7.11)
Hypothermia at Admission	7 (28.0)	11 (44.0)	0.64 (0.30, 1.37)	0.60 (0.28, 1.29)
Hyperthermia (>37.5C)	2 (8.0)	1 (4.0)	2.00 (0.19, 20.67)	--
Hypoglycemia	4 (16.0)	3 (12.0)	1.33 (0.33, 5.35)	--
NICU Admission	16 (64.0)	18 (72.0)	0.89 (0.61, 1.30)	0.81 (0.64, 1.02)
Composite	1 (4.0)	1 (4.0)	1.00 (0.07, 15.11)	--

*Risk ratios adjusted for stratum and time from delivery to the warmer using modified Poisson regression
** Among n=21 in treatment group and n=19 in control group with temperature data available at completion of resuscitation
-- Adjusted risk ratios cannot be calculated due to sparse data

1107 The role of MSAFP screening in prenatal diagnosis of omphalocele

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OBJECTIVE: As serum screening for aneuploidies becomes less prevalent due to the uptake of non-invasive prenatal testing and improved prenatal imaging, it is unclear whether continued maternal-serum alpha-fetoprotein (MSAFP) screening results in earlier omphalocele detection compared to ultrasound alone. We explored whether MSAFP screening results in earlier omphalocele detection.

STUDY DESIGN: This is an IRB-approved retrospective cohort study of prenatally detected omphalocele cases at our fetal referral center, from 08/2007-05/2023. Maternal, fetal, and neonatal outcomes were abstracted. We explored the association between MSAFP screening and gestational age at omphalocele diagnosis using bivariate analyses and the Mann-Whitney U test for nonparametric comparisons.

RESULTS: Among 102 pregnancies with prenatally diagnosed omphalocele, 27 (26.4%) had MSAFP screening. Of these, 11 (41%) had MSAFP values ≥2.5 MoM and 16 (59%) did not have an elevated MoM; these findings did not correlate with omphalocele rupture or additional major anatomic defects (phi=0.368). The median gestational age at MSAFP screening was 17w3d. Among pregnancies with MSAFP screening, the median GA at first sonographic suspicion of omphalocele was 18w2d; however, among pregnancies without MSAFP screening the median GA was slightly earlier at 17w5d though this was not significant (p=0.75). There was also no difference between MSAFP and no-MSAFP cases in GA at sonographic confirmation of the omphalocele (p=0.87).

CONCLUSION: In this cohort of prenatally diagnosed omphaloceles, MSAFP was abnormally elevated in approximately 40% of cases. MSAFP screening was not associated with earlier sonographic suspicion for or prenatal confirmation of omphalocele. While there is a paucity of consistent data regarding whether MSAFP still aids in prenatal detection of gastroschisis and neural tube defects, MSAFP screening in this population did not lead to earlier omphalocele detection.

Antenatal diagnostic characteristics	MSAFP Screening (n=27)	No MSAFP Screening (n=75)	*p*-value
GA at MSAFP draw, in weeks Mean (SD) Median (Min-Max) IQR (Q1-Q3)	 17.6 (1.7) 17.4 (15.1-21.6) 2.4 (16.4-18.8)	 NA	 NA
GA at sonographic suspicion for abdominal wall defect Mean (SD) Median (Min-Max) IQR (Q1-Q3)	 18.3 (4.8) 18.3 (11.0-31.7) 5.57 (14.6-20.2)	 18.7 (7.0) 17.9 (10.0-38.4) 8.6 (12.9-21.6)	 0.75
GA at sonographic confirmation of omphalocele Mean (SD) Median (Min-Max) IQR (Q1-Q3)	 24.9 (6.5) 24.4 (12.3-37.0) 10.5 (20.2-30.71)	 24.6 (6.9) 24.7 (11.6-38.9) 8.6 (20.0-28.7)	 0.87
Maternal Body Mass Index Mean (SD) Median (Min-Max) IQR (Q1-Q3)	 27.7 (6.9) 25.0 (17.7-47.5) 7.3 (23.5-30.8)	 27.6 (5.1) 27.8 (18.7-42.0) 6.95 (23.6-30.6)	 0.73

1108 Sharing or not-sharing individual participant data: how valid are randomized trials evaluating induction of labor?

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OBJECTIVE: To compare characteristics, trustworthiness of randomized controlled trials (RCTs) and outcomes on labor induction that shared individual participant data (IPD) versus those that did not.

STUDY DESIGN: In this meta-epidemiological study, RCTs included in five IPD-MAs comparing different methods of labor induction were evaluated using published data. We used Monte Carlo simulation with baseline characteristics to assess randomization. Trustworthiness of RCTs was evaluated using the TRACT checklist (pubmed.ncbi.nlm.nih.gov/37337220/). Agreement in outcomes (cesarean delivery and hyperstimulation) between shared and non-shared was done with random-effects meta-analysis.

RESULTS: Of 112 RCTs, 29 (25.9%) shared data and 83 (74.1%) did not. Median year of publication of the shared group was 2015 (range 1996-2023) versus 2008 (1983-2021) for non-sharing RCTs. Shared RCTs were larger median (range) compared to the non-shared; 339 (101-1859) versus 126 (38-1358).

Studies that did not share data had a small probability of having proper randomization (p=0.03), whereas shared group seems to be having proper randomization (p=0.85). In non-shared group, authors who refused to share were less likely (p=0.003) to have proper randomization than authors who could not share data as data were not available (p=0.14).

Proportion of RCTs with 'concerns' under seven domains of the TRACT checklist between shared vs non-shared was: Governance 36.8% vs 75.1%; Author Group 2.3% vs 11.2%; Plausibility of Intervention 0% vs 16.9%; Timeframe 3.4% vs 21.1%; Drop-Out Rates 0% vs 27.7%; Baseline Characteristics 0% vs 11.7%; Outcomes 12.6% vs 32.1%.

According to random-effects meta-analysis, only one comparison showed comparable effect estimates for cesarean delivery and uterine hyperstimulation between shared and non-shared groups (Table 1).

CONCLUSION: In studies on labor induction, RCTs without IPD sharing have lower quality and more trustworthiness concerns than those who shared IPD. The availability of IPD and willingness to share is a good indicator of the quality and trustworthiness.

Table 1 shows the results of aggregate data random-effects meta-analyses in the shared and nonshared groups.

Comparison	Outcome	Group	No.of trials	OR (95% CI)	P-value	I^2
Balloon catheter versus low-dose oral misoprostol	Cesarean delivery	Shared	4	0.77 (0.64;0.92)	0.02	0.0 (0 -90)
		Non-shared	3	1.47 (0.06; 33.49)	0.36	
	Uterine hyper-stimulation	Shared	4	1.33 (0.72;2.49)	0.24	0.0 (0 - 85)
		Non-shared	3	No data	-	-
Balloon catheter versus vaginal prostaglandin	Cesarean delivery	Shared	12	1.07 (0.92; 1.25)	0.32	13.2 (0 - 53)
		Non-shared	28	1.05 (0.84;1.30)	0.67	28.9 (0 -55)
	Uterine hyper-stimulation	Shared	9	0.34 (0.13;0.88)	0.03	47.9 (0 -76)
		Non-shared	14	0.34 (0.11;1.09)	0.07	36.6 (0 -71)
Single balloon versus double balloon	Cesarean delivery	Shared*	3	1.39 (0.76;2.52)	0.14	0 (0-90)
		Non-shared	5	0.59 (0.34;1.01)	0.05	6.9 (0 - 81)
	Uterine hyper-stimulation	Shared	3	No data	-	-
		Non-shared	5	No data	-	-
Vaginal dinoprostone versus low-dose vaginal misoprostol	Cesarean delivery	Shared	8	1.08 (0.91;1.27)	0.32	0 (0 - 68)
		Non-shared	24	0.76 (0.59;0.97)	0.03	65 (46 - 77)
	Uterine hyper-stimulation	Shared	6	1.07 (0.74;1.54)	0.65	0 (0 - 75)
		Non-shared	20	1.24 (0.81;1.92)	0.29	19.6 (0 - 55)
Outpatient versus inpatient methods	Cesarean delivery	Shared**	8	1.22 (1.03;1.44)	0.03	0 (0-68)
		Non-shared	7	0.84 (0.67;1.05)	0.10	0 (0 - 71)
	Uterine hyper-stimulation	Shared	3	0.39 (0.01;12.05)	0.36	53 (0 - 87)
		Non-shared	4	1.33 (0.21;8.43)	0.67	0 (0 - 90)

*One shared trial and **two shared trials were published as abstracts and only included for the meta-analysis, not for the other assessments.

1109 THC Impact in Urine Drug Screens on Maternal and Neonatal Outcomes in Substance Use Disorder

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OBJECTIVE: Evaluate the effects of tetrahydrocannabinol (THC) presence in urine drug screens (UDS) on neonatal and maternal outcomes in patients with substance use disorder.

STUDY DESIGN: Prospective cohort study of pregnant patients enrolled in a multidisciplinary treatment program between 2015 and May 2023. Patients had at least 2 prenatal visits. Unexpected UDS group contained at least 2 UDS positive for THC, while the control group had no UDS with THC. Primary outcomes included decreased birth weight, decreased head circumference, NICU admission, and NICU length of stay. Secondary outcomes assessed were tobacco use, Neonatal Abstinence Syndrome (NAS), a composite of various neonatal outcomes, prenatal care compliance, maternal obstetric outcomes, return to opioid use, and unexpected UDS. Categorical outcomes displayed counts, percentages and Fisher's Exact test p-values. Quantitative outcomes showed summary stats with respective Poisson regression p-values or t-test. Analyses were done in SAS 9.4.

RESULTS: 382 patients enrolled in the multispecialty treatment program met inclusion and exclusion criteria. 114 of 382 (30%) had a positive UDS for THC vs 268 of 382 (70%) patients had no THC on any UDS. Tobacco use during pregnancy was similar in THC group 90% vs 84%, P=.316. Demographic data was similar including age at e-cigarette use and overdose history.

Prenatal and Postnatal visit compliance was lower in THC group 57% ± 30% vs 77% ±28%, < .0001. Compliance was defined as the number of appropriate visits (without a positive UDS for any drugs) divided by the total number of potential visits). Mean Buprenorphine dose at delivery was similar for THC group 12 mg ± 4 vs no THC at 12 mg ± 4, P=.648. Maternal complications, GA at delivery,

head circumference, birth weight, NOWS rates and NICU admissions were similar between groups, Table 1.

CONCLUSION: The presence of THC in urine pregnancy tests of women with OUD did not appear to significantly affect maternal delivery complications, birth weight or head circumference. However, it was associated with lower compliance with prenatal and postnatal visits.

Table 1. Maternal and Neonatal delivery data with P value calculated by Fisher's Exact Test.

	THC (n=114)	No THC (n=268)	P value
Prenatal (PN) & Postpartum (PP) Outcomes			
PN visits attended	13.4 +/- 7.7	12.8 +/- 6.6	0.467
Inappropriate PN visits	5.5 [2 to 11.8]	2.0 [0 to 5]	<0.0001
PN visit compliance	0.35 +/- 0.53	0.62 +/- 0.44	< 0.0001
Total number of PP visits	4 [2 to 5]	4 [2 to 6]	0.736
Total PP compliance	0.68 +/- 0.35	0.81 +/- 0.30	0.001
Number of PN and PP visits	17.3 +/- 8.6	17.1 +/- 7.6	0.769
Total inappropriate PN and PP visits	8 [3 to 15]	2 [1 to 6]	< 0.0001
Total PN and PP compliance	0.57 +/- 0.30	0.77 +/- 0.28	< 0.0001
Percent lost to prenatal care	9.6% (11)	4.9% (13)	0.105
Maternal Outcomes			
Mode of delivery • Vaginal Delivery • Operative Vaginal Delivery • Cesarean Section	 58 (51.3%) 10 (8.8%) 45 (39.8%)	 149 (56%) 9 (3.4%) 108 (40.6%)	0.090
Complications • Preterm Labor • PPROM • Hypertensive disorders • Diabetes	 9 (7.9%) 8 (7%) 26 (22.8%) 7 (6.1%)	 22 (8.2%) 13 (4.9%) 45 (16.9%) 19 (7.1%)	 1 0.462 0.196 0.827
MAT Formulation at Delivery • Buprenorphine products • No MAT	 96 (84.2%) 17 (14.9%)	 224 (83.6%) 36 (13.4%)	0.721
Buprenorphine dose at delivery (mg)	12 [8 to 16]	12 [8 to 16]	0.648
Naloxone dose at delivery (mg)	2 [0.5 to 4]	2 [0.0 to 4]	0.530
Mother roomed in with infant	68 (62.4%)	145 (56.2%)	0.299
Neonatal Outcomes			
GA at delivery	38.2 +/- 1.7	38.2 +/- 1.6	0.825
Preterm birth rate	9.6% (11)	12.3% (33)	0.599
Birth weight (Grams)	3025 +/- 499	2972 +/- 487	0.339
Small for GA	14 (12.5%)	36 (13.5%)	0.869
Head circumference	33.5 +/- 2.3	33.4 +/- 1.7	0.595
Head circumference percentile	37.8 +/- 26.7	39.4 +/- 27.7	0.543
APGARs • 1 min • 5 min • 10 min	7.8 +/- 1.7 8.6 +/- 1.0 7.9 +/- 0.7	7.9 +/- 1.5 8.6 +/- 0.9 8.3 +/- 0.9	0.502 0.608 0.100
Fetal anomalies	8 (7.6%)	21 (8.7%)	0.835
Admitted to NICU/NACU	92 (80.7%)	195 (73.3%)	0.152
Length of hospital stay (days)	9 [6 to 19.0]	11 [6 to 19.2]	0.962
Treated for NOWS	51 (44.7%)	120 (45.1%)	1

1110 The Effect of Second Provider Consultation and Checklist Utilization on the Cesarean Delivery Rate

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OBJECTIVE: Effect of mandatory second provider consultation using California Maternal Quality Care Collaborative (CMQCC) checklist on the Nulliparous, Term, Singleton, Vertex (NSTV) cesarean rate.

STUDY DESIGN: Prospective cohort study conducted 3/1/2021-2/28/2022. Unscheduled cesareans required consutation with second attending and use of CMQCC checklist. The primary provider ultimately decided whether to proceed with cesarean. Nulliparous patients with vertex, term, singleton pregnancies were included. Multiple gestations, preterm pregnancy, scheduled cesarean, malpresenting fetus were excluded. The primary outcome was NTSV cesarean rate. The study period was compared to a pre-COVID (3/1/2019-2/29/2020) and COVID cohort (3/1/2020-2/28/2021).

RESULTS: 1365 patients were included, 10.8% Asian/Pacific Islander, 11.0% Black, 55.5% White and 20.1% Other. 50.5% were non-Hispanic. English was the primary language for 96.6%. 23.4% had public insurance. During the study period, NTSV cesarean rate was 25.6% (vs 29.4% COVID, p=0.01; vs 31.1% pre-COVID, p=0.0002). Black patients had a higher NTSV cesarean rate in all cohorts. Within the study period, the rate was 32.7% for Black, 22.7% for White, 31.8% for Asian/Pacific Islander and 27.0% for Other (p=0.01). Second opinion/checklist did not modify the relationship between race and NTSV cesarean rate (p= 0.69). Over all cohorts, the privately insured had a higher NTSV cesarean rate compared to the publicly insured (p< 0.0001). During the study period, the privately insured had a rate of 28.2% (vs 18.2% publicly insured). Second opinion/checklist did not modify the relationship between insurance and NTSV cesarean rate (p= 0.14). There was no association between ethnicity or primary language and NTSV cesarean rate. The neonatal composite outcome was 6.8% (vs 39.6% pre COVID, p< 0.0001; vs 36.1% COVID, p< 0.0001).

CONCLUSION: Pre-cesarean checklist with second provider consultation reduced the NTSV cesarean rate without increasing neonatal morbidity, but disparities based on race and insurance persist.

Table 1. Nulliparous, Term, Singleton, Vertex Cesarean (NTSV) Rate and Neonatal Composite by Period

Nulliparous, Term, Singleton, Vertex Cesarean (NTSV) Rate by Period					
Variable	ALL (n=7404)	STUDY PERIOD (3/1/2021-2/28/2022) (n=1365)	PRE-COVID (3/1/2019-2/29/2020) (n=3246)	DURING COVID (3/1/2020-2/28/2021) (n=2793)	p-value1
NTSV rate –no. (%)	2179 (29.4)	350 (25.6)‡,§	1009 (31.1)†	820 (29.4)§	0.001
Neonatal composite score Among by Period					
Variable	ALL (n=7404)	OUR STUDY PERIOD (3/1/2021-2/28/2022) (n=1365)	PRE-COVID (3/1/2019-2/29/2020) (n=3246)	DURING COVID (3/1/2020-2/28/2021) (n=2793)	p-value1
Neonatal Composite Score –no. (%)	2387 (32.2)	93 (6.8) ‡,§	1285 (39.6) †,*	1009 (36.1) *,§	<.0001

†Chi-square test for association was used

‡,§ Statistically significant post hoc pairwise comparisons at Bonferroni-adjusted significance level 0.017.

1111 The Effect of Pregnancy Complications on Quality of Life with Placenta Accreta Spectrum

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OBJECTIVE: Placenta accreta spectrum (PAS) is associated with significant pregnancy and postpartum complications. We evaluated the effect of pregnancy complications during a PAS pregnancy on quality of life (QOL).

STUDY DESIGN: This was a retrospective survey from February-May 2023 of patients with a PAS pregnancy enrolled in the National Accreta Foundation or Placenta Accreta Ireland. QOL was assessed using the validated SF-36 Short Form measuring physical functioning, role limitations due to physical health, role limitations due to emotional problems, energy/ fatigue, emotional well-being, social functioning, pain, general health, and health change. Participants were asked to compare their current health to one year prior to their PAS pregnancy.

RESULTS: Of the 448 respondents, the median age at delivery was 34 years (interquartile range (IQR) 31 − 37). Gestational age at delivery was 35 weeks (IQR 34-38). Participants were mostly white (89.5%), had private health insurance (69%), a history of depression (17.4%) and anxiety (23.4%). Surveys were completed at a median of 3 years (IQR 2−6) after PAS. Participants who had a hemorrhage vs. no hemorrhage reported lower QOL; specifically in social functioning, general health, and health change (all $p \leq 0.02$). Peripartum hysterectomy vs. no hysterectomy was associated with a lower; specifically in energy/fatigue, emotional well-being, social functioning, and pain (all $p \leq 0.04$). Antenatal suspicion of PAS was associated with better QOL; specifically in role functioning/physical and pain (both $p \leq 0.02$). This pattern was not seen across all subscales between those who had an unplanned vs. planned delivery; however, those with unplanned delivery reported a better QOL in role functioning/physical and general health (both $p=0.04$).

CONCLUSION: Postpartum hemorrhage and hysterectomy resulting from a PAS pregnancy are associated with a lower QOL, even years after their delivery. Differences were also seen in those with and without an antenatal diagnosis, and those with unplanned vs. planned delivery.

1112 Prevalence rates of chronic hypertension and hypertensive disorders of pregnancy: US national trends 2015-2020

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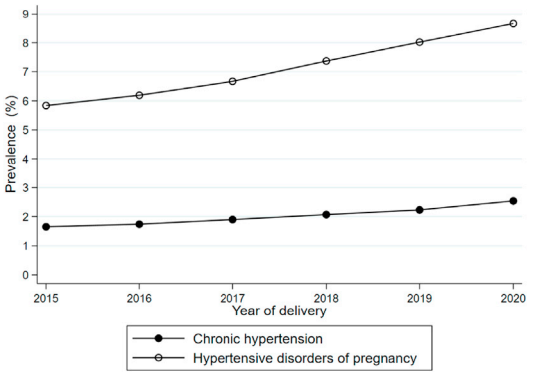
OBJECTIVE: Chronic hypertension (cHTN) and hypertensive disorders of pregnancy (HDP) represent one of the leading causes of severe maternal morbidity and mortality in the United States (US). However, data on the population burden of these disorders is lacking. We sought to quantify recent prevalence rates and trends of cHTN and HDP among pregnant patients.

STUDY DESIGN: We performed a retrospective cohort study of all US pregnancies between 2015 to 2020 using the National Vital Statistics. Annual prevalence rates were calculated for cHTN and HDP and visualized graphically. Risk difference (RD), relative risk (RR), and their 95% confidence intervals (CI) comparing cHTN and HDP rates for 2020 with 2015 were estimated.

RESULTS: A total of 23,027,245 births were included in the analysis. In the US, rates of cHTN increased from 1.65% (95% CI: 1.63%, 1.66%) in 2015 to 2.54% (2.52%, 2.56%) in 2020 with a statistically significant RR of 1.54 (95% CI: 1.52, 1.56) and an absolute RD of 0.89% (95% CI: 0.87%, 0.91%). During the same period, rates of HDP increased from 5.84% (95% CI: 5.81%, 5.86%) in 2015 to 8.65% (95% CI: 8.62%, 8.68%) in 2020 with a RR of 1.48 (1.47, 1.49) and an absolute RD of 2.81% (2.77%, 2.85%).

CONCLUSION: National prevalence of cHTN and HDP have increased in recent years. This trend underscores the need for targeted interventions to address perinatal cardiometabolic health. More studies are needed to explore the factors influencing the rise of hypertensive disorders nationally.

Figure 1. Annual US prevalence rates of chronic hypertension and hypertensive disorders of pregnancy between 2015 and 2020.



1113 The 4th Trimester and Beyond: Optimizing Maternal Health Through a Novel Postpartum Clinic Service Line

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OBJECTIVE: Adverse metabolic outcomes (AMO) during pregnancy increase future risks of chronic metabolic diseases, including heart disease, diabetes (DM) & hypertension (HTN). The postpartum (PP) period is when transitions to primary/specialty care services are imperative & often lacking. As such, we established a Postpartum Cardiometabolic Clinic (PPMC) for patients at 12 weeks PP with a gestational AMO to bridge gaps in care transitions. We investigated if PPMC attendance improves follow-up with primary/specialty providers.

STUDY DESIGN: This retrospective cohort study included patients referred to PPMC between 8/22-7/23 for diagnoses of chronic HTN/ hypertensive disorders of pregnancy or pre-gestational/gestational DM. We compared follow-up with primary/specialty care services among those who attended vs. did not attend PPMC. Continuous variables were compared using Wilcoxon Rank Sum Tests. Categorical variables were compared using Chi-Square/Fisher's exact tests. Log binomial regressions calculating adjusted risk ratios (ARR) were performed.

RESULTS: Of N=150 referrals, 62% (n=93) attended PPMC (Table 1). Persons who attended PPMC vs. those who did not were more likely to have follow-up within 6 months PP with any provider *(73.1% vs. 36.8%, $p< 0.001$)*, Primary Care *(40.9% vs. 22.8%, $p< 0.05$)*, or Cardiology *(51.6% vs. 17.5%, $p< 0.001$)*, & have lipids/

triglycerides *(29.0% vs. 7.0%, p< 0.01)* & HgbA1c *(28.0 vs. 7.0%, p< 0.01)* assessed. After controlling for confounders (age, race, parity, education & insurance), those attending PPMC had a 2-fold higher likelihood of follow-up with any provider ***(ARR 1.9**, 95% CI 1.3-2.6, p< 0.01)* or Cardiology ***(ARR 1.8**, 95% CI 1.4-2.4, p< 0.001)*. There was no difference in follow-up with Endocrinology or 2-hour Glucose Tolerance Test completion between groups (Table 1).

CONCLUSION: We innovatively demonstrated that a PPMC service *significantly* improved PP follow-up with primary/specialty care. With rates of gestational AMOs increasing & impacting long-term maternal metabolic health, our data support the need for serious considerations to change current 4th trimester standards-of-care.

Table 1. Demographic characteristics and postpartum follow-up of persons who attended vs. did not attend a comprehensive Postpartum Cardiometabolic Clinic.

	Overall (n=150)	Attended PPMC (n=93)	Did not attend PPMC (n=57)	p-value
Demographic information				
Age (years); mean (SD)	33.2 (5.7)	33.6 (5.4)	32.4 (6.1)	0.243
Race				
African American	110 (73.3)	64 (68.8)	46 (81)	
Caucasian	25 (16.7)	19 (20.4)	6 (11)	0.263
Asian	9 (6.0)	7 (7.5)	2 (3)	
Unknown	6 (4.0)	3 (3.2)	3 (5)	
Ethnicity				
Hispanic	10 (6.7)	7 (7.5)	3 (5.3)	0.916
Non-Hispanic	134 (89.3)	82 (88.2)	52 (91.2)	
Unknown	6 (4.0)	4 (4.3)	2 (3.5)	
Insurance				
Public	40 (26.7)	21 (22.6)	19 (33.3)	0.104
Private	109 (72.7)	72 (77.4)	37 (64.9)	
Uninsured/self-pay	1 (0.7)	0 (-)	1 (1.8)	
Education				0.149
High school	9 (6.0)	7 (7.5)	2 (3.5)	
College	39 (26.0)	26 (28.0)	13 (22.8)	
Post-graduate school	43 (28.7)	30 (32.3)	13 (22.8)	
Unknown	59 (39.3)	30 (32.3)	29 (50.9)	
Gravidity; mean (SD)	2.8 (2.0)	2.5 (1.6)	3.3 (2.4)	0.072
Parity; mean (SD)	2.0 (1.6)	1.8 (1.0)	2.4 (2.2)	0.182
Cardiometabolic history and follow-up				
# days postpartum PPMC visit occurred (days); mean (SD)		90.8 (18.3)	N/A	
PPMC visit type				
In-person		30 (32.3)	N/A	
Virtual		63 (67.7)		
Other co-existing conditions addressed during PPMC visit				
Nutriton/weight loss		58 (62.4)	N/A	
Mental health		41 (44.1)		
Reason for PPMC referral				
Diabetic indication[1]	44 (29.3)	29 (31.2)	15 (26.3)	0.525
Hypertensive indication[2]	137 (91.3)	85 (91.4)	52 (91.2)	0.971
Maternal cardiac disease	4 (2.7)	1 (1.1)	3 (5.3)	0.154
Visits attended or scheduled within 6 months postpartum				
Any (≥ one specified below)	89 (59.3)	68 (73.1)	21 (36.8)	**<0.001**
Primary Care	51 (34.0)	38 (40.9)	13 (22.8)	**0.023**
Cardiology	58 (38.7)	48 (51.6)	10 (17.5)	**<0.001**
Endocrinology	11 (7.3)	9 (9.7)	2 (3.5)	0.207
Labs available for review after PPMC visit				
Lipids/triglycerides	31 (20.7)	27 (29.0)	4 (7.0)	**0.002**
Hemoglobin A1c	30 (20.0)	26 (28.0)	4 (7.0)	**0.002**
2-hr Glucose Tolerance Test	9 (6.0)	7 (7.5)	2 (3.5)	0.484

PPMC, Postpartum Cardiometabolic Clinic; SD, standard deviation.
[1] includes Type 1 diabetes (DM), Type 2 DM, A1 gestational (G)DM, A2 GDM
[2] includes chronic hypertension (HTN), gestational HTN, preeclampsia (PRE) w/o severe features (SF), PRE w/ SF, chronic HTN w/ superimposed PRE w/ SF, eclampsia.
Data are reported as n (%) unless otherwise specified.

1114 Link between adiposity distribution and cytokine signaling in offspring brains of exercised versus sedentary mice

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OBJECTIVE: Human epidemiological and animal studies have shown that the maternal *in utero* environment significantly impacts offspring development. This maternal environment includes a sedentary (SED) lifestyle, which is linked to developmental programming of metabolic dysfunction. Our previous study showed significant differences in adiposity distribution in offspring from SED versus exercised (EX) dams, with EX increasing brown adipose and decreasing white adipose tissue weight. The aim of this study was to investigate if cytokine signaling in the brains of offspring could predict adiposity distribution in mice born to either EX or SED dams.

STUDY DESIGN: C57BL/6J female mice were placed on a control diet and allocated to SED or voluntary running wheel EX cages. Voluntary wheel running was allowed for 2 weeks prior to breeding and throughout weaning. Offspring were euthanized at 16 weeks of age. Adipose tissue depots were dissected and weighed. Offspring brains were harvested, and hypothalamus was dissected for Luminex cytokine quantification and analysis. We performed partial least squares (PLS) analysis to create predictive models.

RESULTS: Using the supervised machine learning tool PLS, we found that cytokine signaling in the hypothalamus of offspring could predict the quantity of brown and white adipose tissue. Offspring with higher levels of brown adipose tissue had upregulated cytokine secretion (Accuracy**:** RMSECV 0.0357, Confidence 100%), and those with higher levels of white adipose tissue had downregulated cytokine secretion (Accuracy**:** RMSECV 0.0748, Confidence**:** 100 %).

CONCLUSION: A connection exists between hypothalamic cytokine profiles and adiposity distribution in mice, which may be altered by maternal programming of either EX or SED behavior. Future studies will investigate if this altered cytokine profile and adiposity distribution protects against the deleterious effects of high fat diet throughout the offspring's life.

1115 The Impact of COVID-19 Infection on Neonatal Birth Parameters and Outcomes

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OBJECTIVE: We aimed to estimate the association between antenatal maternal COVID-19 (C-19) infection and the risk for small-for-gestational-age (SGA) neonatal birthweight. We also sought to assess if gestational timing or severity of C-19 infection differentially impacts the risk of SGA.

STUDY DESIGN: This retrospective cohort study included all pregnant patients with C-19 infection and randomly selected unexposed controls who delivered at a tertiary care center from 10/1/2020 to 6/1/2022. We also assessed C-19 exposure by trimester of infection and disease severity. The primary outcome, SGA, was defined as neonatal birthweight < 10th percentile for gestational age based on a standard growth curve. Secondary outcomes included birth length and head circumference (HC) percentiles, APGAR scores and neonatal hospital length of stay (LOS). We used chi-squared and t-tests to estimate differences between C-19 exposed and unexposed groups, and multivariable logistic regression analysis to estimate the association between C-19 and SGA.

RESULTS: Among 1011 patients, 502 had C-19 infection and 509 did not. Baseline demographics between groups were similar. Overall C-19 was not associated with increased risk of SGA adjusting for confounding by maternal age, hypertension and race. Among patients with C-19, 15.2%, 31.1% and 53.7% had infection in the 1st, 2nd, and 3rd trimester and 68.4%, 25.4% and 6.2% had mild, moderate, or severe disease respectively. First trimester C-19 infection was associated with a 2-fold increase in SGA (aOR 2.3, 95% CI 1.1-5.1), compared to 2nd or 3rd trimester infection. Stratifying by C-19 disease severity, moderate-severe disease was associated with a 2-fold increase in SGA (aOR 2.1, 95% CI 1.1-3.5), but mild disease did not increase this risk. C-19 exposure was not associated with increased risk of any other secondary neonatal outcomes (Table 1).

CONCLUSION: When stratifying by antenatal C-19 disease severity and timing of infection, we observed a two-fold increased risk of SGA in patients with severe C-19 disease and with infection in the 1st trimester.

	COVID-19 exposed (n= 502)	COVID-19 unexposed (n = 509)	Adjusted OR (95% CI)
SGA (<10th percentile); n (%)	48 (9.6%)	37 (7.4)	1.3 (0.9-2.1)
Secondary outcomes*	**COVID-19 exposed (n= 502)**	**Unexposed (n = 509)**	**P-value**
Neonatal LOS (days)	4.6 (11.4)	4.04 (12.1)	0.18
Apgar score (1 min)	8 (8-9)	9 (8-9)	0.23
Apgar score (5 min)	8 (7-8)	8(8-9)	0.23
Neonatal HC percentile	52.6 (32.0)	49.0 (32.2)	0.07
Neonatal Birth length percentile	64.6 (30.3)	64.5 (31.4)	0.53

Table 1: COVID-19 Exposure and Neonatal Birth Parameters and Outcomes

*Continuous variables reported as mean (standard deviation). Apgar score, an ordinal variable, reported as median (interquartile range).

1116 The profile of fetuses with growth restriction with and without growth recovery

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OBJECTIVE: We aimed to compare the cardiac size and shape and functional parameters, thigh volumes, and neurodevelopmental outcomes of growth restricted fetuses whose estimated fetal weight (EFW) and abdominal circumference (AC) later exceed the 10th percentile.

STUDY DESIGN: This was a retrospective cohort study of singleton non-anomalous pregnancies with fetal growth restriction initially diagnosed after 20 weeks of gestation. Fetuses who then had growth recovery define as EFW and AC greater than 10th percentile were compared to the growth restricted cohort. Cardiac size, shape, and functional parameters were obtained using speckle tracking. Thigh volumes calculation were measured using 3-dimentional ultrasound and calculated according to Lee et al. Bayley-III scores were measured at 2-3 years of age. The percentiles of these parameters were compared using Mann-Whitney U tests.

RESULTS: There were a total of 95 fetuses included in the cohort with 15 (15.8%) who showed growth recovery and 80 (84.2%) who remained growth restricted. Cardiac data was available in 95 patients, thigh volume data was available in 75 patients, and Bayley-III scores were available in 34 patients. There were no differences in size and shape, and functional parameters between the recovered and growth restricted cohorts except for a decreased fractional left ventricular shortening of segment 12 (L FS T12) percentile (Figure 1a). Left ventricular cardiac output (LVCO) was < 10% for both groups. Total thigh and lean thigh volumes were smaller in growth restricted cohort (Figure 1b). The recovered growth children had higher motor and language percentiles on the Bayley-III (Figure 1c).

CONCLUSION: Traditionally, growth recovery in growth restricted fetuses may result in reduced to no surveillance given the perceived overall improved outcomes in this group. While thigh volumes and neurodevelopmental outcomes were improved in the recovered group, cardiac parameter similarity and low LVCO in both the recovered and growth restricted groups may suggest residual risk to the recovered growth fetuses.

Figure 1a. Cardiac size, shape, and functional parameters in recovered EFW and AC fetuses compared to IUGR fetuses.

	Recovered EFW and AC (n=15)	IUGR (n=80)	P-value
EFW (%)	16.60 (11.20- 22.00)	3.45 (1.60- 5.98)	<0.001*
AC (%)	23.90 (13.00- 37.00)	2.30 (1.60- 6.00)	<0.001*
R GLS (%)	75.11 (11.43- 94.04)	81.83 (44.02- 96.68)	0.514
L GLS (%)	84.51 (28.82- 95.12)	73.04 (33.13- 96.23)	0.943
R FAC (%)	12.40 (2.82- 53.35)	13.57 (0.93- 50.68)	0.894
L FAC (%)	2.76 (0.00093- 46.83)	27.29 (0.50- 79.20)	0.270
LVCO (%)	4.99 (0.81- 23.56)	6.03 (1.23- 37.37)	0.589
R FS T12 (%)	29.70 (7.66- 39.04)	22.19 (4.61- 54.62)	0.911
L FS T12 (%)	5.05 (1.34- 21.16)	28.96 (10.96- 56.51)	0.006*
GH (%)	27.22 (10.26- 75.85)	21.01 (3.92- 55.82)	0.403
Arm (%)	85.66 (35.66- 95.07)	83.95 (45.36- 99.16)	0.603
BAL (%)	74.56 (26.86- 90.68)	58.90 (29.70- 87.39)	0.729
TW (%)	77.03 (60.43- 94.14)	93.70 (59.86- 99.83)	0.150
RV/LV Ratio (%)	41.79 (29.07- 94.21)	63.13 (32.46-85.23)	0.799

Abbreviations: EFW: estimated fetal weight, AC: abdominal circumference, IUGR: intrauterine growth restriction, R: right, L: left, GLS: global longitudinal strain, FAC: fractional area change, LVCO: left ventricular cardiac output, FS T12: transverse ventricular fractional shortening segment 12, GH: global atherivity index, BAL: basal apical length, TW: transverse width, RV/LV: right ventricular/left ventricular. Mann-Whitney U tests were used to compare continuous variables. Data are presented as median (IQR).

Figure 1b. Fetal thigh volume in recovered EFW and AC fetuses compared to IUGR fetuses.

	Recovered EFW and AC (n=12)	IUGR (n=63)	P-value
GA Thigh	35.93 (33.86- 37.36)	36.00 (35.29-36.57)	0.971
Total Thigh Volume	57.65 (47.60- 64.97)	48.26 (35.40-53.94)	0.011*
Lean Mass Volume	27.70 (20.61- 35.04)	21.04 (17.22-26.06)	0.018*
SubQ Volume	27.73 (23.53- 36.05)	23.76 (17.83-29.60)	0.102

Abbreviations: EFW: estimated fetal weight, AC: abdominal circumference, IUGR: intrauterine growth restriction, GA: gestational age, SubQ: subcutaneous. Mann-Whitney U tests were used to compare continuous variables. Data are presented as median (IQR).

Figure 1c. Bayley-III scores in recovered EFW and AC fetuses compared to IUGR fetuses.

	Recovered EFW and AC (n=9)	IUGR (n=25)	P-value
Cognitive (%)	50.00 (50.00-78.25)	50.00 (37.00-59.75)	0.160
Motor (%)	58.00 (50.00-75.00)	34.00 (27.00-58.00)	0.012*
Language (%)	66.00 (58.00-88.00)	54.00 (27.00-71.25)	0.046*
Socioemotional (%)	75.00 (56.60-87.50)	75.00 (31.00-95.00)	0.848
Adaptive Behavior (%)	87.00 (46.00-91.50)	50.00 (24.00-66.00)	0.060

Abbreviations: EFW: estimated fetal weight, AC: abdominal circumference, IUGR: intrauterine growth restriction.

1117 SNP-based Prenatal Cell-free DNA Screening in Twin Pregnancies: A New Standard of Care?

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OBJECTIVE: Prenatal diagnosis of chorionicity is critical for the management of twin pregnancies. Although ultrasound has been recommended for this, it has not been thoroughly validated. SNP-based cell-free DNA (cfDNA) can determine zygosity from 9 weeks' gestation. Dizygotic cfDNA infers dichorionicity (DC). Monozygotic (MZ) cfDNA results may require managing the pregnancy as monochorionic (MC), regardless of chorionicity. The purpose of this study was to assess the accuracy of the diagnosis of chorionicity by ultrasound (C-US) prior to knowledge of cfDNA results.

STUDY DESIGN: Prospective observational registry multi-institutional study (13 sites in the USA). Inclusion criteria were an ongoing twin pregnancy (< 20 weeks' gestation) with C-US prior to cfDNA. Exclusion criteria were higher order multiples, contraindication for cfDNA, and twin to twin transfusion syndrome prior to enrollment. C-US, cfDNA results, perinatal outcome and placental pathology reports were collected.

RESULTS: A total of 137 twin pregnancies were enrolled in the study. After exclusions for undetermined zygosity on cfDNA (1), missing placental pathology (15), incomplete follow-up (11), and unreported chorionicity on ultrasound (4), 106 pregnancies remained. Median gestation at C-US was 11 weeks. Two of 28 (7.1%) pregnancies reported to be MC on pathology were DC on C-US. All were monozygotic on cfDNA. One in 78 pregnancies (1.3%) reported to be DC on pathology was MC on C-US and was dizygotic on cfDNA. Overall, chorionicity was misdiagnosed by C-US in 2.8% (3/106) of twin pregnancies. Of the MZ-cfDNA twins (41.5%, 44/106), 36% were DC and 64% were MC on pathology. All DZ cfDNA twins (62/106, 58.5%) were DC on pathology. Surgical pathology confirmed the cfDNA zygosity diagnosis in all cases.

CONCLUSION: Ultrasound assessment of chorionicity may be inaccurate in approximately 3% of twins. False negative MC diagnosis may preclude timely management of typical MC complications. False positive MC diagnosis may result in unnecessary surveillance or interventions. cfDNA screening for zygosity is essential in the management of twin pregnancies.

Table 1. Comparison of placental pathology, prenatal ultrasound, and zygosity based on cfDNA

Placental Pathology	Pre-cfDNA Ultrasound	cfDNA Dizygotic (n)	cfDNA Monozygotic (n)	Overall (n)
Total		62	44	106
Dichorionic (N=78)	Dichorionic	61	16	77
	Monochorionic	**1**	0	1
Monochorionic (N=28)	Dichorionic	0	**2**	2
	Monochorionic	0	26	26

1118 Postpartum Antihypertensive Choice and Readmission Outcomes

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OBJECTIVE: Postpartum women with hypertensive disorders are routinely discharged on Labetalol, Nifedipine, and Lasix; however, the impact of antihypertensive selection on readmission is not well understood.

STUDY DESIGN: We performed a retrospective cohort study of all pregnancies at a single institution who delivered from 07/31/2012 to 01/31/2023 who had a hypertensive disorder during pregnancy. Discharge antihypertensive medications were recorded along with other demographic data. Readmission within 42 days was then ascertained for the cohort. Our primary outcome was the readmission rate. Univariate analysis was performed.

RESULTS: A total of 11192 pregnancies met study criteria. The average maternal age was 30.1 and the study population was 55.78% white and 34.57% Black. 35.35% of the study cohort received health insurance funded by the government. A total of 491 patients were readmitted within 42 days of discharge, for a total readmission rate of 4.39%. Both Nifedipine and Lasix were associated with a statistically significant decreased risk of readmission, with readmission rates of 2.97% (p=0.04) and 3.45% (p=0.045) respectively. Receipt of labetalol was not associated with a change in readmission rate (5.12%, p=0.174).

CONCLUSION: Discharge on Nifedipine or Lasix was associated with a statistically significant decrease in readmission rate, while receipt of Labetalol did not change readmission rates.

Maternal Demographics			
Maternal age (years)	30.1 (+/- 5.97)		
Gravidity	2.67 (+/- 1.95)		
Parity	1.01 (+/- 1.30)		
Singleton gestation, n (%)	10720 (95.78)		
Race, n (%)			
White	6203 (55.78)		
Black	3844 (34.57)		
Asian	333 (2.99)		
Other	741 (6.66)		
Ethnicity, n (%)			
Hispanic/Latino	1273 (11.45)		
Non-Hispanic/Latino	9806 (88.23)		
Government insurance, n (%	3956 (35.35)		
Maternal Pre-Pregnancy BMI	31.00 (+/- 11.64)		
Gestational Age(weeks)	37.26 (+/- 2.86)		
Length of Stay (days)	4.00 (+/- 0.04)		
Prior C-section, n (%)	1808 (16.15)		
Stillbirths, n (%)	71 (0.64)		
NICU admission, n (%)	2611 (23.33)		
	Readmit	**No Readmit**	**P value**
Cumulative	491 (4.39)	10701 (95.61)	
Discharge medication			
Labetalol (n=1290)	66 (5.12)	1224 (94.88)	0.17
Nifedipine (n=1517)	45 (2.97)	1472 (97.03)	0.04
Lasix (n=1651)	57 (3.45)	1594 (96.55)	0.045

1119 Routine use of the Detailed First Trimester Ultrasound (DFTU) and Associated Outcomes

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OBJECTIVE: As many states incorporate gestational age limits on elective termination, the identification of congenital anomalies (3-5% in the general population) in the first trimester becomes paramount to having the ability to choose elective termination. We sought to determine the anomaly rate, types of anomalies, and outcomes detected on the DFTU.

STUDY DESIGN: At our large, academic teaching hospital, we offer all pregnant patients a DFTU regardless of risk. We performed a retrospective cohort study of our database between February 23, 2022 and March 31, 2023. All examinations were performed by the division of Maternal Fetal Medicine.

RESULTS: A total of 3748 pregnant patients received a DFTU exam, of which 3715 (99.1%) were available for analysis. 41 (1.10%) had at least one fetal anomaly noted. There were demographic differences between the two cohorts. Anomaly detection rate on second trimester anatomy ultrasound was significantly higher in the anomaly on DFTU group (41.7% versus 1.3%, $p < 0.001$). Additionally, anomaly on DFTU was associated with a significantly higher risk of high risk NIPT testing (47.2% versus 1.30%, $p< 0.001$), as well as higher rates of invasive testing using chorionic villous sampling (CVS) (9.75% versus 0.16%, $p< 0.001$) and amniocentesis (14.6% versus 0.49%, $p< 0.001$). The most common anomaly identified on DFTU was cystic hygroma, which was seen 58.5% of DFTUs with an abnormality. Less than half of DFTU abnormalities were revisualized on a detailed second trimester ultrasound, however 20% of DFTU revealed a different anomaly than was previously seen on the DFTU. Of patients with an anomaly, 36/41 (87.8%) elected to have cell free DNA (cfDNA) screening, and of those who did have cfDNA screening 19/36 (52.8%) were negative.

CONCLUSION: The rate of detecting an anomaly on the DFTU exam in our cohort was approximately 1 in 90 (1.1%). Of those, over half had negative cfDNA screening.

	Anomaly on DFTU n = 41	No anomaly on DFTU n = 3674	P value
Maternal Demographics			
Maternal age (years)	33.1 ± 5.31	30.7 ± 5.18	0.004**
Gravidity	3.54 ± 2.5	2.57 ± 1.69	<0.001**
Maternal BMI	31.2 ± 7.92	29.0 ± 7.38	0.07
Gestational Age(weeks)	12.7 ± 0.60	13.0 ± 0.54	<0.001**
Number of gestations	1.02 ± 0.16	1.04 ± 0.21	0.56
NIPT Testing			
Received NIPT Testing	36 (87.8)	3231 (87.9)	0.49
High risk NIPT	17 (47.2)	42 (1.30)	<0.001**
Low risk NIPT	19 (52.8)	2625 (81.2)	<0.001**
No Result Reported	0 (0)	564 (17.5)	
Invasive Testing			
CVS	4 (9.75)	6 (0.16)	<0.001**
Abnormal	3	2	
Amniocentesis	6 (14.6)	18 (0.49)	<0.001**
Abnormal	4	6	
DFTU Abnormality	**2nd tri performed (n=24)**	**Same Anomaly Reidentified (n=8)**	**Different Anomaly Identified (n=5)**
Cranium (n=4)	0/4	-	-
Neck (n=24)	12/24	3/12	4/12
Heart (n=10)	8/10	2/8	0/8
Thorax (n=0)	-	-	-
Abdominal wall (n=5)	3/5	1/3	0/3
Stomach (n=0)	-	-	-
Kidneys (n=1)	1/1	1/1	0/1
Bladder (n=2)	1/2	0/1	1/1
Spine (n=0)	-	-	-
Extremities (n=3)	1/3	1/1	0/1
Other (n=2)	1/2	0/1	0/1

1120 The Impact of Age on Adverse Obstetrical Outcomes among Pregnant Women with COVID-19 Infection.

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OBJECTIVE: Pregnant individuals experienced a more severe course of COVID-19 infection. Advanced age is widely recognized as a risk factor for severe disease and its complications, as well as for adverse obstetrical complications.

Therefore, our study aimed to investigate the association between maternal age at the time of COVID-19 infection and obstetrical adverse outcomes.

STUDY DESIGN: We conducted a retrospective cohort study at a tertiary single medical center, which included all singleton gestations of women with COVID-19 infection within a week prior to or after delivery, who delivered between 2020 and 2022. Exclusion criteria included women with incomplete medical records, multiple gestations and nulliparity. The women were categorized into two groups: below and above 35 years old. A multivariable logistic regression model was used to adjust for confounders such as obesity, cesarean delivery, induction of labor, epidural analgesia and birthweight.

RESULTS: Our study included 443 patients with peripartum COVID-19 infection, of whom 354 were younger than 35 years and 89 were 35 years or older. We observed an increased risk of cesarean delivery (Table 1: 28.1% Versus 16.1%, P value= 0.01) and an increased risk of preterm delivery before 34 weeks (8% Versus 1.7%, P Value= 0.006) among the older age group.

Using multivariate logistic regression model after adjusting for maternal obesity, induction of labor, epidural analgesia and neonatal birthweight, the association between preterm delivery before 34 weeks and advanced maternal age remained significant (Adjusted Odd Ratio 8.04, P value=0.021).

CONCLUSION: Maternal age over 35 years is a risk factor for preterm delivery before 34 weeks in pregnant women with peripartum COVID-19 infection.

Table 1: Obstetrical characteristics and perinatal outcomes of women with COVID-19 diagnosis under 35 Years old or 35 and above.

Characteristics	Women with COVID-19<35 years old n=354	Women with COVID-19–>35 years old n=89	P- value
Mode of delivery			
Vaginal delivery n (%)	297 (83.9%)	64 (71.9%)	0.01
Cesarean section n (%)	57 (16.1%)	25 (28.1%)	
Preterm delivery			
34-36.6 weeks n (%)	34 (9.6%)	14 (15.9%)	0.12
<34 weeks n (%)	6 (1.7%)	7 (8%)	0.006
Hypertensive disorders of pregnancy n (%)	16 (4.5%)	7 (7.9%)	0.28
GDM n (%)	8 (2.3%)	5 (5.6%)	0.14
Polyhydramnios n (%)	0	1(1.1%)	0.2
Oligohydramnios n (%)	12 (3.4%)	2 (2.2%)	0.74
PROM n (%)	32 (9%)	7 (7.9%)	0.83
PPROM n (%)	4 (1.1%)	3 (3.4%)	0.14
Induction of labor n (%)	50 (14.1%)	6 (6.7%)	0.07
Epidural analgesia n (%)	103 (29.3%)	17 (19.3%)	0.06
Third- or fourth-degree perineal laceration n (%)	6 (1.7%)	0	0.6
Episiotomy n (%)	3 (0.8%)	1 (1.1%)	0.99
Infant perinatal mortality n (%)	8 (2.3%)	2 (2.2%)	1
Maternal perinatal mortality n (%)	1 (0.3%)	1 (1.1%)	0.36
Birthweight (gram± SD)	3143.24+-513.39	3241.9+-642.35	0.18
Moderate-severe Covid19 Symptoms	10 (2.8%)	5 (5.6%)	0.19

N number GDM gestational diabetes mellites, PROM premature rupture of membranes, PPROM preterm premature rupture of membranes, SD standard deviation

1121 Prenatal Diagnosis Post-Dobbs in an Abortion-Banned State: A Retrospective Cohort Study

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OBJECTIVE: Following the ruling of Dobbs v. Jackson Women's Health Organization (Dobbs), Tennessee became an abortion-banned state. The impact of abortion bans on diagnostic prenatal genetic testing was unknown. We sought to examine the frequency and characteristics of women undergoing prenatal diagnostic genetic testing before and after Dobbs.

STUDY DESIGN: A retrospective cohort study (IRB #5070) examined viable pregnancies electing diagnostic genetic testing by either chorionic villus sampling (CVS) or amniocentesis during two 9-month periods before and after Dobbs at our regional MFM practice. Cases were identified by CPT codes; demographic information, procedure details, and results were collected for comparison. Area deprivation index (ADI) rankings and cross tabulation tables were created; chi-square tests were used to determine significance.

RESULTS: 119 patients underwent diagnostic genetic testing during the periods studied (7/1/18 to 3/31/19 = 48; 7/1/22 to 3/31/23 = 71). Demographic characteristics are shown in Table 1. No difference in race, age at delivery, or gestational age (GA) at the time of testing

were noted; however, GA at the time of testing for CVS procedures was statistically lower post Dobbs (12.88 vs. 11.99 weeks, p=.024). Prior to Dobbs, CVS accounted for 16.7% of diagnostic procedures (11.2 per thousand 1st trimester exams (76801)), compared to 26.8% post-Dobbs (19.5 per thousand 76801). After Dobbs, a significantly higher proportion of patients undergoing CVS for diagnostic testing were publicly insured (0% vs. 52.6%, p=.012) while ADI ranking did not differ.

CONCLUSION: Following events that limited access to in-state abortion, we observed an increase in the number of patients seeking diagnostic genetic testing and a larger proportion undergoing CVS. We also observed an increase in pre-pregnancy BMI and public insurance status with a decrease in GA at the time of CVS. Further work will be aimed at determining the impact of this increased and earlier testing and explore the association with insurance status and BMI.

Table 1
Demographics

	All (n=119)	Pre-Dobbs	Post-Dobbs					
CVS, n	27	8	19					
Rate *	16	11.2	19.5					
Amniocentesis, n	92	40	52					
Rate †	13.5	15.1	12.4					
					CVS Only			
	All (n=119)	Pre-Dobbs	Post-Dobbs	*P* value	All (n=27)	Pre-Dobbs	Post-Dobbs	*P* value
Age at delivery, y, mean (SD)	30.2 (6.46)	29.5 (6.86)	30.80 (6.16)	.301	31.56 (6.46)	30.12 (.94)	32.16 (1.46)	.490
BMI, kg/m², pre-pregnancy, mean (SD)	29.95 (6.82)	28.04 (6.18)	31.21 (6.98)	**.013**	29.80 (7.17)	27.44 (5.01)	30.91 (7.88)	.197
No USG findings or positive screen, n (%)	26 (21.8%)	7 (14.6%)	19 (26.8%)	.174	11 (40.7%)	1 (12.5%)	10 (52.6%)	.090
Gestational age, wk, at testing, mean (SD)	18.5 (5.39)	19.2 (5.06)	18.0 (5.58)	.201	12.25 (.97)	12.88 (.80)	11.99 (.93)	**.024**
Public insurance, n (%)	61 (52.1%)	20 (41.7%)	41 (59.4%)	.064	10 (37.0%)	0 (0%)	10 (52.6%)	**.012**
National ADI ranking, mean (SD)	63.15 (20.53)	63.88 (22.98)	62.60 (18.69)	.766	58.29 (23.03)	52.13 (30.59)	62.01 (17.24)	.349
State ADI ranking, mean (SD)	5.35 (2.53)	5.60 (2.67)	5.16 (2.43)	.387	4.76 (2.59)	4.63 (3.11)	4.85 (2.34)	.866

* per thousand 1st trimester ultrasounds (76801)
† per thousand detailed fetal anatomic ultrasounds (76811)

1122 Revisiting low-lying placenta: internal os distance and pregnancy outcomes

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OBJECTIVE: Low-lying placenta is diagnosed when the internal os distance (IOD) is 2 centimeters or less without any part covering the os and has been associated with antepartum and postpartum hemorrhage, hospitalization, cesarean delivery and small for gestational age neonates. The management of a low-lying placenta remains undefined. A recent study suggested using >5 mm as a cutoff for trial of labor. We sought to report outcomes associated with this cutoff.

STUDY DESIGN: Pregnant people diagnosed with placenta previa or low-lying placenta in the second trimester who underwent a follow-up examination in the third trimester and delivered at our institution between January 2012 and March 2023 were included. The last scan with an IOD on transvaginal imaging prior to delivery was used. Outcomes were grouped based on IOD as 0-5, 6-20, and >20 mm. Maternal and neonatal outcomes were collected from an available obstetric database and electronic chart review. Patients with placenta previa, other placental abnormalities (e.g. placenta accreta spectrum) or cord abnormalities near the cervix (e.g. vasa previa) were excluded from the analysis. Statistical analysis included χ^2 for categorical measures and ANOVA for continuous measures, with $P < 0.05$ considered significant.

RESULTS: A total of 344 patients met inclusion criteria for analysis. Third trimester follow-up sonography was performed at a mean gestational age of 33.5±2.0 weeks. Maternal age was significantly different between groups but not race/ethnicity, BMI, or parity (Table). Compared to normal implantation, a low-lying placenta was delivered at a lower relative gestational age; had increased rates of antepartum hemorrhage, hospitalization, and cesarean; and a decreased induction rate. No differences were observed for small for gestational age, postpartum hemorrhage, or maternal transfusion.

CONCLUSION: Low-lying placenta at < 5 and 6-20 mm demonstrated increased pregnancy morbidity. Patients attempting trial of labor should be counseled on these risks and shared decision making pursued.

Table. Maternal demographics and selected pregnancy outcomes based on third trimester transvaginal internal os distance (IOD).

Category	Internal os distance (mm) 0-5 *N=28*	6-20 *N=82*	>20 *N=234*	P-value
Maternal age (years)	34.5 ± 4.7	32.4 ± 5.8	30.4 ± 6.2	<0.001*
Advanced maternal age	25 (89%)	61 (74%)	135 (58%)	<0.001*
Race/ethnicity				0.191
Non-Hispanic Black	0 (0%)	11 (13%)	28 (12%)	
Non-Hispanic White	1 (4%)	0 (0%)	6 (3%)	
Hispanic	24 (86%)	70 (85%)	191 (82%)	
Asian	1 (4%)	0 (0%)	3 (1%)	
Other	2 (7%)	1 (1%)	6 (3%)	
BMI at delivery(kg/m²)	33.7 ± 6.3	31.8 ± 4.6	31.9 ± 5.8	0.262
Parity				
0	2 (7%)	11 (13%)	48 (21%)	0.139
1	8 (29%)	18 (22%)	66 (28%)	
≥2	18 (64%)	53 (65%)	120 (51%)	
Gestational age at delivery (weeks)	38 [37, 39]	39 [38, 39]	39 [38, 40]	<0.001*
Preterm Birth (<37 weeks)	3 (11%)	10 (12%)	13 (6%)	0.119
Small for gestational age	1 (4%)	9 (11%)	20 (9%)	0.481
Mode of delivery				
Vaginal	1 (4%)	37 (45%)	150 (64%)	<0.001*
Cesarean	27 (96%)	45 (55%)	84 (36%)	
Emergent	1 (4%)	4 (9%)	3 (4%)	0.399
Induction of labor	2 (7%)	26 (32%)	97 (41%)	0.001*
Antepartum hemorrhage[1]				
None	19 (68%)	66 (80%)	206 (88%)	0.036*
Spotting	7 (25%)	8 (10%)	19 (8%)	
Mild uterine hemorrhage	1 (4%)	5 (6%)	7 (3%)	
Significant hemorrhage	1 (4%)	3 (4%)	2 (1%)	
Hospitalization for hemorrhage	5 (18%)	13 (16%)	12 (5%)	0.003*
Placental abruption	1 (4%)	2 (2%)	5 (2%)	0.889
Postpartum hemorrhage	7 (25%)	27 (33%)	58 (25%)	0.350
Maternal transfusion	3 (11%)	11 (13%)	15 (6%)	0.131

[1]Bleeding was restricted to second and third trimester and quantified based on subject report or objective assessment. Spotting was based on report or an exam with <10 cc bleeding. Mild uterine hemorrhage was based on the report of saturating 1-2 pads or exam with 10-25 cc bleeding. Significant hemorrhage was based on the report of multiple pads, passage of clots, or >25 cc bleeding on exam).

1123 The Value of Extending Maternal Care of Diabetes Mellitus After Delivery in Underserved Areas

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OBJECTIVE: Postpartum care for patients with diabetes mellitus (DM) is challenging for underserved communities. The aim of this study is to compare glycemic control for patients enrolled in a dedicated postpartum care program to those living in other areas of an urban region.

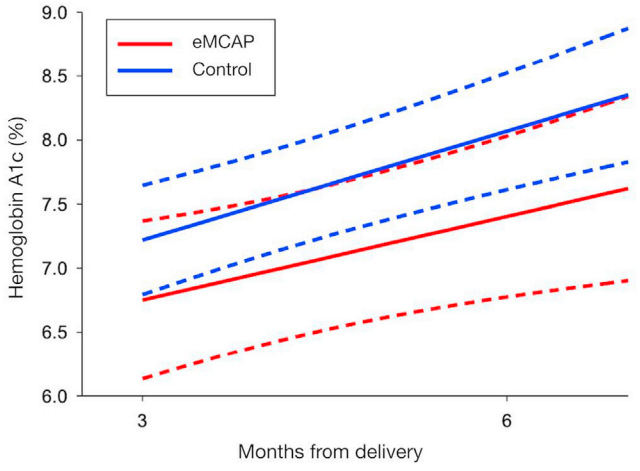
STUDY DESIGN: This was a prospective cohort study of postpartum individuals with pregestational DM who delivered at a large, safety-net hospital. Patients living within a group of zip codes with identified health disparities are offered enrollment into the extending

Maternal Care After Pregnancy (eMCAP) program, which provides management of chronic health conditions including access to a mobile health unit for a year after delivery. Patients living outside the target zip codes receive routine referral to a primary care provider postpartum. Patients in eMCAP with DM were matched 1:2 for maternal age, race/ethnicity, and delivery date to non-eMCAP (control) DM cases. Statistical analysis included Pearson's chi-square and Student's t-test. A mixed effects repeated measures regression model was used to compare the change in hemoglobin A1c (HbA1c) over time (a random effect) between cases and controls (a fixed effect).

RESULTS: Between Oct 2020 - Dec 2022, 50 patients with DM were enrolled into eMCAP compared to 100 controls. The majority of eMCAP patients identified as Hispanic (72%) and Black (24%) with mean BMI 37.4 ± 8.5 kg/m^2. Patients enrolled in eMCAP had significantly higher rates of follow-up at 3, 6 and 12 months postpartum (all P< 0.01). As a corollary, HbA1c values were significantly lower at 3 and 6 months in patients followed in eMCAP compared to controls, a finding that persisted at 1-year postpartum (P< 0.01, Figure).

CONCLUSION: Patients with DM enrolled in a dedicated postpartum care program had significantly higher follow-up rates and lower postpartum HbA1c values after delivery. Improving access to postpartum DM care is critical to improve maternal health and reduce future maternal cardiometabolic disease.

Figure. Estimated Hemoglobin A1c (%) by months from delivery (with 95% confidence intervals)



1124 Reproductive Outcomes with Universal Detailed First Trimester Ultrasound

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OBJECTIVE: In a political climate where reproductive autonomy is being challenged and earlier decisions are key to access in many states, we sought to determine the effect on termination rates of performing routine detailed first trimester ultrasounds (DFTUs).

STUDY DESIGN: At our institution, we offer all pregnant patients DFTU's and cell free DNA screening (cfDNA). We performed a retrospective cohort study of all pregnancies who received a DFTU between February 23, 2022 and March 31, 2023. All exams were performed by the Division of Maternal-Fetal Medicine at our large academic teaching hospital. The cohort was divided into two groups: those with fetal anomalies found on DFTU and those without. Our primary outcome was the rate of termination. Univariate analysis was performed.

RESULTS: A total of 3715 patients had a DFTU, of which 41 (1.10%) of DFTUs had at least one fetal anomaly noted. There was no difference in maternal BMI between the groups. Maternal age was greater in the abnormal DFTU group (33.1 versus 30.7, p = 0.004), as was gravidity (3.54 versus 2.57, p = 0.0003). Gestational age at time of DFTU performance was lower in the abnormal DFTU group (12.7 weeks versus 13.0 weeks, p < 0.001). 18/41 (43.9%) chose elective termination versus 11/3674 (0.30%) without an anomaly (P< 0.001). Of the 18 who chose elective termination 14/18 (77.8%) did so based on the results of the DFTU, terminating prior to their routine second trimester ultrasound. Of the patients who shared the gestational age at which they terminated, the average gestational age at termination with abnormal DFTU was 15.6 weeks (SD 3.99) versus 19.8 weeks (SD 2.86) for those with normal DFTU. Of those 18, 13/18 (72.2%) also had a genetic anomaly identified on a genetic test (cfDNA, CVS, or amniocentesis).

CONCLUSION: Patients who have an abnormal DFTU are likely to pursue an elective termination, and the majority of those happen before a routine second trimester sonogram is performed.

	Anomaly on DFTU n = 41	No anomaly on DFTU n = 3674	P value
Maternal Demographics			
Maternal age (years)	33.1 ± 5.31	30.7 ± 5.18	0.004**
Gravidity	3.54 ± 2.5	2.57 ± 1.69	<0.001**
Maternal BMI	31.2 ± 7.92	29.0 ± 7.38	0.07
Gestational Age(weeks)	12.7 ± 0.60	13.0 ± 0.54	<0.001**
Number of gestations	1.02 ± 0.16	1.04 ± 0.21	0.56
Genetic Testing			
Received cfDNA Testing High risk Low risk No Result Reported	36 (87.8) 17 (47.2) 19 (52.8) 0 (0)	3231 (87.9) 42 (1.30) 2625 (81.2) 564 (17.5)	0.49 <0.001** <0.001**
CVS Abnormal	4 (9.75) 3	6 (0.16) 2	<0.001**
Amniocentesis Abnormal	6 (14.6) 4	18 (0.49) 6	<0.001**
Reproductive Outcomes			
Elective Termination	18 (43.9)	11 (0.30)	<0.001**
Gestational Age at Termination (weeks)	15.6 ± 3.99 (n=13)	19.8 ± 2.86 (n=6)	0.03**
Termination Prior to Second Trimester Anatomy Scan	14 (77.8)	4 (0.11)	<0.001**
Genetic Testing Abnormal Prior to Termination	13 (72.2)	6 (54.5)	0.33

1125 Residential Proximity to Hydraulic Fracturing Wells Increased the Risk for Low Birth Weight

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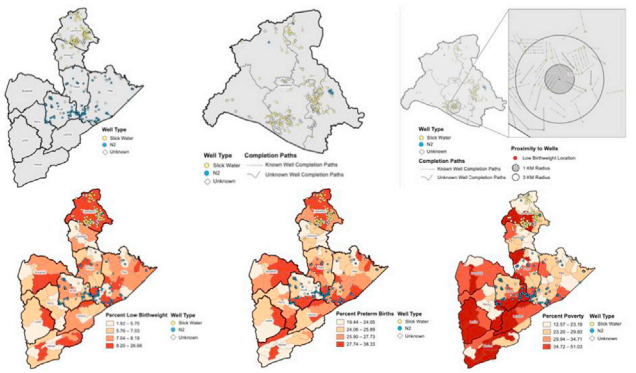
OBJECTIVE: Exposure to hydraulic fracturing (HF), an oil and gas extraction method, may be associated with adverse birth outcomes. Nitrogen (N2) HF uses nitrogen gas to extract natural gas, whereas

slick water HF uses a combination of chemicals, water and sand. By differentiating outcomes by type of HF performed, recommendations can be made on the methods of gas extraction which confer the lowest risk to pregnant patients. Our aim is to demonstrate the impact of residential proximity to slick water versus N2 based HF wells and preterm birth and low birth weight.

STUDY DESIGN: This is an ecological study. Ten eastern Kentucky (KY) counties that contain both slick water and N2 fracking were identified. Data from the KY Public Health Department included: demographics, gestational age (GA), and birth weight for singleton pregnancies over 20 years. Individual births were categorized by term (GA > 37weeks) or preterm (GA < 37 weeks) as well as LBW (< 2500g) or VLBW (< 1500g). The KY Geologic survey provided location data for HF wells in 10 eastern KY counties. KY county shapefiles were downloaded from the US Census Bureau's TIGER/Line Shapefile repository. Data for percent poverty was downloaded from the American Community Survey 2019 5-year estimates. Choropleth maps are expressed by quantiles. All maps were produced in ESRI ArcGIS Pro version 2.8.4.

RESULTS: There were 29,360 unique births during the study period. A total of 398 HF wells were identified in all counties, 45.7% were slick water HF and the vast majority were in Lawrence county (n=160). Lawrence county had the highest prevalence of low birth weight (15.37%, n=166). The 9 remaining counties did not show a spatial association between residential proximity and low birth weight. There was no association between preterm birth and slick water or N2 well location.

CONCLUSION: There appears to be a spatial association between slick water HF, and low and very low birth weight. This spatial correlation is not present for preterm birth.



1126 The Placenta Accreta Index: Potential cutoffs for clinical management

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OBJECTIVE: The placenta accreta index (PAI) is a standardized method for the ultrasound (US) prediction of placenta accreta spectrum (PAS). Since 2019, we have prospectively applied the PAI in pregnancies in the second and third trimester identified to be at risk for PAS due to prior history of cesarean and placenta previa or low-lying placenta or other sonographic signs of PAS. We sought to determine clinically meaningful cutoffs to guide the decision to obtain adjunct magnetic resonance imaging (MRI).

STUDY DESIGN: We analyzed pregnant individuals who underwent assessment with the PAI from 2019-2023. The last PAI prior to delivery was analyzed for prediction of hysterectomy. Two cut off values were determined for a 96% sensitivity and specificity for the outcome of cesarean hysterectomy. Associated sensitivity, specificity, positive predictive and negative predictive values were determined.

RESULTS: Of 126 with a PAI in the third trimester, 45/126 (36%) required a hysterectomy at delivery. PAI was performed at a mean gestational age of 31.2 ± 2.6 weeks. Mean gestational age at delivery was 36.8 ± 2.0 weeks. The cutoff value for a sensitivity of 96% for cesarean hysterectomy was a PAI of 3.5. The cutoff value for a specificity of 96% for cesarean hysterectomy was a PAI of 8.

CONCLUSION: Our proposed cutoffs of 3.5 and 8 can provide excellent sensitivity and specificity respectively for predicting hysterectomy. The PAI range of 3.5 to 8 was indeterminate, with potential added value of MRI. Future studies will explore the value added of MRI within this PAI range.

Table. Sensitivity, specificity, positive and negative predictive values based on PAI for 96% sensitivity and specificity of cesarean hysterectomy in pregnant individuals at risk for PAS.

96% sensitivity for cesarean hysterectomy PAI optimal cut off: 3.5			
	Value	Lower Limit	Upper Limit
Sensitivity	0.956	0.849	0.995
Specificity	0.593	0.478	0.701
Positive Predictive Value	0.566	0.450	0.917
Negative Predictive Value	0.960	0.862	0.975
96% specificity for cesarean hysterectomy PAI optimal cut off: 8			
	Value	Lower Limit	Upper Limit
Sensitivity	0.511	0.358	0.663
Specificity	0.988	0.933	1.000
Positive Predictive Value	0.958	0.800	0.977
Negative Predictive Value	0.784	0.660	0.993

1127 Prenatally Diagnosed Genetic Anomalies, Anticipated Phenotypes, and Pregnancy Outcomes

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OBJECTIVE: Phenotypic severity ranges broadly among genetic anomalies and should inform decisions about pregnancy termination. Our objective was to explore phenotype severity and pregnancy outcomes in those with abnormal genetic results.

STUDY DESIGN: This is a retrospective cohort study at a tertiary care center from 2016-2022. Pregnant patients who underwent invasive testing with abnormal results were included. Those with incomplete data or miscarriages were excluded. Phenotypes were categorized into "Severe" (e.g. Trisomy 13/18, OI Type II) "Moderate" (e.g. Trisomy 21, Noonan Syndrome), "Mild" (e.g. sex chromosome aneuploidy, Stargardt Disease), and "Unknown" (e.g. copy number variant of unknown significance) based on anticipated degree of

cognitive impairment, morbidity and longevity. All patients underwent post-test genetic counseling. Analysis was done with Chi-square, Fisher Exact, or T-Test as appropriate.

RESULTS: 202 patients were included. Demographic information and the distribution of diagnoses and phenotypes between pregnancies that were terminated vs continued are in Table 1. Patients who underwent termination were more likely to undergo CVS vs amniocentesis (71% vs 38%) ($p< 0.001$). The overall rate of abortion following prenatal diagnosis was 64.8%. Autosomal trisomy was the most common diagnosis and was more common in pregnancies undergoing termination (50.4% vs 5.6%) ($p< 0.001$). There was a strong correlation between phenotype severity and the decision to undergo abortion. The rates of abortion were 92.8%, 90.1%, and 60.4% for those with severe, moderate, and mild phenotypes, respectively ($p< 0.001$). Only 15.6% of those with an uncertain phenotype terminated the pregnancy.

CONCLUSION: In patients with prenatal diagnosis of genetic anomalies, we saw a strong correlation between phenotype severity and the rate of pregnancy termination. This highlights the importance of appropriate genetic counseling following prenatal diagnosis. Rates of termination were high even with milder phenotypes, indicating that most individuals in our population who choose invasive testing would consider abortion.

Title: Distribution of Prenatal Diagnoses and Phenotypes in Pregnancies undergoing Termination vs Continuation

	Pregnancy Outcome		P-value
	Pregnancy Termination (N = 131)	Pregnancy Continuation (N = 71)	
Maternal Age *(median [IQR])*	37 (33-40)	36 (34-38)	0.43
Insurance Type (%)			0.35
Public	15 (11.5%)	5 (7.0%)	
Private	116 (88.5%)	67 (93.0%)	
Invasive Testing Type (%)			**<0.001**
CVS	93 (71.0%)	27 (38.0%)	
Amniocentesis	36 (27.5%)	43 (60.6%)	
Genetic Diagnosis (%)			**<0.001**
Trisomy 13/18	23 (17.6%)	2 (2.8%)	
Trisomy 21	43 (32.8%)	2 (2.8%)	
Sex Chromosome Abnormality	21 (16.0%)	7 (9.9%)	
Affected Fetus of Carrier Couple	15 (11.5%)	12 (16.9%)	
Single Gene Disorder	7 (5.3%)	0 (0.0%)	
Copy Number Variant (Pathogenic)	7 (5.3%)	4 (5.6%)	
Variant of Uncertain Significance	8 (6.1%)	43 (60.6%)	
Other	7 (5.3%)	1 (1.4%)	
Phenotype (%)			**<0.001**
Mild	29 (22.1%)	20 (28.1%)	
Moderate	55 (42.0%)	6 (8.5%)	
Severe	39 (29.8%)	2 (2.8%)	
Uncertain	8 (6.1%)	43 (60.6%)	

1128 Reliability of FISH by Testing Indication

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OBJECTIVE: With gestational age limits on abortion, expediting results of prenatal testing is important. Florescence in situ hybridization (FISH) can provide rapid results following CVS or amniocentesis. Our objective was to explore the reliability of FISH in prenatal diagnosis.

STUDY DESIGN: This was a retrospective cohort study from 2020-2021. All patients undergoing invasive testing with FISH were included. Patients with uninformative FISH results were excluded. The positive predictive value (PPV) of FISH was calculated for each testing indication, considering only the chromosomes evaluated by FISH (13, 18, 21, X, Y). Fisher's Exact test was used for statistical comparison.

RESULTS: 703 patients (483 CVS/220 amniocentesis) met inclusion criteria, with 146 abnormal FISH results (20.8%). The most common indication for invasive testing was abnormal NIPT ($n = 225$) followed by AMA ($n = 206$). 27 had chromosomal abnormalities beyond the scope of FISH. Results of FISH and karyotype based on procedure and indication are in Table 1. Overall, FISH was not consistent with karyotype in 8 cases (1.1%), all from CVS There were 2 false positive and 6 false negative results. Discrepancy between FISH and karyotype was seen in 8 of 459 CVS vs 0 of 217 amniocentesis (1.7% vs 0%; $p = .06$). Both false positive results were in cases with abnormal NIPT and normal NT. The 6 false-negative FISH results included one case of T18, one of 47XXY, and four mosaic results, two confined to the placenta based on normal karyotypes on amniocentesis. The PPV of FISH for all indications was 98.6%. PPV was 100% in those with abnormal NT or ultrasound. The overall NPV was 98.9% (524/530), with NPV of 100% with amniocentesis. NPV was lower when CVS was done for abnormal NT than for other conditions (93.6% vs. 99.0%, $p = .04$).

CONCLUSION: While most FISH findings are confirmed by karyotype, PPV with CVS is less than for amniocentesis. Normal FISH results are less reliable with abnormal NT. When NIPT is abnormal but NT is normal, awaiting confirmation with karyotype is recommended.

Table 1: Results of FISH and karyotype based on procedure and indication

			Karyotype Result				
			Abnormal (n=150)		Normal (n=526)		Other (n=27)
	Testing Indication		CVS (n=130)	Amniocentesis (n=20)	CVS (n=329)	Amniocentesis (n=197)	
FISH Result	Abnormal NIPT (n=225)	Abnormal	99	17	2	0	0
		Normal	1	0	36	66	4
	Advanced Maternal Age (n=206)	Abnormal	3	0	0	0	0
		Normal	2	0	144	47	10
	Abnormal NT (n=84)	Abnormal	16	1	0	0	0
		Normal	3	0	44	14	6
	Prior Abnormal Pregnancy (n=41)	Abnormal	1	0	0	0	0
		Normal	0	0	38	1	1
	Abnormal Serum Screen (n=39)	Abnormal	3	0	0	0	0
		Normal	0	0	13	23	0
	Abnormal Anatomy (n=22)	Abnormal	0	2	0	0	0
		Normal	0	0	0	20	0
	Low-Risk (n=86)	Abnormal	2	0	0	0	0
		Normal	0	0	52	26	6

1129 Let's talk about twin survival after fetal therapy...the same way

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OBJECTIVE: To understand the various measurement constructs that can be used describe twin outcomes after fetal therapy and demonstrate how these methods can represent the same data differently.

STUDY DESIGN: We evaluated all patients who underwent fetoscopic laser for twin to twin transfusion syndrome (TTTS) from 2014 to 2023 using commonly described outcome measures. Double twin survival (DS) is the percentage of pregnant patients who have two surviving twins. At Least One Survivor (ALOS) describes the sum of the percentage of pregnant patients with DS plus the percentage of those with a single survivor (SS). Perinatal survival (PS) considers each twin as a separate patient and potential survivor which is DS x2 + SS x 1 / all patients x 2. We compared DS to ALOS at the time of birth within our own cohort using Chi squared analysis. We also calculated the PS at birth for the same cohort.

RESULTS: 408 patients underwent laser surgery for TTTS. The median gestational age at birth was 32.3 [29.2-34.2] weeks. 314/408 (77%) had double survival. An additional 65 (17.2%) patients had SS therefore 379/408 (93%) had ALOS which was statistically different from DS, p< 0.001. Perinatal survival was 693/816 (85%).
CONCLUSION: Amongst a cohort of 408 consecutive patients undergoing laser surgery, birth survival could be described as 77% (double survival), 93% (at least one survivor), or 85% (perinatal survival). These findings emphasize the importance of previously stated goals to harmonize and understand outcome measures, as well as outcomes. We recommend DS and PS as the most useful survival measures as ALOS underemphasizes the significance of single fetal demise.

1130 Sonographic parameters associated with mode of delivery among small for gestation and growth-restricted fetuses

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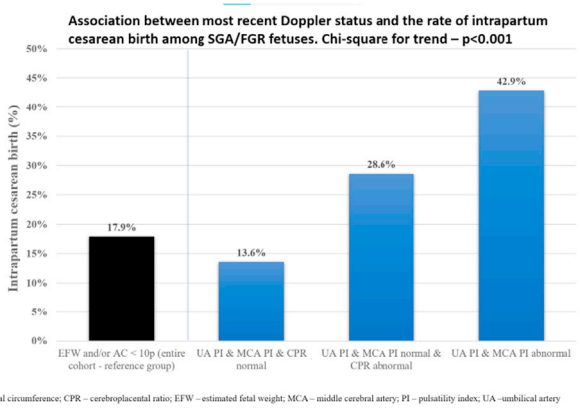
OBJECTIVE: Doppler measurements play a crucial role in managing fetuses with impaired fetal growth. However, the existing evidence on their association with the mode of delivery is limited. This study aims to identify the sonographic parameters associated with intrapartum cesarean section among patients with small-for-gestational-age (SGA) or fetal growth-restricted (FGR) fetuses.
STUDY DESIGN: A retrospective cohort study was conducted, including all singleton pregnancies ≥ 32 wks that experienced a trial of labor. All cases completed Doppler assessment (umbilical artery pulsatility index (UA-PI) and middle cerebral artery (MCA) PI, and cerebroplacental (CPR) within 14 days before birth. Eligible fetuses had either EFW and/or AC < 10% for gestational age without known genetic or structural anomalies. The study compared patients who achieved a successful vaginal birth with those who ultimately underwent an intrapartum cesarean birth. Univariate and multivariable logistic regressions were utilized.
RESULTS: In total, 632 patients with SGA/FGR fetuses participated in a trial of labor. Among them, 519 (82.1%) had a vaginal birth, while 113 (17.9%) underwent intrapartum cesarean birth. Gestational age at the most recent ultrasound, ultrasound-to-birth interval, rates of EFW < 3%, and rates of umbilical artery PI >95% were comparable between the groups. The Doppler status was significantly associated with the mode of delivery (p< 0.001; Figure) Multivariable logistic regressions adjusted for parity, obesity, history of cesarean birth, hypertensive disorders, labor induction, and gestational age at birth identified several sonographic parameters associated with an intrapartum cesarean birth. These included AC < 3% (adjusted odds ratio 1.63; 95% confidence interval 1.03-2.58) and CPR < 5% centile (2.02; 1.28-3.19).
CONCLUSION: Sonographic measurements have been found to be significantly associated with the mode of delivery in SGA/FGR fetuses. These findings highlight the importance for caregivers to consider those parameters when counseling the mode of delivery with patients who have SGA/FGR fetuses.



1132 Lived experiences of pregnant patients with COVID-19 requiring ICU admission

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OBJECTIVE: We sought to understand the lived experiences of pregnant patients requiring ICU admission due to severe COVID-19 infection including their familiarity with their diagnosis and hospital course, and the impact of their ICU stay on peripartum wellbeing.
STUDY DESIGN: A qualitative descriptive study was performed using semi-structured interviews at a single tertiary care medical center. All pregnant subjects had a diagnosis of COVID-19 requiring ICU admission between March 2020 and October 2022. Interviews were conducted via Zoom, transcribed verbatim, identifiers removed, and coded thematically using the Dedoose data analysis software.
RESULTS: A total of 17 subjects were approached and 9 were enrolled. 8 of 9 subjects (88.9%) required intubation and 3 (33.3%) received ECMO while in the ICU. Our study identified four themes describing the experiences of pregnant patients requiring ICU admission due to severe COVID-19**:** (a) intense loneliness and confusion due to the pandemic, hospitalization, and visitor restrictions (b) depersonalization and feeling absent during a key life event (c) complex birth trauma with several subjects reporting new debilitating psychiatric diagnoses after their ICU admissions and (d) resiliency from either religious beliefs, strengthened family relationships, or the need to survive for their newborn.
CONCLUSION: Pregnant patients admitted to the ICU with COVID-19 experience unique physical, cognitive, and mental challenges secondary to their hospitalization and transition into the fourth trimester. Our subjects felt fear, confusion, and a painful absence from a major life event, with an increase in psychiatric diagnoses following hospitalization. Many patients described a reinvigoration of spiritual faith and maintaining family relationships. Pregnant patients surviving critical illness may benefit from additional tailored support, and a detailed review of their complex courses with their medical team.

1135 The Effect of Preoperative Music and Conversation on Anxiety in Women Undergoing Elective Cesarean Delivery

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OBJECTIVE: Anxiety is a common mental health condition affecting a significant number of individuals, especially pregnant women. Mind-body techniques may be helpful to reduce anxiety before surgeries. Our study aimed to investigate the effect of preoperative music and brief preparatory conversation on anxiety in women undergoing elective cesarean delivery (CD).

STUDY DESIGN: A prospective study in a tertiary referral hospital was conducted between the years 2022-2023, investigating preoperative anxiety of women undergoing elective CD. All patients attended a preoperative clinic (team consisting of a nurse and physician) with explanations regarding the procedure. In addition, the intervention group received a message with detailed information accompanied by relaxing music and a brief conversation. The State-Trait Anxiety Inventory (STAI) was used to measure the level of anxiety in both groups during the morning before the operation. Multivariable linear analysis was conducted to control for potential confounding variables.

RESULTS: The analysis included a total of 130 women undergoing elective CD, with 65 women in each group. No significant difference in maternal age, level of education, religion, financial status, parity, previous CD were noted between the groups. Preoperative anxiety and stress levels were significantly **lower** following the intervention with preoperative music and a brief conversation, compared with patients who underwent preoperative clinic alone (Table). Specifically, women in the intervention group were less anxious and expressed happier feelings as compared to women in the non-intervention group (Table). Two linear regression models were constructed for the prediction of both positive and negative feeling composites, controlling for age, parity, previous CD, education, ethnicity, and financial status. The music intervention significantly improved the positive composite (B=7.23, SD 0.91; $p< 0.001$) and reduced the negative composite stress outcome (B=-7.07, SD 0.75; $p< 0.001$).

CONCLUSION: Intervention with preoperative music and a brief conversation may reduce anxiety before an elective CD.

Table. Preoperative anxiety levels, using the State-Trait Anxiety Inventory

	Pre-operative clinic and music Intervention group (n=65)	Preoperative clinic alone (n=65)	P-value
State-Trait Anxiety Inventory (STAI)			
I feel calm	3 (3-3)	2 (1.75-3)	<0.001
I feel secure	3 (3-4)	3 (2-3)	<0.001
I feel tense	2 (2-2)	3 (2-4)	<0.001
I feel strained	1 (1-1)	1 (1-2)	0.17
I feel at ease	3 (2.5-4)	2 (2-3)	<0.001
I feel upset	1 (1-1)	1 (1-2)	<0.001
I am presently worrying over possible misfortunes	2 (1-2)	2 (2-3)	<0.001
I feel satisfied	3 (2-3)	2 (2-3)	<0.001
I feel frightened	2 (1-2)	3 (2-4)	<0.001
I feel uncomfortable	3 (3-3)	2 (2-3)	<0.001
I feel self-confident	3 (3-4)	2 (2-3)	<0.001
I feel nervous	1 (1-1)	1 (1-2)	<0.001
I feel jittery	2 (1-2)	3 (2-3)	<0.001
I feel indecisive	1 (1-2)	3 (2-4)	<0.001
I am relaxed	2 (2-3)	1 (1-2)	<0.001
I feel content	3 (3-4)	3 (2-3)	<0.001
I am worried	2 (2-2)	3 (2-4)	<0.001
I feel confused	2 (1-2)	2 (2-3)	0.03
I feel steady	4 (3-4)	3 (2-4)	<0.001
I feel pleasant	3 (3-4)	2 (2-3)	<0.001

1136 The Cost-Effectiveness of Access to Termination for Pregnancies Affected by Trisomy 13

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OBJECTIVE: We aimed to evaluate the cost of restrictive abortion bans in pregnancies diagnosed with fetal trisomy 13 in the first trimester. A secondary aim was to compare costs between access to termination versus restrictive abortion ban in pregnancies affected by trisomy 13.

STUDY DESIGN: Using a decision analytic model, we assessed the cost-effectiveness of two strategies for managing pregnancy with trisomy 13 diagnosed in the first trimester: legal access to pregnancy termination versus restrictive abortion ban. Costs included were abortion procedures, travel, abortion complications, pregnancy complications, and medical care of the infant including palliative care. Effects included decision to terminate pregnancy, stillbirth, and maternal preeclampsia. The costs and effects of the two strategies were compared with the primary outcome being the cost per stillbirth averted and sensitivity analysis conducted. Variables were abstracted from published literature and the analysis was conducted from the healthcare perspective.

RESULTS: In the base case, access to termination was less costly ($20,2016 vs $63,103) and resulted in fewer stillbirths than restricted abortion access and was, therefore, the choice strategy. The model was most sensitive to the cost of stillbirth and the probability of live birth but there were no thresholds identified in any of the variables where the choice strategy would change. Assuming current Trisomy 13 prevalence and national birthrates, access to termination would result in 222 fewer stillbirths annually and $9,520,914 lower costs.

CONCLUSION: For pregnancies diagnosed with fetal trisomy 13 in the first trimester, access to termination results in fewer stillbirths and reduced costs.

Base case Trisomy 13	Probability (low, high)	Cost, (low, high $ US Dollars)
Elective termination (access)	0.73 (0.71-0.78)	388 (161-528)
Travel termination (no access)	0.15 (0.1-0.3)	2473 (1,350-4,992)
Abortion complication	0.126 (0.0014-0.0138)	669 (546-749)
Live Birth	0.368 (0.2-0.43)	29,524 (26,598-32,451)
Stillbirth	0.6436 (0.8-0.57)	9756 (857-100,336)
Preeclampsia	0.12 (0.09-0.26)	49334 (25,527-110,702)
Palliative care	0.75 (0.52-0.77)	23,214 (10,555-67,577)
Life-prolonging care	0.25 (0.48-0.33)	468,945 (369,044-568,846)

Table 1, costs and probabilities for base-case analysis. US: United States

1137 Pregnancy hormones effects on coronary artery cellular gene regulation and functional correlates of SCAD

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OBJECTIVE: Spontaneous coronary artery dissection (SCAD) occurs during hormonal-mediated events such as pregnancy. The objective of this study was to determine the effect of pregnancy-level estradiol and progesterone on coronary artery smooth muscle cells

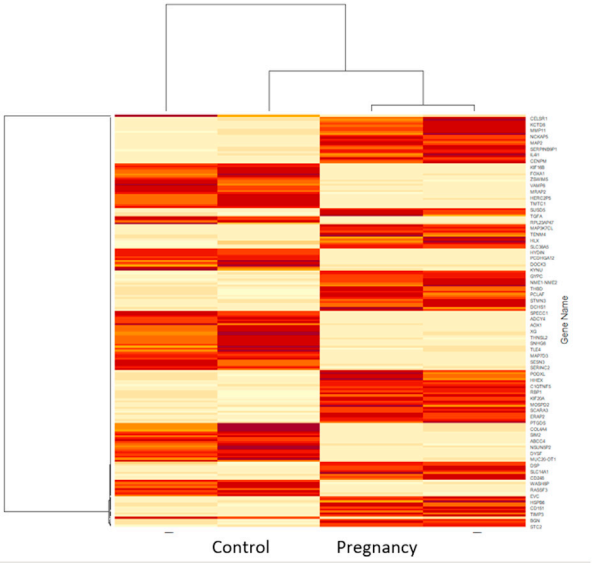
(huCASMCs) and cellular behavior relevant to arterial destabilization such as in SCAD.

STUDY DESIGN: Human CASMCs were propagated and incubated with either control media or 100nM estradiol plus 1000nM progesterone (pregnancy) for 48 hours. Experiments were performed in triplicate. To query transcriptional activation by hormone exposure, RNA sequencing (RNASeq) was analyzed to detect differentially expressed genes and processes. To validate transcriptomic findings on functional models, traction force microscopy (TFM) was performed on the hormone and control cells using a polydimethylsiloxane (PDMS) layer with a predefined elasticity modulus and fluorescent nanoparticles with deflections measured to quantify force generation. A wound healing assay was performed to assess cellular migration. Bromodeoxyuridine (BrdU) incorporation was measured to determine cellular proliferation. Analyses were performed using DESeq2 in R, Friedman tests, and Kruskal-Wallis tests where appropriate.

RESULTS: Over 100 transcripts were differentially expressed between the control and pregnancy conditions (Fig.1). Significant biologic processes identified by gene ontology analysis included cell proliferation (p=0.01), cell adhesion (p=0.02) and cell movement (p=0.01). TFM showed increased force in the pregnancy condition when induced with KCl (263±11 N/m^2 versus 181±8 N/m^2, p=0.01). Although the pregnancy cells were less proliferative (24 hours of BrdU incorporation, p=0.03), they showed increased migration in the wound healing assay (p=0.01).

CONCLUSION: Results from this in vitro study highlight candidate transcriptional and cellular behavior of the vascular smooth muscle induced by estradiol and progesterone that support specific mechanistic hypotheses for the regulation coronary artery smooth muscle cells that may have relevance to pregnancy-related cardiovascular events.

Figure 1: Heatmap of differentially expressed genes



1138 Prediction of pregnancy outcomes by various blood pressure metrics among patients with mild chronic hypertension

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OBJECTIVE: To assess the ability of various blood pressure (BP) measures to predict adverse pregnancy outcomes in patients with mild chronic hypertension (CHTN).

STUDY DESIGN: Secondary analysis of an open label RCT of antihypertensive treatment (vs. none) in pregnant patients with mild CHTN (BPs < 160/105 mmHg) and singleton pregnancies < 23 weeks' gestation. All enrolled patients with ascertained outcomes were included. The primary exposures were average mean arterial pressure (MAP) compared to mean systolic (SBP) and mean diastolic (DBP) blood pressures in pregnancy. The primary outcome was a composite of severe preeclampsia, preterm birth < 35weeks, placental abruption, and fetal or neonatal death. Receiver operating curves (including c-statistics and 95% CI) from adjusted multivariable logistic regression models were used to compare predictive ability of the various BP measures with respect to adverse outcomes.

RESULTS: Participants were included if they had at least 1 prenatal blood pressure measurement and the primary composite (N=2,267). Mean age was 32.3 ± 5.6 years, 1075 (47.4%) were Black and >50% had public insurance. Over half (n=1,233, 54.4%) were on anti-HTN medications at baseline and >80% were multiparous. Average mean MAP, SBP and DBP in pregnancy were 97.2 ± 7.6, 130.7 ± 10.1, and 80.5 ± 7.7mmHg respectively. All BP measures were modest predictors of the primary outcome, however, MAP was a significantly better predictor of the primary outcome compared to SBP and DBP (mean difference: MAP vs. SBP 0.02, 95% 0.01-0.04; MAP vs. DBP 0.02, 95% CI 0.01-0.03). For all other secondary outcomes except SGA and respiratory support, MAP was marginally better at predicting outcomes. DBP was the best predictor of small for gestational age < 10th percentile, while SBP best predicted any neonatal respiratory support.

CONCLUSION: Compared to SBP and DPB, MAP is a better predictor of most adverse outcomes in pregnant patients with mild chronic hypertension.

Table: Mean Blood Pressure Measures and their Association with Outcomes in Pregnant Patients with Mild Chronic Hypertension

Outcome	MAP	SBP	DBP	MAP vs SBP	MAP vs DBP
Primary Composite	0.71	0.69	0.69	0.02 (0.01-0.04)	0.02 (0.01-0.03)
Severe Preeclampsia	0.71	0.68	0.69	0.03 (0.01-0.04)	0.02 (0.01-0.03)
Preterm Birth (<35 weeks)	0.75	0.73	0.72	0.02 (0-0.03)	0.02 (0.01-0.03)
Fetal/Neonatal Death (<28 days)	0.60	0.58	0.58	0.02 (-0.03-0.07)	0.02 (-0.02-0.05)
Placental Abruption	0.64	0.62	0.63	0.02 (-0.03-0.06)	0.02 (-0.02-0.05)
SGA < 10th Percentile	0.54	0.51	0.55	0.03 (0.01-0.05)	-0.009 (-0.02-0.005)
NICU Admission	0.71	0.67	0.70	0.04 (0.02-0.05)	0.006 (-0.004-0.02)
Low Birth Weight <2500g	0.63	0.63	0.61	-0.003 (-0.01-0.02)	0.03 (0.008-0.03)
Composite Neonatal Morbidity	0.72	0.70	0.69	0.02 (-0.02-0.06)	0.02 (-0.008-0.06)

Numbers are AUC and Mean difference (95% confidence interval) as appropriate; Confidence intervals in bold do not cross the null.

1139 Risk factors of uterine rupture in individuals attempting TOLAC in the setting of stillbirth

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OBJECTIVE: TOLAC counseling is based on the risk and benefits gathered from multiple cohort studies. However, the evidence may not apply in the setting of stillbirth when perinatal outcome is not considered in the evaluation, and the available data is limited. Our study aimed to assess risk factors for uterine rupture in individuals who attempted TOLAC in the setting of stillbirth.

STUDY DESIGN: This was a case-control study using Fetal Death Data from the National Vital Statistics System from 2014 to 2021. We limited analysis to individuals with stillbirth at 20 weeks or greater and a history of cesarean delivery and those who underwent TOLAC. Variables were compared between individuals who had uterine rupture and those who did not using bivariate analysis. Those with P-value < 0.1 were included in multivariable logistic regression to calculate adjusted odds ratios (aOR) with 95th confidence intervals (95% CI).

RESULTS: Of 11,550 eligible for inclusion, 147 (1.3%) had uterine rupture. Compared to individuals who did not have uterine rupture, those who had uterine rupture were less likely to be Hispanic, deliver at term, and have greater number of prior cesarean delivery. Risk factors for uterine rupture included greater gestational age (20-23 weeks 0.5% [referent]; 24-27 weeks 0.6% [aOR 1.19, 95%CI 0.57-2.49]; 28-36 weeks 1.4% [aOR 2.78, 95%CI 1.71-4.51]; 37 weeks or greater 3.7% [aOR 8.12, 95%CI 5.00-13.18]), pregestational diabetes (2.2% [aOR 1.73, 95%CI 1.03-2.91]), and number of cesarean delivery (1 previous cesarean 1% [referent]; 2 previous 2.1% [aOR 2.68, 95%CI 1.87-3.84]; 3 previous 2.0% [aOR 2.58, 95%CI 1.51-4.42]). Hispanic compared to non-Hispanic ethnicity was associated with decreased odds of uterine rupture (0.9% vs. 1.4% [aOR 0.57, 95%CI 0.36-0.92]).

CONCLUSION: Overall, the rate of uterine rupture in individuals who attempted TOLAC in the setting of stillbirth was comparable to overall historical data, even in the setting of multiple cesarean deliveries. Individuals considering the mode of delivery after stillbirth at term should be counseled on a potentially increased odds of uterine rupture.

Table 1. Risk factors for uterine rupture after TOLAC in the setting of fetal demise

	Uterine rupture n (%)	Crude OR (95%CI)	Adjusted OR (95%CI)
Gestational age			
20-23	24/4588 (0.5)	Reference	Reference
24-27	10/1559 (0.6)	1.23 (0.59-2.57)	1.19 (0.57-2.49)
28-36	55/3818 (1.4)	**2.78 (1.72-4.50)**	**2.78 (1.71-4.51)**
37 or greater	58/1585 (3.7)	**7.22 (4.47-11.66)**	**8.12 (5.00-13.18)**
Number of previous CD			
1	79/8234 (1.0)	Reference	Reference
2	51/2440 (2.1)	**2.20 (1.55-3.14)**	**2.68 (1.87-3.84)**
3 or greater	17/876 (1.9)	**2.04 (1.20-3.47)**	**2.58 (1.51-4.42)**
Ethnicity			
Hispanic	21/2450 (0.9)	**0.62 (0.39-0.98)**	**0.57 (0.36-0.92)**
Pregestational diabetes	17/776 (2.2)	**1.83 (1.10-3.06)**	**1.73 (1.03-2.91)**

1140 Retroverted uterus in the first trimester and associated pregnancy outcomes

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OBJECTIVE: To determine if retroverted (RV) uterus diagnosed at the time of nuchal translucency (NT) ultrasound is associated with second trimester pregnancy loss and other adverse pregnancy outcomes.

STUDY DESIGN: This is a retrospective cohort study of patients with RV uterus documented on NT ultrasound at a single institution from 10/2019 to 03/2023. Subjects were identified using a query for "retroverted" uterus within the obstetric ultrasound imaging program. Two subjects with anteverted (AV) uterus were selected for every RV case and used as a comparison group. Patients with multiple gestation, Mullerian anomalies, fetal aneuploidy, or those who delivered at an outside institution were excluded. Maternal demographics, obstetrical, and neonatal outcomes were obtained by chart review. Chi-square test or Fisher's exact test were used for categorical variables, and t-test or Mann-Whitney test were used for continuous variables, with p value < 0.05 denoting significance. Multivariable logistic regression was used to adjust for possible confounding variables.

RESULTS: There were 249 subjects included: 83 in the RV group and 166 in the AV group. Most RV subjects (98%) had resolution of retroversion by the second trimester. Uterine incarceration requiring intervention occurred in three subjects. Significantly more RV subjects conceived by in vitro fertilization (IVF), 11% vs 3% (p=0.02). There was no difference in second trimester pregnancy loss between groups, 0% vs 1.2% (p=0.55). After adjusting for IVF, RV subjects were four times more likely to have first trimester vaginal bleeding (OR=4.1, p=0.001). There were no other differences in adverse outcomes, including first trimester pregnancy loss.

CONCLUSION: Persistent RV uterus in the first trimester is associated with increased risk of first trimester vaginal bleeding. However, rates of first and second trimester pregnancy loss were similar between groups, providing valuable information for patient counseling. Significantly more RV subjects conceived by IVF, highlighting the need for further study in this patient population.

Table 1. Pregnancy outcomes of patients with RV versus AV uterus on NT ultrasound

Total n=249	Retroverted (n=83)	Anteverted (n=166)	P value
Cesarean section	32 (38.5%)	68 (41%)	0.91
First trimester bleeding	14 (16.9%)	7 (4.2%)	**0.001**
First trimester spontaneous abortion	2 (2.4%)	2 (1.2%)	0.60
Second trimester pregnancy loss	0 (0%)	2 (1.2%)	0.55
Short cervix	2 (2.4%)	7 (4.2%)	0.72
Composite adverse maternal outcomes*	18 (21.7%)	51 (30.7%)	0.13
Composite adverse fetal outcomes†	9 (10.8%)	11 (6.6%)	0.25
Composite adverse neonatal outcomes‡	22 (26.5%)	42 (25.3%)	0.83

*Composite adverse maternal outcomes include hypertensive disorders of pregnancy, spontaneous preterm labor, preterm prelabor rupture of membranes, placental abruption, postpartum hemorrhage, retained placenta
†Composite adverse fetal outcomes include growth restriction, oligohydramnios, and intrauterine fetal demise
‡Composite adverse neonatal outcomes include low birth weight (LBW), very LBW, extremely LBW, preterm delivery, 5-minute APGAR score < 7, NICU admission, neonatal death

1141 T2DM identified as risk factor for IHCP using a machine learning approach with pregnancy records

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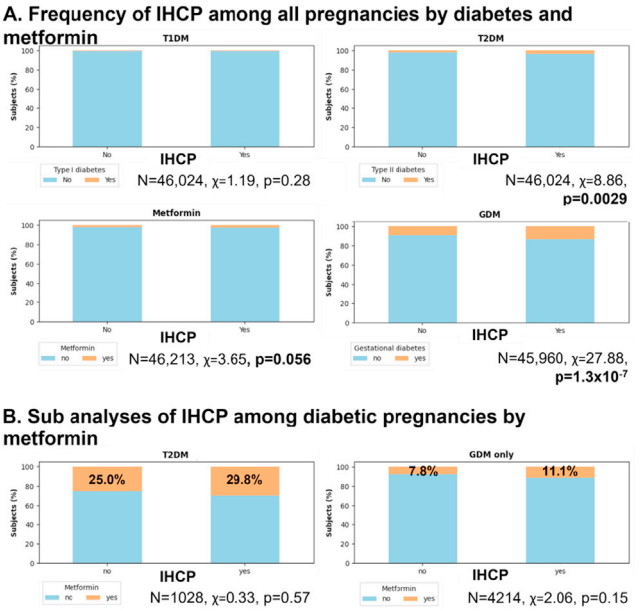
OBJECTIVE: Intrahepatic cholestasis of pregnancy (IHCP) is a poorly understood disease known to have hormonal and metabolic links. In a discovery approach, we sought to naively assess a large database of pregnancies using machine learning and natural language processing (NLP) for novel insights into pathology and risk.

STUDY DESIGN: Peribank, a research database of 46,641 pregnancies containing 12,017 data entry fields, was natural language processed using *spaCy* pretrained models, with Boolean and scalar data retained. Medications were corrected against MEDI-Ensemble using Levenshtein distance *fuzzy* matching. Post processing filtering left ~450,000 unique features that were assessed for predictive feature selection with *scikit-learn*. Logit regression was used for select features.

RESULTS: There were 1374 IHCP pregnancies discovered in the database. Feature selection revealed top scoring predictors of IHCP (positive or negative) in decreasing score as T2DM as indication for antenatal testing, T2DM, metformin use at conception, white maternal race, white paternal race (both inclusive of Hispanic ethnicity), no medications at conception, tetanus vaccination, high alkaline phosphatase, high glucose, flu vaccination, and GA at admittance. Diabetes and metformin use were then assessed independently for risk. T2DM patients had increased risk for IHCP (OR 1.44, 95% CI 1.05-1.98, p=0.023) as did GDM (1.54, CI 1.31-1.81, $p=3.5x10^{-7}$), while there was no association with Type I diabetes or metformin use independently. The associations were confirmed by X^2 for T2DM (p=0.0029), GDM ($p=1.3\ x10^{-7}$) and metformin use (p=0.056) (Fig. A). A sub analyses of only diabetic patients of all types (n=5110) found metformin treated patients more likely to develop IHCP than others (14.0% vs. 10.8%) though it did not reach significance (p=0.17, X^2) (Fig. B).

CONCLUSION: The novel association of risk for IHCP with T2DM adds to the known association of GDM. Given the absence of association with T1DM, and the possible influence of metformin, the results support the theory that IHCP pathology is linked to hepatic insulin resistance.



1142 Long- term infectious morbidity of offspring born to women with psoriasis

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OBJECTIVE: Psoriasis is a common skin disease with prevalence of 1.5-2.2% in the adult population. About half of psoriasis patient are women, presenting usually before the age of 40. Limited data exists regarding long-term morbidity of the offspring in women with psoriasis. The objective of this study was to assess long-term infectious morbidity of the offspring born to women with psoriasis.

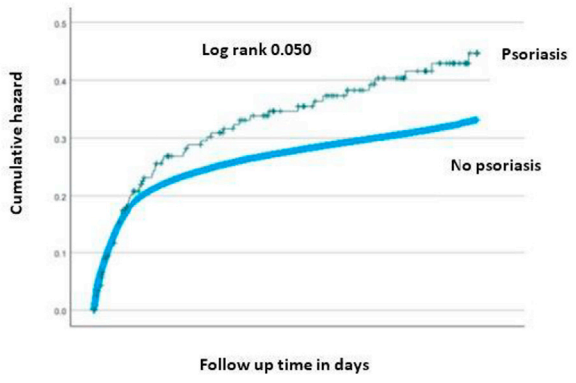
STUDY DESIGN: In a population-based cohort study, long- term infectious hospitalizations of the offspring were compared between singletons born to mothers with and without psoriasis. Deliveries occurred between the years 1991-2021 in a regional tertiary medical center. Infectious related morbidity up to the age of 18 years was assessed according to a predefined set of ICD-9 codes associated with offspring hospitalizations. A Kaplan-Meier survival curve was used to assess cumulative incidence of infectious related morbidity of the offspring and a Cox proportional hazards model was performed to control for confounders.

RESULTS: During the study period 356,356 deliveries met the inclusion criteria, 240 (0.07%) occurred in women with psoriasis. Rates of long- term infectious hospitalizations of the offspring were comparable between the groups (30.4% vs 24.1% for offspring to mothers with and without psoriasis, respectively, p=0.129). However, the cumulative incidence of long- term infectious morbidity was higher among offspring born to women with psoriasis (Kaplan-Meier Log -rank = 0.050, Figure). In a Cox proportional hazards model, controlling for birth-weight, being born to a woman with psoriasis was independently associated with long term infectious

morbidity of the offspring (adjust HR = 1.2, 95% CI 1.01-1.58; p=0.049).

CONCLUSION: Being born to a mother with psoriasis is an independent risk factor for long-term infectious morbidity of the offspring.

Figure: Kaplan-Meier survival curve for cumulative incidence of long-term infectious morbidity of the offspring born to mothers with and without psoriasis (Log Rank P= 0.050)



1143 Social determinants of health and stillbirth evaluation

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OBJECTIVE: Intrauterine fetal demise (IUFD) is defined as fetal death at ≥20 weeks' gestation and complicates about 1 in 160 pregnancies. Several important social determinants of health (SDOH) have been associated with higher rates of stillbirth, such as race, income, education, and access to antenatal care, however SDOH haven't been examined relative to stillbirth evaluation. Our objective was to examine the role of SDOH factors on post-delivery evaluation of stillbirth.

STUDY DESIGN: Retrospective cross-sectional analysis was conducted to examine IUFD deliveries occurring at two tertiary care centers from 2016 to 2022. Cases included IUFD occurring ≥20 weeks gestation. Exclusion criteria were elective termination, pre-viable preterm premature rupture of membranes, or multiple gestation. 340 cases were included. Descriptive statistics were calculated for study variables and Student's T-test and Chi-squared tests used for analysis.

RESULTS: The stillbirth rate (7.2 per 1000 live births) was comparable to the 2020 US stillbirth rate of 5.7 per 1000 live births. Higher rates of stillbirth were observed for non-Hispanic Black women and Hispanic women, compared to White women. Fewer non-Hispanic Black women received diagnostic genetic testing (27%) and autopsy (30%) following IUFD compared to non-Hispanic White women (54%, 46%, respectively) (p=0.0005, p=0.037). There were no other factors associated with a difference in rate of diagnostic testing or autopsy. Additionally, non-Hispanic Black women were administered urine toxicology testing 3X as often as non-Hispanic White women (39% vs. 11%) (p=0.016), despite lower positivity rates (24% vs. 50%).

CONCLUSION: Our data shows that disparities are present in both the occurrence of stillbirth and the evaluation performed thereafter, particularly for diagnostic genetic testing and autopsy. Further studies are needed to elucidate the reasons behind observed differences in stillbirth evaluation. Future efforts should focus on standardization of the counseling recommended for stillbirth evaluation and elimination of testing that is neither helpful nor equitably performed.

1144 Predicting preeclampsia and gestational hypertension using the vasculature of the eye

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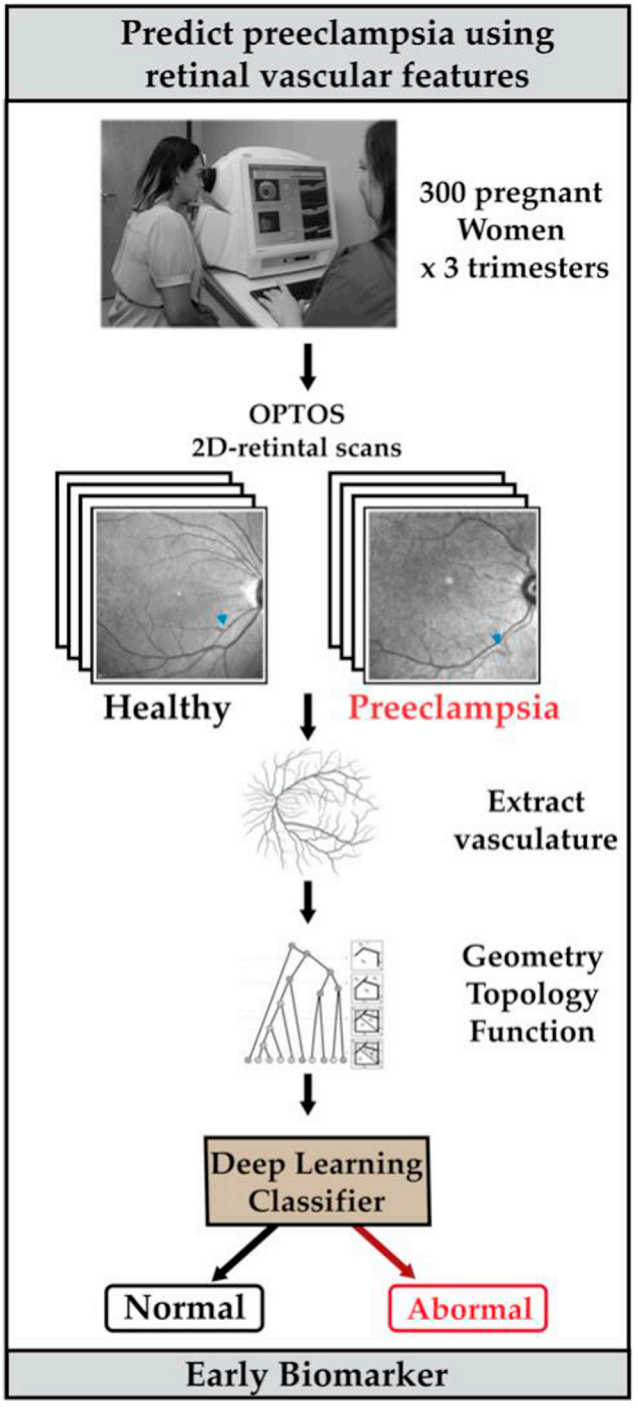
OBJECTIVE: Preeclampsia is one of the most severe pregnancy complications and a leading cause of maternal death. Notably, the initial vascular alterations leading to preeclampsia occur in the placenta and maternal vasculature well before symptoms develop. This observation is **key to novel diagnostics.** Here we evaluate, for the first time, changes in the retinal vasculature occurring prior to the patient becoming symptomatic and use an Artificial Intelligence (AI) framework to develop and test a vascularity based predictive algorithm.

STUDY DESIGN: Recent advancements in ocular imaging now provide high-resolution, cheap, and non-invasive imaging of the retina. Using the Optos Daytona machine, we collected retinal images from 300 pregnant women at 1st, 2nd and 3rd trimester visits. We further developed an AI framework, combining topological data analysis and deep learning termed DVT-Net (Deep Vascular Topology Network), suitable to characterize the topological and geometrical changes in the retinal vasculature to predict preeclampsia (Figure 1).

RESULTS: From the cohort of 300 pregnancies, 12 women were diagnosed with preeclampsia, 40 with gestational hypertension and 248 had neither. Using images from the first and second trimesters, our computational framework (DVT-Net) and a 10-fold cross validation, we achieved an accuracy of 0.813 (95% CI [0.76, 0.91]) in predicting the above-mentioned pregnancy-disorders.

CONCLUSION: Our approach provides a nuanced description of the retinal vasculature topology in normal and hypertensive pregnancies and serves as an accessible and sensitive imaging surrogate of placental vasculature changes. This may allow early prediction of preeclampsia and gestational hypertension.



1145 Postnatal growth trajectories of offspring exposed to maternal SARS-CoV-2 infection: a pandemic era cohort study

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OBJECTIVE: Prior birth cohorts have suggested an association between maternal infection in pregnancy and offspring risk for childhood obesity. The objective of this study is to determine whether *in utero* exposure to SARS-CoV-2 is associated with differences in offspring weight, length, BMI, systolic and diastolic blood pressure at 12 months of age.

STUDY DESIGN: This electronic health records-based cohort study included the live offspring of all individuals who delivered during the COVID-19 pandemic (March 1, 2020 - May 31, 2021) at any of 8 hospitals within the Mass General Brigham network. Exposure was defined as a positive SARS-CoV-2 PCR during pregnancy. Offspring weight, length, and BMI percentiles for age were determined using sex-specific WHO growth curves at birth and 12 months (+/- 30 days). Differences in mean offspring weight-for-age, length-for-age, and BMI-for-age percentiles and mean systolic and diastolic blood pressure (BP) between groups were compared at birth and 12 months (Welch's two sample t-test).

RESULTS: The study cohort included 18,323 pregnancies (17,446 unexposed and 877 exposed offspring). Maternal age, gestational age, public insurance, and diabetes were significantly different in SARS-CoV-2 positive pregnancies (Fig. 1A). At birth, weight-for-age percentiles were lower in exposed infants ($p< 0.001$, Fig. 1B); no difference was observed in mean length-for-age or BMI-for-age percentiles. At 12 months of age, mean BMI-for-age percentiles and weight-for-age percentiles were significantly higher in exposed vs. unexposed offspring ($p=0.005$ and $p=0.03$, respectively, Fig. 1B). No significant differences in mean systolic or diastolic BP were observed between groups at 12 months.

CONCLUSION: Altered growth patterns with lower weight-for-age percentiles at birth and higher weight- and BMI-for age percentiles at 12 months of age were observed in infants with in utero exposure to maternal SARS-CoV-2 infection. Larger cohorts and longer follow-up will be necessary to assess the clinical significance of these findings and evaluate risk across the lifespan.

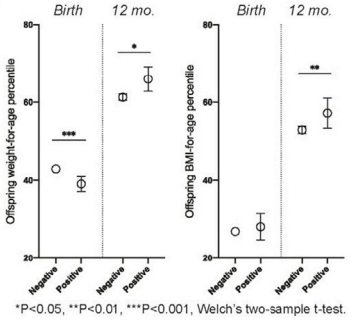
A

Cohort clinical/demographic characteristics

	SARS-CoV-2 negative	SARS-CoV-2 positive	P*
N	17,446	877	
Maternal age, yrs	33 (30, 36)	32 (28, 35)	<.001
Public insurance	3,162 (18%)	427 (48%)	<.001
Diabetes	2,424 (14%)	149 (17%)	0.01
Hypertensive disorder	3,132 (18%)	166 (19%)	0.5
Gestational age, wks	39 (38, 40)	39 (37, 40)	<.001
Male sex	8,928 (51%)	457 (52%)	0.6

Median (IQR) and N (%). *Chi-square test.

B



*P<0.05, **P<0.01, ***P<0.001, Welch's two-sample t-test.

"Negative" and "Positive" reflect maternal SARS-CoV-2 PCR test result during pregnancy.

1146 Single-cell transcriptomic profiling of Hofbauer cells reveals varied baseline functions and cluster-specific responses to SARS-CoV-2

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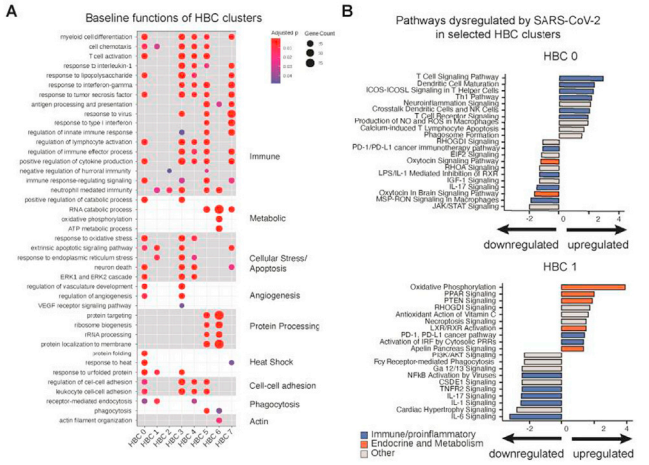
OBJECTIVE: Immune activation at the maternal-fetal interface has the potential to impact fetal development. Hofbauer cells (HBCs) are fetal placental macrophages that play diverse roles in placental immunity and homeostasis. To gain insight into the potential impact of

maternal SARS-CoV-2 infection on fetoplacental immunity, we examined HBC gene expression profiles.

STUDY DESIGN: We performed single-cell RNA sequencing (scRNA-seq, 10x Genomics) on placental macrophage suspensions from individuals with SARS-CoV-2 infection during pregnancy (N=4) and uninfected controls (N=8). Graph-based clustering was performed to identify cell types based on marker gene expression. To characterize unique functions of HBC clusters, Gene ontology (GO) pathway analysis of top marker genes was performed (log fold-change >0.25, Benjamini-Hochberg (BH) p< 0.05). Differentially expressed genes (DEGs) by SARS-CoV-2 status were identified (BH-p < 0.05), and Ingenuity Pathway Analysis (IPA) was used to predict signaling pathways dysregulated by SARS-CoV-2.

RESULTS: 31,719 high-quality cells were identified as macrophages. 8 HBC clusters were identified by expression of distinct marker genes; GO analysis of marker genes revealed variable enrichment in pathways involved in immune, metabolic, angiogenesis, and cellular stress responses by cluster (Fig. 1A). Number of DEGs by SARS-CoV-2 status was highest in clusters HBC0-3 and HBC5. IPA analysis of DEGs by SARS-CoV-2 reveals upregulation of pro-inflammatory responses and phagocytic pathways in two HBC clusters (0, 3) and downregulation in three (1, 2, 5). Pathways involved in T-cell communication are upregulated in HBC 0 in SARS-CoV-2, whereas in HBC 1, metabolic processes are upregulated and innate immune pathways are downregulated (Fig. 1B).

CONCLUSION: ScRNA-seq reveals varied gene programs in HBC subclusters at baseline and differences in response to maternal infection with SARS-CoV-2, with unique clusters engaged in both pro- and anti-inflammatory functions. These data can inform future studies of mechanisms underlying fetoplacental programming in response to maternal viral infection.



1147 The use of intrapartum ultrasound in operative vaginal delivery: a cohort study

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OBJECTIVE: Operative vaginal birth (OVB) is associated with higher maternal and perinatal morbidity. A safety bundle, including routine intrapartum ultrasound (IPUS), a structured time-out and procedural checklist, aims to improve accuracy of assessing fetal position, interdisciplinary communication and adherence to guidelines at OVB. We aim to compare deliveries where IPUS was and was not used during the safety bundle implementation period at Monash Health.

STUDY DESIGN: We performed a prospective cohort study of OVB and second-stage caesareans with a term singleton cephalic fetus at Monash Health. We compared deliveries when IPUS was and was not used. To control confounding by indication, we estimated propensity scores (PS) for the probability of using IPUS for each case and adjusted the effect estimates for the PS using multivariable logistic regression models. The primary outcome was neonates delivered in an unexpected position. Neonatal and maternal morbidity were also assessed.

RESULTS: There were 1077 second stage operative births from August 2022 to June 2023, of which IPUS was used in 432, and not used in 645. In deliveries where IPUS was used, there was more often fetal malposition (34% vs 23%, p< 0.001) and mid-cavity station (49% vs. 35%, p< 0.001), and greater use of the time-out (56 vs 37%, p< 0.001) and checklist (77% vs 56%, p< 0.001). IPUS was associated with more forceps (66% vs. 58%, adjusted OR [adjOR] 1.35, 95%CI 1.03-1.77, p = 0.028) and a trend to less vacuum births (25% vs. 33%, adjOR 0.75, 95%CI 0.56-1.00, p = 0.052). IPUS was associated with significantly less infants delivered in an unexpected position (0.2% vs. 2.2%, adjOR 0.09, 95% CI 0.01-0.70, p=0.021) and reduced composite neonatal morbidity including Apgar 5 min < 7, cord lactate >8mmol/L, need for resuscitation, birth trauma or neonatal intensive care unit admission (20.6% vs. 25.3%, adjOR 0.66 [95%CI 0.48-0.91], p = 0.011).

CONCLUSION: Use of IPUS as part of an OVB safety bundle was associated with less infants delivered in an unexpected position and reduced neonatal morbidity.

Table 1. Results

	Ultrasound (n = 432)	No Ultrasound (n = 645)	p value	Adjusted OR	95% CI	p value
Process outcomes						
Forceps birth	**286 (66.2)**	**371 (57.5)**	**0.005**	**1.35**	**[1.03;1.77]**	**0.028**
Vacuum birth	**107 (24.8)**	**210 (32.6)**	**0.007**	0.75	[0.56;1.00]	0.051
Second-stage caesarean section	39 (9.0)	64 (9.9)	0.701	0.86	[0.55;1.35]	0.518
Caesarean section without OVB attempt	29 (6.7)	52 (8.1)	0.481	0.89	[0.54;1.48]	0.664
Caesarean section following failed attempted OVB	10 (2.3)	12 (1.9)	0.767	0.65	[0.26;1.63]	0.363
Clinical outcomes						
Maternal outcomes						
Anal sphincter injury	20 (4.6)	35 (5.4)	0.659	0.81	[0.44;1.47]	0.484
Postpartum haemorrhage >1000ml	86 (19.9)	112 (17.4)	0.329	1.13	[0.81;1.58]	0.471
Blood transfusion	22 (5.1)	26 (4.0)	0.499	1.28	[0.69;2.39]	0.434
Neonatal outcomes						
Neonate delivered in unexpected position	**1 (0.2)**	**14 (2.2)**	**0.017**	**0.09**	**[0.01;0.70]**	**0.021**
Neonatal composite morbidity	**89 (20.6)**	**163 (25.3)**	**0.086**	**0.66**	**[0.48;0.91]**	**0.010**
5-minute Apgar <7	6 (1.4)	18 (2.8)	0.188	0.49	[0.18;1.31]	0.153
Cord lactate >8mmol/L	35 (9.7)	59 (11.4)	0.506	0.74	[0.46;1.19]	0.215
Need for resuscitation	55 (12.7)	103 (16.0)	0.166	0.69	[0.47;1.00]	0.051
Birth trauma*	5 (1.2)	15 (2.3)	0.244	0.46	[0.15;1.34]	0.154
Neonatal intensive care unit admission	10 (2.3)	20 (3.1)	0.562	0.81	[0.36;1.83]	0.607
Special care nursery admission	49 (11.3)	64 (9.9)	0.520	1.14	[0.75;1.74]	0.546
Shoulder dystocia	26 (6.0)	30 (4.7)	0.395	1.36	[0.76;2.41]	0.301
Need for oxygen resuscitation	30 (6.9)	57 (8.8)	0.316	0.76	[0.47;1.23]	0.265
Neonatal intubation	0 (0.0)	2 (0.3)	0.663			

Data are presented as mean (SD) or number of cases (%)
Operative vaginal birth (OVB); *Birth trauma includes significant cephalohematoma, facial laceration, fracture or nerve injury requiring neonatal admission to either special care nursery or neonatal intensive care unit.

1148 Politics v. Applicants: Effects of the Roe v. Wade overturn on prospective MFM fellowship applicants

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OBJECTIVE: The overturn of Roe v. Wade continues to have a dramatic effect on MFM clinical practices, especially in abortion restrictive states. We aimed to assess how the overturn of Roe v. Wade affected application decisions of prospective MFM fellowship applicants.

STUDY DESIGN: This is a cross-sectional survey distributed to prospective MFM fellowship applicants in the 2023 application cycle. A survey link was sent to US residency program directors to distribute to senior residents planning to apply into MFM in the 2023 application cycle and circulated electronically to all SMFM members in March 2023. The dual primary outcome was whether the overturn of Roe v. Wade affected the number and geographic distribution of MFM programs to which the applicants planned to apply. Secondary outcomes included applicants' desires to receive dilation and evacuation (D&E) training during MFM fellowship. In the past five years, 153 to 192 residents applied to MFM fellowship per cycle. Assuming a 60% response rate, we aimed to survey 100 prospective applicants. Anonymous survey data without participant identifiers was collected; thus a waiver of consent from our institution's IRB was obtained.

RESULTS: Among 37 responders, most identified as women (83.8%) and white (73.0%). The majority of survey participants were from the Midwest (41.7%) or the Northeast (36.1%). The majority of participants planned to apply to the same number of programs (64.9%), but 67.6% of participants planned to apply to fewer programs located in abortion-restrictive states and 97.3% of participants planned to apply to the same or more programs in abortion accessible states. A large majority of participants (86.5%) were interested in receiving D&E training during fellowship.

CONCLUSION: Though the low survey response rate introduces risk of selection bias, the overturn of Roe v. Wade has affected how prospective MFM fellowship applicants plan to apply. Given that most respondents desired D&E training during MFM fellowship, applicants may disproportionately avoid seeking training in abortion restrictive states.

Table 1: Survey responses

	N=37 (%)
Has the overturn of Roe affected how you are planning to apply into MFM fellowship?	
Yes	21 (56.8%)
No	12 (32.4%)
Unsure	4 (10.8%)
Overall, I plan to apply to:	
Fewer programs	6 (16.2%)
More programs	7 (18.9%)
The same number of programs	24 (64.9%)
When considering applying to fellowships in abortion restrictive states, I plan to apply to:	
Fewer programs	25 (67.6%)
More programs	1 (2.7%)
The same number of programs	11 (29.7%)
When considering applying to fellowships in abortion accessible states, I plan to apply to:	
Fewer programs	1 (2.7%)
More programs	18 (48.6%)
The same number of programs	18 (48.6%)
What types of abortion education/training have you received in residency (select all that apply):	
Medical management of abortion	36 (97.3%)
Manual vacuum aspiration	37 (100%)
Suction dilation & curettage	36 (97.3%)
Dilation & evaluation	33 (89.2%)
Are you interested in receiving dilation & evacuation training during your fellowship?	
Yes	32 (86.5%)
No	3 (8.1%)
Undecided	2 (5.4%)

1149 The Impact of Obstetric Risk Factors for Preterm Delivery among Women with Cervical Cerclage

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OBJECTIVE: Cervical cerclage is considered as an effective procedure for patients with cervical insufficiency. However, these patients still remain at a higher risk for preterm delivery. Several studies have attempted to ascertain predictors for preterm delivery among patients with cervical cerclage with mixed findings. We aimed to study the impact of obstetric risk factors for preterm delivery among women with cervical cerclage.

STUDY DESIGN: A population-based cohort study was performed including all patients with cervical cerclage. Deliveries occurred between the years 1991-2023 in a tertiary medical center. Multiple gestations and pregnancies with chromosomal abnormalities were excluded from the study. Diagnoses were pre-defined based on ICD-9 codes, as recorded in the hospital medical files. A multiple linear regression model was used to assess the impact of maternal characteristics as well as pregnancy complications on the length of pregnancy.

RESULTS: A total of 1416 deliveries following a pregnancy with cervical cerclage were included in the study. After univariate analysis, the following factors were found to be associated with preterm delivery in our study group**:** fetal growth restriction, placental abruption, nulliparity and advanced maternal age. Using a multiple linear regression model, with backward elimination, the impact of these variables on the length of pregnancy was assessed ($R^2 = 0.18$, $p < 0.001$). The mean gestational age at birth among patients ***without*** risk factors was 38.4 weeks. Placental abruption reduced gestational age by 7 weeks, chorioamnionitis reduced gestational age by 6.27 weeks, fetal growth restriction reduced gestational age by 1.2 weeks, nulliiparity reduced gestational age by 0.89 weeks, and maternal age over 35 years reduced gestational age by 0.21 weeks (Table).

CONCLUSION: Placental abruption, chorioamnionitis, fetal growth restriction, nulliiparity and maternal age over 35 years are independent risk factors for preterm delivery among patients with cervical cerclage.

The impact of obstetric risk factors and complications on the length of pregnancy among patients with cervical cerclage.

Characteristics	B (CI 95%)	SE	P Value
Maternal Age >35	-0.21	0.01	0.183
Ethnicity	-0.05	0.20	0.978
Nulliparity	-0.89	0.22	<0.001
Smoking	-0.21	0.63	0.738
Obesity	-0.35	0.55	0.516
Fertility Treatments	-0.06	0.28	0.814
Recurrent Pregnancy Loss	-0.01	0.18	0.918
Diabetes Mellitus	-0.52	0.26	0.843
Mild or Severe Preeclampsia	-0.21	0.47	0.612
Fetal Growth Restriction	-1.23	0.50	0.014
Placental Abruption	-7.01	0.84	<0.001
Chorioamnionitis	-6.27	0.48	< 0.001
Constant (No Risk Factor)	38.4	0.49	< 0.001

1150 Risk factors for preterm delivery in monochorionic diamniotic pregnancies undergoing selective cord occlusion

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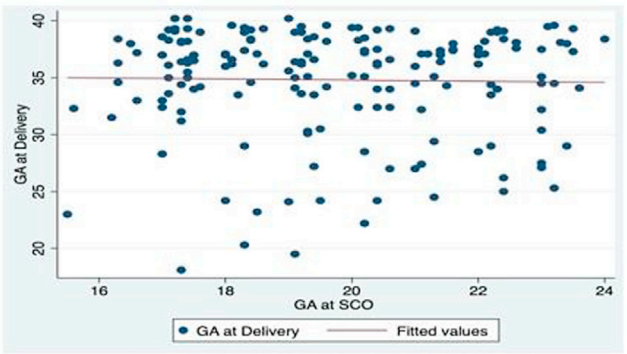
OBJECTIVE: To review risk factors for preterm delivery in a cohort of monochorionic diamniotic twin pregnancies undergoing selective cord occlusion (SCO) using radiofrequency ablation (RFA).

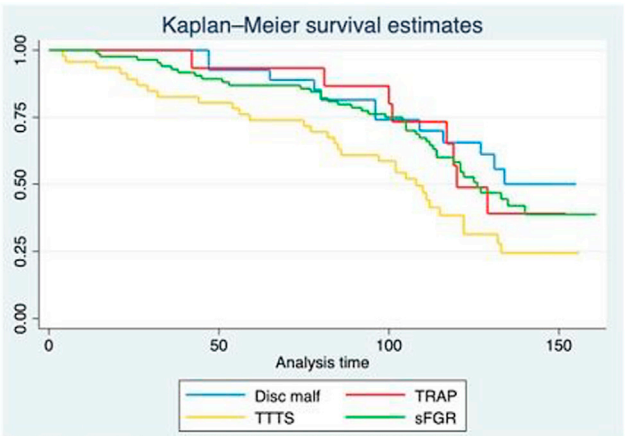
STUDY DESIGN: Single center retrospective analysis of complex monochorionic pregnancies managed with SCO via RFA between 2014-2022. The spontaneous preterm group was compared to the full-term delivery group. Correlation analysis between gestational age at SCO and gestational age at delivery was performed. Kaplan-Meier survival analysis was created for time to delivery between different diagnostic indications and log-rank test was performed.

RESULTS: Total live birth rate in the twin population undergoing RFA was 86% (160/186) with a median gestational age at delivery of 36.1 weeks. Total survivor to discharge rate was 82.3% (153/186). To evaluate risk factors for premature birth, pregnancies with dual demise within the first post-operative week and iatrogenic preterm deliveries were excluded. A total of 155 pregnancies were evaluated - 76 (49%) had spontaneous preterm delivery and 79 (51%) delivered full term. Preoperative variables were comparable in the two groups. A higher proportion of women undergoing RFA for TTTS had spontaneous preterm delivery (34.2% versus 19%, $p< 0.05$). Adding amnioreduction in conjunction with RFA did not increase the risk of preterm delivery (13.2% vs 10.1%). The rest of the operative variables did not influence the rates of premature delivery. Gestational age at procedure did not correlate with gestational age at delivery ($p=0.78$). Kaplan−Meier curves showed that the proportion of pregnancies remaining undelivered from the time of radiofrequency ablation until 37 weeks' gestation was lower for the indication of TTTS.

CONCLUSION: Most perioperative variables did not influence the rates of spontaneous premature delivery in the monochorionic twin population undergoing RFA. Preoperative indication of TTTS was associated with an increased risk of preterm birth, possibly suggesting the underlying diagnosis increasing risk for prematurity rather than the procedure.



Graph 1 Correlation analysis of gestational age at SCO and gestational age at delivery



Graph 2 Kaplan–Meier curves according to the types of indications, p=0.037

1151 Promoting Timely Treatment of Severe Hypertension with Live Visual Metric on Labor and Delivery

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OBJECTIVE: To assess if a live visual metric in common work areas would improve timely treatment of severe hypertension (sHTN) episodes, as defined by the Society for Maternal-Fetal Medicine's suggested sHTN quality metric.

STUDY DESIGN: This is a single institution prospective observational quality improvement study. The visual metric is a g-chart, converted to a 'scoreboard'-poster that displays (1) the number of consecutive days sHTN episodes were managed appropriately and (2) the best streak without metric failure. The AdaptX platform tracked these episodes. On March 9, 2023 the visual metric was displayed in the Labor and Delivery and Postpartum multidisciplinary team-rooms. The primary outcome was the rate of timely treatment of sHTN episodes, aiming to increase our success rate from 93% to 100% in the following five months post-implementation.

RESULTS: In the 23 months prior to implementation, from April 1, 2021 to March 8, 2023, there were a total of 535 sHTN episodes, 93.6% with successful timely treatment. This represented an average of 18 days between metric failures (+/- 22.4; upper control limit 189) and a median of 8 sHTN cases between failure events (IQR 10; upper control limit 51). In the five months after implementation of the visual metric, from March 9, 2023 to August 6, 2023, there were a total of 102 sHTN episodes, 99.0% with successful timely treatment.

Only one failure occurred in this time period, with a best streak of 104 consecutive days (74 consecutive cases) without metric failure. The poster continues to be regularly updated.

CONCLUSION: A low cost, live visual metric in common work areas appears to be a promising motivator for multi-disciplinary clinical performance to enhance patient safety. We hope to implement standing order sets that would improve timely treatment of sHTN episodes, assess staff attitudes after implementation of the visual metric and further analyze the location and time of day in which metric failures occurred.

Table 1.1 Baseline Characteristics

	Pre-Visual Metric Implementation (*n*=535) Mean (Range) or *n* (%)	Post-Visual Metric Implementation (*n*=102) Mean (Range) or n (%)
Age (years)	32.98 (17-53)	33.19 (19-48)
Gravidity	2.65 (1-15)	2.69 (1-7)
Parity	0.93 (0-10)	0.81 (0-5)
Maternal Race		
White/Caucasian	307 (57.38)	63 (61.76)
Asian	82 (15.33)	13 (12.75)
Black/African American	78 (14.58)	19 (18.63)
Unknown	50 (9.35)	7 (6.86)
American Indian/Alaskan Native	12 (2.24)	
Other	6 (1.12)	
Hispanic ethnicity	53 (9.91)	16 (15.69)

Table 1.2 Timely treatment of severe HTN episodes

	Pre-Visual Metric Implementation (*n*=535) *n* (%) or Mean (SD) or Median (IQR)	Post-Visual Metric Implementation (*n*=102) *n* (%)
Timely treatment of sHTN episode		
Yes	501 (93.6)	101 (99.0)
No	34 (6.4)	1 (1.0)
Average of days between metric failures	18 (+/- 22.4)	104*
Median of sHTN cases between metric failures	8 (10)	74‡

*Only one failure has occurred since the implementation of the visual metric (from March 9, 2023 to August 6, 2023) thus an average of days between metric failures unable to be calculated

‡Given only one failure has occurred since the implementation of the visual metric (March 9, 2023 to August 6, 2023) this represents the number of cases prior to the failure, a median of cases unable to be calculated

1152 Positive Carrier Screening for Alport Syndrome: A Need for Greater Awareness

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OBJECTIVE: Alport syndrome can be inherited as an autosomal recessive, dominant or X-linked condition. *COL4A3* and *COL4A4* genes are included in some carrier screening panels due to their association with autosomal recessive Alport syndrome. Carriers for pathogenic (P) or likely pathogenic (LP) variants in these genes have a frequency of approximately 1 in 279 and 1 in 332, respectively (Souter et al., Obstet Gynecol; In Press), and these individuals can also express symptoms, including hematuria and progressive renal disease. We present follow up data for pregnant people identified through carrier screening as carriers for P/LP variants in one of these two genes.

STUDY DESIGN: This retrospective observational study included follow-up of pregnant people (aged 18-55 years) identified as heterozygous for a P/LP variant in *COL4A3* or *COL4A4* through a 274 gene panel ordered from a US commercial laboratory (01/2020-09/2022). Pregnancy outcomes were requested from providers offices. Data were de-identified prior to analysis. Pre-pregnancy health, hematuria, specialist consults, and pregnancy complications were evaluated.

RESULTS: To date, outcomes are available for 76 pregnant people: 45 were heterozygous for a *COL4A3* variant and 31 for a *COL4A4* variant. Hematuria or a pre-pregnancy history of renal disease was present in 6.6% and pre-pregnancy hypertension was reported in 3.9%, but only a minority of patients with these symptoms had a nephrology referral. Preeclampsia in the most recent pregnancy was reported in 11.8%. Overall, 1 in 15 patients were referred to a nephrologist, 13 (17.1%) to maternal fetal medicine, and 23 (30.3%) were referred for comprehensive genetic counseling.

CONCLUSION: Our preliminary data showing low specialist referral rates suggest that the potential for developing Alport syndrome in people identified as carriers might not be widely recognized among obstetric professionals. The significance of symptoms such as hematuria might not be recognized and the opportunity for nephrology care and early intervention could be missed.

1153 Progression in AHA stage of hypertension and cardiovascular disease risk among ACOG-defined normotensive individuals

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OBJECTIVE: Antenatal and postpartum hypertension (HTN) are associated with long-term cardiovascular disease (CVD) risk. We aimed to analyze the prevalence of worsening blood pressure (BP) during low-risk pregnancies and implications for long-term CVD risk.

STUDY DESIGN: This retrospective study included singleton pregnancies and excluded those with CVD, diabetes, renal disease, chronic HTN as defined by ACOG, or using anti-HTN medication antenatally (AN: prior to gestation or < 20w gestation). Participants were categorized as Normal, Elevated, or Stage 1 HTN AN based on AHA guidelines, and again categorized postpartum (PP, measured at 6-12 months), with additional categories of Stage 2 HTN and use of anti-HTN medication. The exposure was persistent or worsening HTN (PWH), defined as unchanged not-normotensive category when comparing AN and PP BP, worsening in category of HTN when comparing AN and PP BP, or using an anti-HTN medication PP. The comparison group was those who remained normotensive or had improved BP PP. The primary outcome was prevalence of high lifetime CVD risk at 6-12 months PP. Prevalence of metabolic syndrome and 30-year CVD risk scores were also calculated. Outcomes were compared using chi-squared or Mann-Whitney U tests.

RESULTS: Of 485 participants, 186 (38.4%) had worsening AHA Stage of HTN at 6-12 months PP and 72 (14.8%) had persistently abnormal BP (Table), so that 53.2% of the cohort had the exposure of PWH. Those with PWH were more likely to have high BMI (28.8 [24.0-34.6] vs. 24.5 [21.9-28.5]; $p< 0.01$) and a HTN disorder of pregnancy (90.7% vs. 64.8%; $p< 0.01$). Participants with PWH were more likely to have high lifetime risk of CVD (79.3% vs. 37.8%; $p< 0.01$). Participants with PWH had higher prevalence of metabolic syndrome and higher 30-year CVD risk scores (Table).

CONCLUSION: Blood pressure worsened in a high fraction of participants after "low-risk" pregnancies: more than a third progressed in AHA Stage of HTN. Those with persistently abnormal or worsening BP at 6-12 months PP are at significantly elevated risk of long-term CVD and may benefit from targeted postpartum follow-up.

Table: Progression in AHA Stage of HTN from antenatal (pre-gestation or <20w gestation) to postpartum (6-12 months postpartum) and long-term risk of cardiovascular disease

Antenatal Blood Pressure (Pre-gestation or <20 weeks GA) ↓ / Postpartum Blood Pressure (6-12 months postpartum) →	Normal SBP <120 and DBP <80	Elevated SBP 120-129 and DBP <80	Stage 1 HTN SBP 130-139 or DBP 80-89	Stage 2 HTN SBP ≥140 or DBP ≥90	Antihypertensive Medication
Normal SBP <120 and DBP <80	157	11	53	26	10
Elevated SBP 120-129 and DBP <80	41	9	30	14	3
Stage 1 HTN SBP 130-139 or DBP 80-89	29	6	57	32	7

1	Improved: abnormal stage antenatal, normotensive postpartum	70 (14.4%)
2	Normal: normotensive antenatal, normotensive postpartum	157 (32.4%)
3	Persistent: abnormal stage antenatal, unchanged stage postpartum	72 (14.8%)
4	Worsening: increased by one or more AHA category postpartum	186 (38.4%)

	Blood Pressure Change from Antenatal (pre-gestation to <20w GA) to Postpartum (6-12 months postpartum)		
	Normal or Improved N=227	Persistent or Worsening N=258	P-Value
30-y CVD risk based on lipids at 6-12 months postpartum, median (IQR)	5.0 [3.0-7.0]	8.0 [6.0-12.0]	<0.001
≥10	17 (8.0)	84 (35.0)	
<10	196 (92.0)	156 (65.0)	<0.001
Unknown	14	18	
30-y CVD risk based on BMI at 6-12 months postpartum, median (IQR)	6.0 [4.0-8.0]	9.0 [7.0-14.0]	<0.001
≥10	35 (15.8)	124 (49.0)	
<10	187 (84.2)	129 (51.0)	<0.001
Unknown	5	3	
Metabolic syndrome at 6-12 months postpartum			
Yes	15 (7.2)	82 (34.5)	<0.001
No	194 (92.8)	156 (65.5)	
Unknown	18	20	
Lifetime risk of CVD, calculated at 6-12 months postpartum			
High	79 (37.8)	184 (79.3)	<0.001
Low	130 (62.2)	48 (20.7)	
Unknown	18	26	

1154 Prenatal Vitamins: An Analysis of Most Common Ingredients and Cost

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OBJECTIVE: Prenatal vitamins are a multi-million-dollar industry and are recommended for every pregnancy. However, ingredients, dosages, and costs vary widely. This study identifies the most common active ingredients and cost range in popular prenatal vitamins in order to evaluate if common over-the-counter prenatal vitamins meet the America College of Obstetricians and Gynecologists (ACOG) vitamin and mineral recommendations during pregnancy.

STUDY DESIGN: The Amazon July 2023 best-seller list for prenatal vitamins was analyzed. The top 50 products were reviewed. The ingredient list and cost per serving was collected for each prenatal vitamin and these ingredients were compared against the ACOG vitamin and mineral recommendations. Descriptive statistics were used to analyze the data.

RESULTS: 48 prenatal vitamins were included with 58 different active ingredients. The top 5 most common were**:** Vitamin D (94%), Vitamin B6 (94%), Vitamin C (92%), Vitamin E (92%), and Vitamin B12 (92%). Folate and Iron were contained in 89% and 75%, respectively. 44% of prenatal vitamins contained all ingredients recommended by ACOG and only 31% contained all the vitamins and minerals in the recommended dosages. The prices ranged from 0.11-2.98$ per-serving.

CONCLUSION: While they are many prenatal vitamins that contain a wide variety of supplements, only about 1/3 of the top 50 prenatal vitamins listed on Amazon contained the recommended vitamins and minerals at recommended doses in accordance with the ACOG recommendations. Furthermore, some of the most well-studied prenatal ingredients including folate and iron were only contained in 10 and 25% of the most common prenatal vitamins, respectively. In a time when many patients utilize online shopping for their basic needs, including prenatal vitamins, practitioners need to be aware that not all prenatal vitamins are created equally. Moreover, there is a wide range of costs per serving associated with prenatal vitamins with no correlation between cost and recommended ingredients or dosages. Practitioners should educate themselves on common vitamins with the recommended dosages.

1155 Prenatal evaluation of fetal abdominal calcifications in the age of advanced sonographic and genetic screening

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OBJECTIVE: The advent of maternal cell free DNA (cfDNA) screening has led to early detection of fetuses with chromosomal abnormalities. Similarly, prenatal ultrasound technique and equipment have advanced leading to increased detection of soft markers of aneuploidy such as abdominal calcifications (AC). The purpose of our study was to assess neonatal outcomes after detection of fetal ACs.

STUDY DESIGN: This is a retrospective case series of patients diagnosed with fetal abdominal calcifications at a single center between 2016 and 2023. A query was created within our ultrasound software (Viewpoint 2.0). Presence, location, number and size of ACs, presence of other soft markers and abnormalities were collected. Chart review was used to determine gestational age (GA) of diagnosis, maternal demographics, viral serologies, genetic/ carrier screening and pregnancy outcomes.

RESULTS: 130 patients had fetal ACs. Prenatal detection of ACs increased steadily within the study period. 73.5% of patients had low risk cfDNA screening, 6.1% had abnormal cfDNA with increased risk of Trisomy 21 and 20.9% of patients opted out of screening. All genetic screening results were known at the time of identification of ACs. Table 1 shows evaluation and outcomes of ACs based on genetic testing. 120 patients (92%) had extrahepatic ACs in the left upper quadrant adjacent to the stomach with other locations including intrahepatic and gastric foci. Patients who had low risk cfDNA underwent the same evaluation (maternal fetal medicine consultation, viral serologies, cystic fibrosis testing and further ultrasounds) as those that did not have testing completed. 95.7% of all patients underwent follow up ultrasound which showed either stable or resolved ACs. The mean GA of delivery was 38 6/7 weeks with mean birthweight and 1 and 5 minute APGAR scores of 2973 gm and 8/8.86 respectively. No neonates in our series had follow up imaging of prenatally diagnosed ACs by 1 month or 1 year of life.

CONCLUSION: Ultrasound identification of fetal ACs resulted in increased testing and follow-up without clinically relevant abnormalities in any infants.

Table 1: Pregnancy related evaluation and outcomes of abdominal calcification based on genetic testing

	cfDNA not completed (n=29)	Low Risk cfDNA (n=98)
	%, (n)	%, (n)
Nulliparous	33.3 (10)	35.7 (35)
Multiparous	66.67 (20)	63.3 (62)
Type of Scan		
Detailed	75.8 (22)	79.6 (78)
Routine Anatomy	24.1 (6)	1.1 (1)
Follow Up	100 (29)	19.3 (18)
Location of Abdominal Calcifications		
Extrahepatic	79.3 (23)	95.9 (94)
Other	20.6 (6)	4.1 (4)
Ultrasound findings		
No other ultrasound findings	65.5 (19)	80.6(79)
Minor abnormalities (EIF, CP Cyst)	24.1 (7)	18.4(18)
Major abnormalities	10.3 (3)	1.0 (1)
MFM Consultation	86.2 (25)	77.6 (76)
Invasive Genetic Testing (amniocentesis)	6.8 (2)	4.1(4)
Serology		
Toxoplasmosis	13.8 (4)	15.3 (15)
Parvovirus	20.6 (6)	34.7 (34)
CMV	41.3 (12)	43.9 (43)
Cystic Fibrosis Testing	20.7 (6)	38.8 (38)
Pregnancy Outcomes		
Pre-eclampsia	6.9 (2)	14.3 (14)
Preterm delivery	3.4 (1)	16.3 (16)
Fetal Growth Restriction	17.2 (5)	5.1 (5)
NICU admission	0	9
Neonatal Follow Up at 1 month	0	0
Neonatal Follow Up at 1 year	0	0

1156 Preeclamptic or History-of-COVID-19 CD4+ T Cells Contribute to Hypertension, Neurovascular Dysfunction Postpartum and in Offspring

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OBJECTIVE: Preeclampsia (PE), new hypertension (HTN) in pregnancy, and COVID-19 infection (CV Hx) are associated with activated CD4+ T cells and neurological dysfunction. We examined the contribution of CD4+ T cells from PE and CV Hx to PE phenotype, maternal neurovascular function, fetal growth, and offspring cognitive function.

STUDY DESIGN: One million placental CD4+ T cells from PE and normotensive (NT) patients with or without CV Hx in pregnancy were injected i.p. into nude athymic rats on gestational day (GD) 12. Memory navigation errors were assessed by Barnes maze and novel object recognition on GD 19 and 12 weeks postpartum (PP) in dams and offspring, and cerebral blood flow (CBF) was measured by Doppler flowmetry. A two-way ANOVA was used for statistical analysis.

RESULTS: MAP (mmHg) increased in PE CV Hx (113±2, n=8) and PE (115±2, n=10) compared to NT CV Hx (104±4, n=7) and NT (98±2, n=7 $p< 0.05$) during pregnancy and remained increased 12 weeks PP in PE CV Hx (111±4, n=4) and PE (115±2, n=5) compared to NT CV Hx (100±4, n=5) and NT (99±3, n=4 $p< 0.05$). PE groups exhibited short term memory dysfunction and greater latency ($P< 0.05$) with more errors in the maze compared to NT groups as well as impaired CBF autoregulation at 3 months PP. No differences in weight, MAP, or latency at age 3 months were observed among the offspring groups. CV Hx offspring had more errors in the Barnes maze compared to offspring of PE and NT without CV Hx.

CONCLUSION: CD4+ T cells from PE with or without CV Hx in pregnancy cause HTN, impaired CBF autoregulation, and cognitive dysfunction during pregnancy and PP in recipients compared to recipients of NT CD4 + T cells. CD4+ T cells from either CV Hx group results in cognitive dysfunction in offspring. This data corroborates the important role of CD4+ T cells in development of long-term sequalae from HTN, including impaired maternal neurological function in pregnancy and PP and cognitive decline in her offspring.

1157 Placental lipid content is associated with neonatal adiposity independent of maternal obesity

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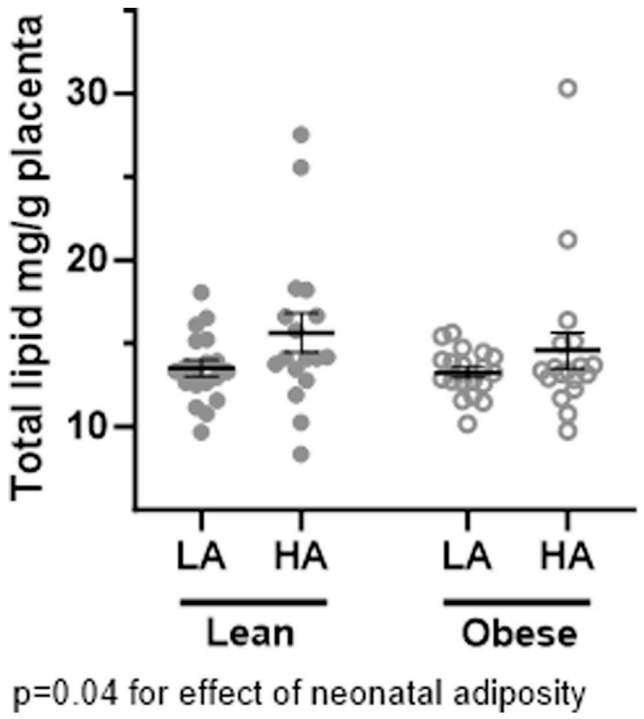
OBJECTIVE: Research has shown that placental lipid metabolism is altered in obese patients and that neonates exposed to obesity *in utero* have higher adiposity at birth on average. However, lean patients may also have infants with high adiposity, suggesting that other factors may modulate this relationship. The objective of this study was to examine the relationship between placental lipid composition and neonatal adiposity in patients with and without obesity.

STUDY DESIGN: Placental samples (N=77) were collected from healthy participants delivered via scheduled cesarean at term and grouped by maternal pre-pregnancy body mass index (BMI) (lean (LE), BMI 18 – 24.9 kg/m^2 vs. obese (OB), BMI 30-40 kg/m^2) and then by tertiles of % body fat at birth measured by skinfold (low adiposity (LA), 1st tertile vs. high adiposity (HA), 3rd tertile) resulting in 4 groups**:** LELA, LEHA, OBLA, OBHA. Total lipids were extracted from the placenta using the Folch method. Placental lipids were separated into lipid species using thin layer chromatography. The effect of maternal obesity and neonatal adiposity on placental lipid composition was analyzed using 2-way ANOVA.

RESULTS: High neonatal adiposity was associated with increased total placental lipid content (p=0.04), cholesterol ester (p=0.015), total phospholipid (p=0.019), and triglyceride (p=0.02), independent of maternal obesity. Maternal obesity had no significant effect on placental lipid content when neonatal adiposity was accounted for, and no interaction between the two variables was detected. No differences in free cholesterol or free fatty acid content was detectable between groups.

CONCLUSION: High total placenta lipid content was associated with high neonatal adiposity at birth, but not to maternal obesity. Esterified lipid species comprised the main differences between groups, whereas no differences were seen among non-esterified lipids. These findings suggest that placental lipid metabolism may modulate fetal fat accrual independent of maternal BMI.



1158 The placental drainage effect on quantitative blood loss after vaginal delivery in an urban population

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OBJECTIVE: Postpartum hemorrhage (PPH) is the leading cause of maternal morbidity and mortality. Placental cord drainage (PCD) is the unclamping of the umbilical cord to allow drainage of blood from the placenta, intended to minimize PPH. This technique has been studied predominantly among healthy patients, so this trial was designed to investigate the effect of PCD in a high-risk population.

STUDY DESIGN: We conducted a randomized controlled trial examining the impact of PCD prior to placental delivery on quantitative blood loss (QBL) in women ages 18 to 45 undergoing term vaginal delivery at a safety-net, county hospital in Memphis, TN. Women were randomly assigned to one of two groups: 1. PCD prior to placental delivery and 2. Immediate delivery of the placenta. Two-sided t testing and Mann Whitney U testing were used to compare QBL, change in hematocrit, and duration of third stage of labor, as appropriate. Analyses were performed on Stata version 16.1 (StataCorp, College Station, Texas).

RESULTS: Between January 2022 and January 2023, 49 total patients met inclusion criteria. 88.6% of participants identified as Black, and 79.2% of participants were enrolled in Medicaid insurance plans. The average body mass index was 34.1. The average gestational age at delivery was 39.0 weeks. There was no significant difference in baseline characteristics between groups ($p > 0.05$ for all comparisons). At time of delivery, 21 (42.9%) patients underwent placental drainage and 28 (57.1%) did not. The average QBL was 273.3 mL in group 1 and 377.8 in group 2 ($p=0.01$). The average percent change in hematocrit before and after delivery was -3.2% in group 1 versus -3.5% in group 2 ($p=0.71$). There was no significant change in the average duration of the third stage of labor (5.8 minutes in group 1 versus 7.4 minutes in group 2; $p=0.95$).

CONCLUSION: PCD is a low cost, simple intervention that may be utilized to reduce average QBL after a vaginal delivery in high-risk populations.

Table 1: Delivery outcomes in patients with placental drainage versus no placental drainage

	Group A: Placental Drainage: Mean (SE), N=21	Group B: No Placental Drainage: Mean (SE), N=28	Mean Difference (SD)	95% CI	P value
Average % change in hematocrit	3.2 (0.6)	3.5 (0.5)	3.4 (2.7)	(2.62-4.20)	0.71
Average QBL (mL)	273.3 (30.0)	377.8 (32.0)	333.3 (23.3)		**0.01**
Average duration of third stage of labor (minutes)	5.8 (0.34)	7.4 (1.4)	6.6 (0.8)	(5.04- 8.21)	0.95
Blood loss >1000 mL	0 (0)	0 (0)			n/a
Blood loss >500 mL	1 (5.3)	3 (11.1)			0.49
Use of uterotonics	11 (57.9)	13 (48.2)			0.52
Post-delivery transfusion	2 (10.0)	1 (4.2)			0.58
Retained placenta after 30 minutes	0 (0)	1 (4.0)			1.00

1159 Reducing blood transfusion administration by introducing a structured intravenous iron protocol for maternal postpartum anemia

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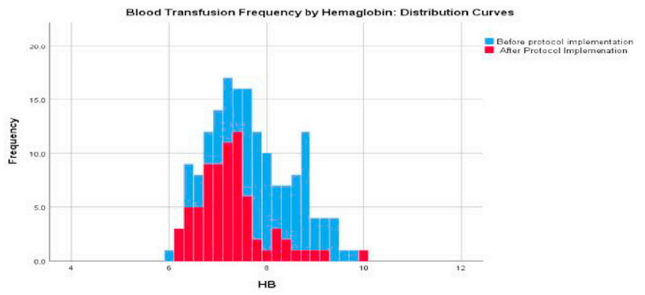
OBJECTIVE: To investigate the effect of implementation of an institutional protocol targeting postpartum anemia with intravenous iron sucrose infusion (Venofer), on the use of red blood cell transfusions (RBCT).

STUDY DESIGN: A detailed structured protocol for managing maternal anemia was introduced starting July 2021 in a single tertiary center based on different hemoglobin (Hb) concentrations, symptoms, and vital signs. The protocol aimed to educate and encourage the routine use of Venofer instead of RBCT in patients with Hb concentrations between 7-10 g/dL.

A comparative analysis was conducted across two distinct time frames: the year preceding the protocol implementation (July 2020 to June 2021), a transitional period (which was excluded from analysis), and the year of protocol implementation (January 2022 to December 2022). All maternal cases that underwent RBCT were enrolled in the study.

RESULTS: Over the course of 24 months in this study, a total of 94 women underwent RBCT prior to the introduction of the protocol, with this number decreasing to 73 after protocol implementation. A comparative analysis between women who received RBCT prior to and following protocol implementation, revealed that the proportion of women receiving RBCT for Hb levels between 8-10 g/dl, dropped from 41.5% to 13.7%. The average Hb for initiating RBCT was lowered from 7.9 to 7.2 following the introduction of the protocol ($pv< .001$). Moreover, there was a significant decrease in RBCT use in each Hb concentration separately (Figure 1). Furthermore, after adjusting for the difference in the number of deliveries during each study period, there was a notable 41% reduction in the utilization of RBCT in the year after protocol implementation, yielding an odds ratio of 0.59 [CI: 0.44-0.79] of receiving RBCT.

CONCLUSION: The implementation of a simple management protocol targeting postpartum anemia using Venofer was associated with a significant 41% decrease in the utilization of RBCT in our center.



1160 The impact of 'low sugar diet' on amniotic fluid index in patients with idiopathic polyhydramnios

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OBJECTIVE: Polyhydramnios is involved in approximately 2% of pregnancies. The leading known cause is gestational diabetes, and a strict diet resolved the problem in most cases. However, in about 60% of the patients, the cause is not identified. The aim of the study is to evaluate the influence of a low simple carbohydrate, high vegetable and fiber diet consumption on the amniotic fluid index (AFI) in women with idiopathic polyhydramnios.

STUDY DESIGN: A total of 50 pregnant women were randomly divided into two groups. The intervention group received dietary recommendations aimed at promoting a healthy diet, including a low simple carbohydrate and high vegetable and fiber diet. The control group was given a normal diet for pregnant women. The AFI was measured after two weeks blindly by a different sonographer. The primary outcome was the AFI measured two weeks after the implementation. Maternal and neonatal outcomes were compared as secondary outcomes.

RESULTS: AFI decreased on average by 18.4% and 4.8%, respectively, in favor of the intervention group (p-value=0.003). A statistically significant difference was found between the two groups when measured after two weeks (22.7 cm and 25.9 cm, respectively) (table 1). A significant decrease of 6.7% was shown in neonatal weight at birth in the intervention group. In 15 of 22 patients in the study group, AFI returned to normal after 2 weeks, a reduction from 27 cm at enrollment in the study, to an average of 20 cm (a decrease of 25.7% in AFI). No difference was seen in maternal or neonatal outcomes.

CONCLUSION: 'Idiopathic Polyhydramnios' in most cases is due to high sugar levels in the blood of pregnant women and can be treated by a proper diet of complex carbohydrates, vegetables, and fruits and a reduction in free sugar. We offer a therapeutic alternative without any danger or potential harm and with a positive effect for the pregnant woman and the newborn.

Table 1

	Control group [n=25]	Study group [n=22]	P_value
The reduction in AFI between 2 measurements (%)	4.8%	18.4%	**0.0026**
Average of first AFI measurement (cm)	27.3	27.9	0.539
Average of second AFI measurement (cm)	25.9	22.7	**0.022**
Gestational week on first measurement	31.6	30.4	0.281
Gestational week on second measurement	34.3	32.7	0.124

1161 Prostaglandin administration and cesarean for non-reassuring fetal status in preterm induction of labor

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OBJECTIVE: The primary objective was to estimate the association between prostaglandin administration in preterm labor induction and cesarean for non-reassuring fetal status. An *a priori* secondary aim was to assess this association in the subgroup of preterm patients with fetal growth restriction (FGR).

STUDY DESIGN: This was a retrospective cohort study using the NICHD Consortium for Safe Labor (CSL) database. Only patients undergoing preterm labor induction were included for analysis. The exposure was prostaglandin E as an induction agent. The primary outcome was cesarean performed for non-reassuring fetal status. Secondary outcomes included rate of cesarean for all indications as well as specified maternal and neonatal adverse outcomes. We used unadjusted and multivariable analyses to estimate the independent effect of prostaglandins on the primary outcome. Multiple imputation was performed to address missing data for maternal body mass index.

RESULTS: Among 228,438 patients in the CSL cohort, 4789 patients underwent preterm labor induction and 833 (17%) of these received prostaglandins. After adjusting for confounding variables, rate of cesarean for non-reassuring fetal status was increased nearly 75% in the prostaglandin-exposed population and the cesarean rate for all indications more than doubled (Table 1). Prostaglandin-exposed patients had lower rates of chorioamnionitis (1.7% v. 4.0%, $p < 0.0001$). Neonates in the prostaglandin-exposed group had longer NICU admissions (22.65±21.71 days v. 17.16±22.16 days, p=0.0003) but lower rates of sepsis (4.0% v. 6.1%, p=0.017). In comparison to the total cohort, the FGR subcohort had increased risk for cesarean for non-reassuring fetal status but not for cesarean for other indications.

CONCLUSION: Prostaglandin administration in preterm induction of labor is associated with increased rate of cesarean for non-reassuring fetal status as well as for cesarean overall. The association between prostaglandin use and cesarean for non-reassuring fetal status is amplified in preterm pregnancies complicated by FGR.

Table 1. Outcome of Cesarean for Preterm IOL

	PG Exposure	Non-PG Exposure	aOR	CI
Preterm birth cohort	**N = 833**	**N = 3956**		
Cesarean for NRFS	130 (15.6)	335 (8.5)	1.73	1.38-2.17
Cesarean for any indication	340 (40.8)	853 (21.6)	2.35	2.00-2.77
Fetal growth restriction subcohort	**N = 52**	**N = 224**		
Cesarean for NRFS	17 (32.7)	44 (19.6)	2.31	1.16-4.64
Cesarean for any indication	21 (40.4)	71 (31.7)	1.54	0.81-2.94

1162 Prenatal predictors of survival in isolated congenital diaphragmatic hernia undergoing expectant management

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OBJECTIVE: To investigate prenatal predictors of survival to hospital discharge in fetuses with isolated congenital diaphragmatic hernia (CDH) undergoing prenatal expectant management.

STUDY DESIGN: We performed a systematic review and meta-analysis on prenatal diagnostic tests in fetuses with isolated CDH undergoing expectant management. Cases undergoing FETO were excluded. Primary outcome was survival to hospital discharge. Subgroup analysis was performed according to the side of CDH when feasible. Pooled effect sizes were presented using mean difference (MD) or odds ratio (OR), using the Mantel-Haenszel test, with 95% confidence interval (CI) for continuous and categorical variables, respectively.

RESULTS: A total of 161 full text articles were assed for eligibility between 2000 and 2023. Forty-five studies encompassing 3977 isolated CDH were included. Pooled proportion for survival was 71.2%, (95% CI 69.8%-72.6%). Index tests that were significantly associated with survival included**:** 1) Total fetal lung volume (TFLV) (MD 13.42, 95% CI 11.22, 15.62), 2) o/e TFLV < 30% (OR 0.09 , 95% CI 0.05, 0.17), 3) o/e TFLV (MD 14.73, 95% CI 11.62,17.84, I2 46%), 4) Liver intra-thoracic ratio (LiTR) (MD 9.59, 95% CI -15.73,-3.46), 5) o/e LHR (MD 14.03, 95% CI 12.69, 15.36), 6) o/e LHR < 25% (OR 0.07, 95% CI 0.04, 0.13), 7) Mediastinal shift angle (MD -6.17, 95% CI -7.70,-4.64), 8) Stomach position in mid-chest (OR 0.14, 95% CI 0.06, 0.36), and 9) intrathoracic liver (OR 0.23, 95% CI 0.15, 0.35), subgroup analysis to the left side remained significant in all the aforementioned tests.

CONCLUSION: In fetuses with CDH, fetal lung size measurements by ultrasound including LHR cut-off of 25% or MRI including TFLV cut-off of 30%, and liver herniation are good predictors for survival in isolated CDH.

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Table : Proposed predictors of survival until hospital discharge in fetuses with congenital diaphragmatic hernia

Variable	CDH type	Number of studies	Survival N/total N	Non-survival N/total N	OR or MD (95% CI)	I^2	P
Mean TFLV	Mixed	6[21,68,75,77,78,92,99,105]	358	117	13.42 (11.22,15.62)	50%	<0.00001
	Left	2[77,105]	89	32	13.53 (9.58,17.48)	0%	<0.00001
o/e TFLV<30%	Mixed	12[16,21,68,78,80,82,85,88,96,103,106,115]	82/502	146/267	0.09 (0.05,0.17)	46%	<0.00001
	Left	4[21,80,102,115]	16/197	55/80	0.03 (0.01,0.07)	0%	<0.00001
Mean o/e TFLV	Mixed	13[17,81,82,85,87,89,90,96,100,106,107,110,115]	571	219	14.73 (11.62,17.84)	49%	<0.00001
	Left	4[80,107,110,115]	126	55	11.50 (7.88,15.11)	0%	<0.00001
Mean LiTR	Mixed	3[85,90,106]	79	27	-9.59 (-15.73,-3.46)	0%	0.002
Mean o/e LHR	Mixed	20[14,19,21,21,69,70,72,80,82,84,90,91,95,100,102,106-108,112,115]	1369	560	14.03 (12.69,15.36)	99%	<0.00001
	Left	6[16,70,104,107,108,115]	547	140	14.21 (12.09,16.32)	0%	<0.00001
o/e LHR<25%	Mixed	12[69,80,82,88,90,96,98,100,102,103,111,114]	13/539	129/439	0.07 (0.04,0.13)	0%	<0.00001
	Left	4[80,102,103,114]	4/160	67/143	0.04 (0.01,0.11)	0%	<0.00001
Mean LHR	Mixed	7[95,84,91,95,96,106,114]	381	146	0.57 (0.44,0.69)	0%	<0.00001
	Left	2[95,114]	108	28	0.74 (-0.46,1.94)	62%	0.22
LHR<1	Mixed	5[76,79,86,94,96]	49/192	120/179	0.29 (0.09,0.76)	68%	0.01
	Left	2[86,93]	11/17	19/25	0.55 (0.14,2.20)	0%	0.40
Mean percentage herniated liver	Mixed	2[66,83]	72	89	-2.12 (-13.95,9.70)	0%	0.72
Mean MSA	Left	5[104,105,107,112,114]	204	57	-6.17 (-7.70,-4.64)	0%	<0.00001
Stomach in mid chest	Mixed	3[69,70,116]	212/371	61/103	0.14 (0.06,0.36)	0%	<0.0001
	Left	2[70,116]	211/332	60/64	0.12 (0.04,0.33)	0%	<0.0001
Mean PPLV	Mixed	3[77,89,115]	91	33	7.86 (3.71,12.02)	67%	0.0002
	Left	2[89,115]	80	30	6.30 (1.47,11.13)	73%	0.01
Liver up	Mixed	20[10,69,75-77,79-81,83,94-96,99,101,102,104,112,116]	463/1242	470/634	0.23 (0.15,0.35)	61%	<0.00001
	Left	8[79,80,84,89,102,113,116]	214/492	187/237	0.21 (0.14,0.32)	0%	<0.00001
GA at delivery	Mixed	23[66,69,70,72,75,80,83,85,86,89,90,94-96,99,102,106,107,109,113,115,115,116]	1516	696	0.66 (0.19,1.12)	87%	0.006

OR: odds ratio, MD: mean difference LHR: lung to head ratio, TFLV: total fetal lung volume, MSA: mediastinal shift angle, LiTR: liver thoracic volume ratio, PPLV: percent predicted lung volume, GA: gestational age

1163 Maternal and neonatal outcomes with severely elevated 1-hour glucose challenge test

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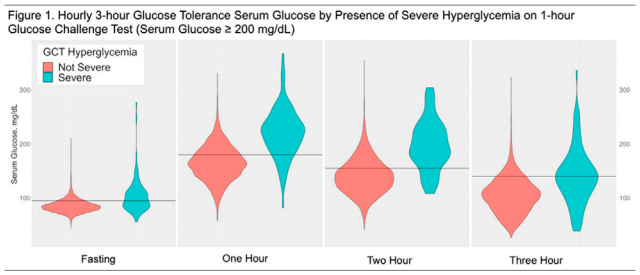
OBJECTIVE: Strategies to diagnose gestational diabetes mellitus (GDM) remain contentious. Severe hyperglycemia (≥ 200 mg/dL) on a 1-hour glucose challenge test (GCT) is associated with high risk for failed 3-hour glucose tolerance test (GTT). We compare perinatal outcomes for those managed as GDM by severe hyperglycemia on GCT alone to those diagnosed by full two-step assessment.

STUDY DESIGN: We performed a retrospective cohort study of pregnant patients with late second or early third trimester GCT > 140 mg/dL in a large healthcare system from 2016-2021. Those with pregestational diabetes, early GDM diagnosis, higher order multiples, preexisting cardiac or renal disease, chronic steroid use, and serious fetal anomalies were excluded. Patients managed as GDM based on severe hyperglycemia by GCT alone were compared to those diagnosed by two-step Carpenter-Coustan criteria. The primary outcome was a composite of primary cesarean delivery, macrosomia, shoulder dystocia, neonatal hypoglycemia, or neonatal hyperbilirubinemia. T-test and X^2 analyses compared outcomes.

RESULTS: Among 4415 positive GCT, 296 (7%) had GCT ≥ 200 mg/dL. Of those with severe hyperglycemia, 205 (69%) were managed empirically as GDM, while 91 underwent GTT. Severe hyperglycemia on GCT was associated with 12-fold increased odds of failed GTT (82% vs 18%, OR 12.0, 95% CI 6.9-20.6); such patients more likely to have blood glucose > 300 mg/dL during GTT (figure 1). Patients managed as GDM by severe hyperglycemia on GCT alone had increased body mass index (33 vs 29 kg/m^2, p< 0.001). The primary outcome was similar between groups (30% vs 33%, OR 0.9, 95% CI 0.6-1.2). Compared to GDM patients diagnosed by two-step, those diagnosed by GCT alone had higher incidence of GDM A2 (24% vs 8%, OR 3.6, 95% CI 2.5-5.2) and were more likely to deliver preterm (27% vs 14%, OR 2.25, 95% CI 1.61-3.15).

CONCLUSION: Severe hyperglycemia on GCT is associated with low likelihood of normal GTT and increased risk for GTT serum glucose > 300 mg/dL. With similar outcomes via either diagnostic method, empiric treatment based on the GCT alone seems reasonable.



1164 The Impact of an Independent, Academic Midwifery Practice on Labor and Delivery Unit Culture

Marika Toscano[1], Stefanie J. Hollenbach[2], Heather Lane[3], Helene Thompson-Scott[3], Megan Hogan-Roy[3], Clare Lennon[3], Eva K. Pressman[3]

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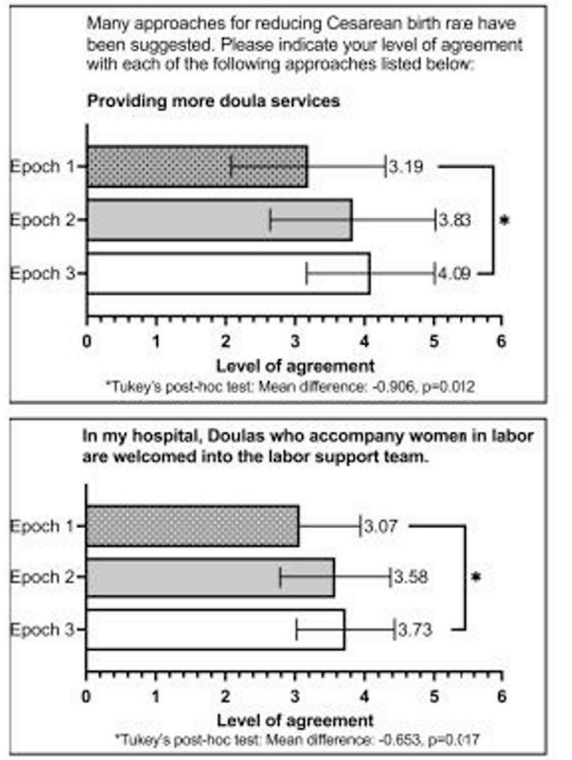
OBJECTIVE: To explore how the addition of an independent, academic, midwifery-only practice group to a traditional physician-led Labor & Delivery (L&D) unit may shift the cultural environment and impact the beliefs and attitudes about childbirth and L&D practices among Obstetrics providers.

STUDY DESIGN: Single center, longitudinal prospective cohort study of L&D providers following a natural "intervention" consisting of the addition of an independent, academic, midwifery-only practice group (not supervised by Obstetricians) to the traditional University hospital physician-led L&D unit. The Labor Culture Survey (VanGompel et al. 2018) was administered to L&D providers longitudinally at baseline (May 2020), 1 year (June 2021), and 2 years (June 2022) after this "intervention" (referred to as epochs 1, 2 and 3). Surveys were completed voluntarily, electronically via RedCap and scored on a Likert-type scale (5: strongly agree; 1: strongly disagree). The primary outcome, difference in mean score over time, was analyzed using one-way ANOVA and Tukey's post-hoc test for significance. Cesarean birth rates pre- and post-intervention were compared as a secondary outcome.

RESULTS: 91 total surveys were completed (response rate: 37%). Respondents were majority female physicians (91.2%) aged 39.3±0.5 years. Following the "intervention", physicians were more likely to welcome doulas as members of the labor support team (p=0.017), support more doula services (p=0.013), and more midwifery services (p=0.042) (Figure 1) as strategies to reduce Cesarean birth rates. Simultaneously, the University hospital saw a decrease in the total Cesarean birth rate from 37.5% in 2019 to 31.9% in 2021 (p< 0.001).

CONCLUSION: Midwifery-style L&D care is known to promote and support physiologic birth in uncomplicated pregnancies. Changing L&D culture and subjective norms via the addition of a midwifery-only practice to a traditional L&D unit has the potential for meaningful changes in perceptions, actions, and behaviors by physician providers.

Figure: Selected responses by Obstetrics physicians to the Labor Culture Survey following addition of an independent, academic, midwifery-only practice group to the traditional University hospital physician-led L&D unit



1165 The impact of early amniotomy on delivery outcomes in pregnancies with fetal macrosomia

Or Touval[1], Gal Cohen[2], Lior Heresco[3], Tal Biron-Shental[4], Michal Kovo[5], Hanoch Schreiber[2]

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OBJECTIVE: The optimal timing for amniotomy during labor is controversial. Early amniotomy (EA), defined as amniotomy performed at cervical dilation < 4 cm, has been shown to shorten labor duration without increasing cesarean delivery (CD) rate, in the general pregnant population. However, its impact in deliveries with fetal macrosomia is unknown. We aimed to investigate the effects of early vs. late amniotomy on delivery outcomes in pregnancies with fetal macrosomia.

STUDY DESIGN: A retrospective cohort study of all women who delivered neonates with a birthweight of ≥ 4,000 g., between 01/2014 to 10/2020. We included parturients admitted in latent phase of labor (< 6 cm dilation), that underwent amniotomy during labor. The study cohort was divided into two groups: the early amniotomy (EA group) and the late amniotomy (LA group), based on the cervical dilation at which amniotomy was performed, (≤ 4 cm

or > 4 cm, respectively). Delivery and neonatal outcomes were compared between the groups.

RESULTS: A total of 797 women were included. There were no differences in the pre-labor fetal-weight estimation between the groups (3,928±273 vs. 3,945±271 g., p=0.61 in the EA and LA group, respectively). Compared to the LA group (n=438), the EA group (n=359) had higher rates of nulliparity (p< 0.001), diabetes mellitus (p< 0.001), induction of labor (p< 0.001), epidural analgesia (p< 0.001) intrapartum fever (6.1% vs. 2.3%, p=0.006) and CD (13.1% vs. 5.7%, p< 0.001). Neonatal birthweights were similar between the EA and LA groups, (4,185±169 g. vs. 4191±181, p=0.61). Composite adverse neonatal outcome was higher in the EA group compared to the LA group (11.8% vs. 6.9%, p=0.046). A multivariable logistic regression analysis adjusted for confounders (table 1) revealed that EA was independently associated with increased risk for CD (aOR 2.13, p=0.014, 95% CI 1.16-3.9).

CONCLUSION: The timing of amniotomy in deliveries of suspected fetal macrosomia should be carefully considered, as early amniotomy may increase the rate of CD.

Table 1. Multivariable logistic regression of factors associated with cesarean delivery during labor.

Variable	Adjusted Odds Ratio (aOR)	95% CI	*P-value*
Early amniotomy	2.13	1.16-3.90	0.014
Nulliparity	9.79	5.38-17.80	<0.001
Diabetes mellitus*	1.54	0.72-3.32	0.267
Induction of labor	1.22	0.67-2.20	0.516
Epidural analgesia	3.30	1.64-6.63	<0.001
Intrapartum fever	4.81	1.99-11.67	<0.001

Factors included in the multivariable regression model were variables found as significantly different between groups in the univariate analysis. Results are reported as adjusted odds ratios (OR) and 95% confidence intervals (CI); *pregestational and gestational diabetes.

1166 Statewide Patterns of Opioid Use Disorder Diagnosis and Treatment in Nulliparous, Term, Singleton, Vertex Pregnancies

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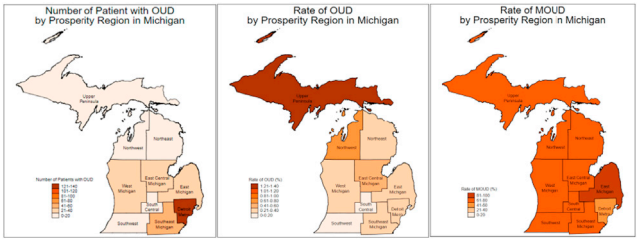
OBJECTIVE: To assess regional variation in rates of identified opioid use disorder (OUD) and treatment for OUD with medication for OUD (MOUD) in birthing people across Michigan.

STUDY DESIGN: We performed a retrospective cohort study of 90,217 birthing people with a nulliparous, term, singleton, vertex (NTSV) pregnancy. Eligible individuals had a vaginal or cesarean birth at one of 62 Michigan birthing hospitals between 1/1/2020 and 1/31/2023. Birthing people were categorized by status of OUD, treatment with MOUD, and MOUD type. Individuals with a postpartum length of stay > 7 days were excluded. We used basic descriptive statistics and tests of comparison between groups based on OUD diagnosis and type of MOUD. We created geocoded heat maps of OUD diagnosis and receipt of MOUD by region.

RESULTS: The rate of OUD was 0.33% (300/90,217). Patients with OUD were older, more likely to have Medicaid insurance, and use other substances (alcohol, tobacco and marijuana) compared to the general population (p< 0.01). Among patients with OUD, 69% (207/300) received MOUD. The most common MOUD was buprenorphine (62%, 129/207), followed by methadone (36%, 75/207) and naltrexone (1.5%, 3/207). The proportion of patients with diagnosed OUD ranged from 0.35-1.36%. The proportion of patients with OUD receiving MOUD ranged from 58.6-95.5%. The region with the highest number of birthing patients with OUD (n=128/300) had one of the lowest rates of MOUD (n= 75/207, 58.6%).

CONCLUSION: There is a mismatch between regions with the highest burden of OUD and utilization of MOUD. Though the majority of NTSV patients with OUD received MOUD, almost one-third of patients did not. Future work is needed to understand the individual and system-level factors that influence patients' access to MOUD.



1167 Sentinel Biomaterials Remotely Monitor The Placental Microenvironment

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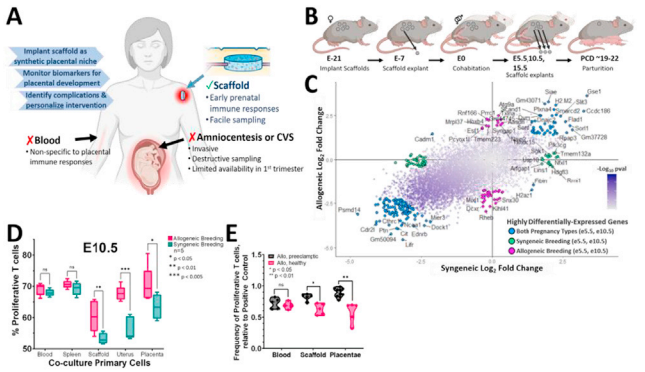
OBJECTIVE: In this work, we employ microporous scaffolds as a synthetic immunological niche to remotely capture the longitudinal immune domain of healthy and preeclamptic-like, miscarriage-prone rodent pregnancies with greater specificity than blood (Fig 1A).

STUDY DESIGN: Microporous poly(ε-caprolactone) (PCL) scaffolds were implanted subcutaneously in C57BL/6 female mice prior to cohabitation with BALB/c (allogeneic) or C57BL/6 (syngeneic) males (FIg 1B). For preeclamptic-like pregnancies, CBA females were bred with DBA/2 males. Scaffolds were serially explanted prior to cohabitation and on embryonic days (E) 5.5, 10.5, and 15.5, along with age-matched non-breeders. Blood, spleen, uterus, placentae, and implanted scaffold cells were processed for flow cytometry, T cell activation, and trophoblast migration. Scaffolds were also sequenced for differential gene expression and pathway enrichment.

RESULTS: In both healthy and preeclamptic-like pregnancies, the scaffold implant recapitulates tissue-resident immune cell phenotypes (including NK cell and macrophage phenotypes) and the immune microenvironment of the uterus and placentae with greater tissue specificity than found in circulation (Fig 1D, E). In addition to the innate immune cell phenotypes in the scaffold, gene expression in the scaffold can be used to distinguish between gestational stages and states (Fig 1C). Through an Elastic Net regression, we identified 8 genes that differentiate between allogeneic-bred and syngeneic-bred mice at embryonic day 5.5 (E5.5), prior to fetal or placental organogenesis, to construct a predictive biomarker panel for the risk of preeclampsia. Lastly, scaffolds capture a population of fetal cells identified in the placentae at E15.5.

CONCLUSION: We have developed scaffold implants to remotely monitor immunological markers of prenatal progression which recapitulate aspects of the uterine microenvironment. Scaffold gene expression can differentiate the prenatal immune state, and scaffolds capture a population of fetal cells from circulation. These scaffolds act as a minimally invasive prenatal monitoring tool.



1168 Quadruple P screening study: risk factors associated with a short mid-pregnancy cervical length in singletons

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OBJECTIVE: Mid-pregnancy short cervical length (CL) ≤35mm has been associated with increased risk for spontaneous preterm birth (sPTB) in singleton pregnancies. However, CL screening is not universal and targeted risk-profiles are not yet established. In this prospective cohort study we aim to identify risk factors for a short mid-pregnancy CL.

STUDY DESIGN: We performed a multicenter prospective cohort study in 25 hospitals and midwifery practices in the Netherlands. We included low-risk, asymptomatic women with a singleton pregnancy undergoing a transvaginal midtrimester CL measurement during the fetal anomaly scan between 18^{+0} -22^{+0} weeks of gestation. The primary outcome is the association between maternal and obstetric characteristics for a CL ≤ 35mm. Secondary outcomes included the association for a CL ≤ 25mm and a multivariable logistic regression was performed. Odds ratio (OR) calculation with a 95 % confidence interval (CI) and binomial logistic regression analyses were used to identify the associations.

RESULTS: Overall, 19,364 women were included in analysis of which 2031 (10.5 %) had a CL ≤35 mm and 269 (1.4 %) a CL ≤ 25 mm. Multiple maternal and obstetrical characteristics were individually significantly associated with a short cervical length (Table 1). In a multivariable logistic regression nulliparity (OR 1.9, CI 1.3 − 2.7) and cervical excisional procedures (OR 3.2, CI 1.8 − 5.5) remained statistically significant. Similar results were found for nulliparity (OR1.3, CI 1.0 − 1.7) and cervical excisional procedures (OR 5.1, CI 3.7 − 7.2) in women with a CL ≤ 25 mm.

CONCLUSION: Nulliparity, a history of cervical excisional procedures and uterine excavation with curettage are associated with increased odds of short mid-trimester CL ≤ 35mm. We advocate for the implementation of universal CL screening during pregnancies, with a particular emphasis on screening women with known risk factors. This facilitates appropriate interventions and personalized care for those at higher risk for sPTB.

Table 1 Association between short cervical length (<35mm) and maternal, medical and obstetric characteristics

	B	p-value	OR	95% CI
Univariate logistic analysis				
Height	**-0.025**	**<0.001**	**0.976**	**0.968 - 0.983**
Pre-pregnancy weight	**-0.010**	**<0.001**	**0.990**	**0.986 - 0.994**
Pre-pregnancy BMI	**-0.015**	**0.012**	**0.985**	**0.974 – 0.997**
Current smoker[1]	**0.27**	**0.030**	**1.311**	**1.027 – 1.674**
Recurrent UTIs[2]	0.18	0.288	1.194	0.861 – 1.656
Cervical excisional procedures[3]	**1.4**	**<0.001**	**4.223**	**3.623 – 4.924**
Nulliparous	**0.44**	**<0.001**	**1.550**	**1.399 – 1.719**
Miscarriage/AFLA/EP	**0.214**	**<0.001**	**1.238**	**1.118 – 1.372**
Curettage	**0.276**	**0.010**	**1.318**	**1.068 – 1.627**
IPI ≤ 6 months	**0.353**	**0.008**	**1.423**	**1.098 – 1.844**
Multivariate logistic analysis				
Height	-0.004	0.750	0.996	0.972 – 1.021
Pre-pregnancy weight	-0.011	0.075	0.989	0.976 – 1.001
Current smoker[1]	0.388	0.319	1.474	0.688 – 3.158
Recurrent UTIs[2]	-0.060	0.901	0.942	0.368 – 2.410
Cervical excisional procedures[3]	**1.161**	**<0.001**	**3.195**	**1.845 – 5.532**
Nulliparous	**0.622**	**<0.001**	**1.863**	**1.299 – 2.670**
Curettage	0.023	0.892	1.0.24	0.732 – 1.432
IPI ≤ 6 months	-0.081	0.675	0.923	0.633 – 1.345

BMI body mass index, UTI urinary tract infections, APLA abortus provocatus lege artis, EP ectopic pregnancy IPI interpregnancy interval
[1]Defined as currently smoking at least one tobacco-product / day
[2]Defined as ≥ 2 UTIs in the last 12 months treated with antibiotics
[3]Defined as conization or Large Loop Excision of the Transformation Zone (LLETZ).

1169 Postpartum Beat-to-Beat Systolic Blood Pressure Variability in Preeclampsia with Severe Features

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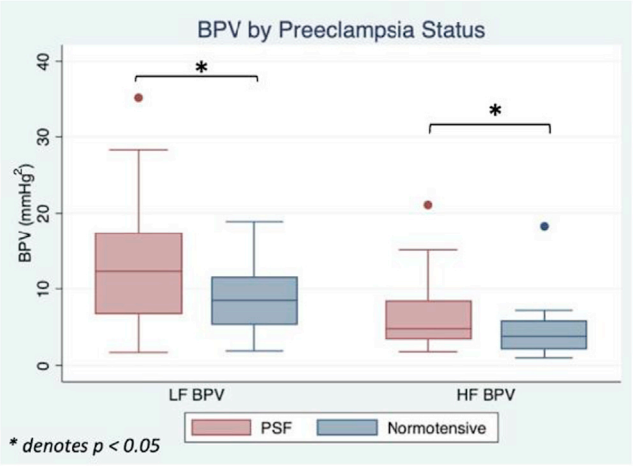
OBJECTIVE: Beat-to-beat blood pressure variability (bbBPV) has been correlated with adverse outcomes including stroke in non-pregnant populations. bbBPV increases throughout healthy pregnancy and to a greater extent in preeclampsia. However, it is unknown whether elevated bbBPV persists in the immediate postpartum period. We compared differences in bbBPV within 8 days postpartum between patients with preeclampsia with severe features (PSF) and normotensive postpartum controls.

STUDY DESIGN: We prospectively recruited individuals with PSF and normotensive pregnant individuals delivering at an urban academic medical center. We measured continuous blood pressure over 10 minutes using finger plethysmography within 8 days postpartum. Systolic bbBPV was calculated using spectral analysis in low frequency (LF, 0.04-0.15 Hz) and high frequency (HF, 0.15-0.40 Hz) bands. Results were compared using parametric or non-parametric tests depending on the distribution.

RESULTS: Subjects were 51 women with PSF, of whom 21 (41%) had chronic hypertension with superimposed preeclampsia (siPEC), and 19 normotensive controls. All PSF subjects had been treated at the time of the study; 10 (20%) had received magnesium sulfate (Mg) and 44 (86%) had received antihypertensive medications

(antiHTNs) within 24 hours before bbBPV was measured. Subjects with PSF had significantly higher LF (median 12.3 vs. 8.5 mmHg^2, p = 0.038) and HF (median 4.8 vs. 3.8 mmHg^2, p = 0.029) systolic bbBPV compared to controls. Within the PSF group, bbBPV did not differ in patients who received Mg or antiHTNs within 24 hours of the study. Subgroup analysis showed no difference in bbBPV in the siPEC group compared to control and non-superimposed PSF groups. LF/HF ratio did not differ significantly among groups.

CONCLUSION: The increase in bbBPV seen in preeclampsia patients during pregnancy persists during the first week postpartum. Standard treatment with Mg and antiHTNs is intended to reduce mean blood pressure but may not address elevated bbBPV in the postpartum period.



1170 Linking patients to primary and subspecialty care through a high-risk fourth trimester clinic

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OBJECTIVE: To describe the primary care (PC) and subspecialty needs of high-risk patients seen at a specialized postpartum clinic within a racially and ethnically diverse urban health system and to determine associations between having a preexisting primary care provider (PCP) and clinic referral indication and postpartum care utilization.

STUDY DESIGN: An observational cohort of high-risk patients was followed for 12 months (6/2022 to 6/2023) at a dedicated postpartum clinic that provides care-coordination. High-risk indications for clinic referral included a chronic medical condition and/or adverse delivery or immediate postpartum event. All patients were asked about their PC and subspecialty needs. A care coordinator helped schedule PCP and subspecialty follow-ups if indicated. Summary statistics described patients' PC and subspecialty needs. Bivariate analyses comparing postpartum attendance characteristics and clinic referral indication by identification of a PCP at entry to postpartum care were performed using chi-square and Mann-Whitney U tests.

RESULTS: Out of N=143 patients seen at the Fourth Trimester clinic, 78.3% (n=112) were publicly insured and 95.1% (n=136) identified as non-white. 52.5% (n=75) identified a PCP at entry to postpartum care. Among the 47.6% (n=68) without a PCP, 73.1% (n=49) received care coordination to schedule a PCP visit and, of these, 63.2% (n=31) attended their appointment. 51.0% (n=73) of patients needed to see at least one subspecialist. 16.7% (n=24) received care coordination to schedule a subspecialty visit; 58.3% (n=14) attended their appointment. No statistically significant difference was found in clinic referral indication, number of postpartum visits attended, or attendance within 21 days postpartum between those with and without a preexisting PCP.

CONCLUSION: Almost half of high-risk patients seen for care at our specialized Fourth Trimester clinic did not identify a PCP at entry to postpartum care. Care coordination linked the majority of these patients to a PCP after delivery, demonstrating its importance in the transition from postpartum to PC.

1171 The need for mental health screening and care at a high-risk fourth trimester clinic

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OBJECTIVE: To describe depression screening and referral to mental health (MH) services among high-risk individuals receiving care at a dedicated postpartum (PP) clinic within a racially and ethnically diverse urban health system and their associations with clinic referral indication.

STUDY DESIGN: An observational cohort of high-risk patients was followed for 12 months (6/2022 to 6/2023) at a specialized PP clinic where universal PP depression screening is performed at least once using the Edinburgh Postnatal Depression Scale (EDPS) as per clinic protocol. High-risk indications for clinic referral included a chronic medical condition and/or an adverse delivery or immediate PP event. All patients were offered referral to MH services regardless of their PP depression screen. Summary statistics described depression screening and referral to MH services. Chi-square test ($p < 0.05$) compared depression screen characteristics and MH referrals by clinic referral indication.

RESULTS: 143 patients, 90.9% (n=130) of whom identify as non-white and 78.3% (n=112) of whom are publicly insured, were seen at our Fourth Trimester clinic. 87.4% (n=126) were screened for depression at least once. Among the 27% (n=34) who screened positive, 88.2% (n=30) were referred to MH services, 52.9% (n=18) of which attended an appointment. An additional 28 patients (19.6%) who screened negative for depression desired referral to MH services. Among those, 67.9% (n=19) attended at least one MH appointment. Performance of depression screening, positive screen prevalence, referral to MH services and attendance of a MH appointment were similar regardless of clinic referral indication.

CONCLUSION: Over 25% of high-risk patients screened positive for depression and an additional 20% without positive screens desired MH referral. A standardized workflow including depression screening and universal referral to MH services can maximize identification of high-risk patients in need of mental health services.

1172 The Integration of Prenatal Data Into the Neonatal Research Network (NRN) Survival Probability Estimator

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OBJECTIVE: Neonatal survival probabilities are important in shared decision-making considerations for peri-viable deliveries. The NICHD NRN Survival Probability Estimator has been used for counseling and treatment decisions but considers very few prenatally available data. We asked whether**:** 1) using an ultrasonographic estimated fetal weight (EFW) within one week of delivery rather than birthweight resulted in significantly different predicted survival probabilities, or 2) predicted probabilities were different based on the indication for delivery.

STUDY DESIGN: Secondary analysis of an observational cohort of deliveries from 16 0/7 through 34 6/7 weeks from January-August 2019 at 34 U.S. hospitals. Patients were included if they had an ultrasonographic estimated fetal weight (EFW) within one week of delivery and a live birth of a non-anomalous infant from 22 0/7 through 25 6/7 weeks. The primary outcome was neonatal survival as estimated from the NRN Estimator. The Estimator uses birthweight, newborn sex, plurality, and antepartum steroid exposure to generate the survival probability. We assessed whether predicted survival was significantly altered after substituting birthweight for EFW, and after partitioning of the cohort by whether 1) PPROM (as primary reason for delivery admission), 2) hypertensive disorders of pregnancy (HDP), or 3) spontaneous premature birth (SPTB) had occurred.

RESULTS: 275 neonates met inclusion criteria. At each week of gestational age the median survival estimate using EFW was not statistically different from that estimated using birthweight. However, the predicted survival was dependent upon whether the selected obstetric complications had occurred. Specifically, birth after SPTB or PPROM identified a group of neonates with a higher probability of predicted survival after 23 weeks.

CONCLUSION: EFW instead of birthweight does not alter NRN Estimator survival probabilities. The findings that predicted survival probabilities varied by indication for delivery warrants further assessment.

Neonatal Predicted Survival^ (22 0/7 to 25 6/7 weeks) with Integration of Prenatal Data

	22 weeks (N=32)	23 weeks (N=64)	24 weeks (N=79)	25 weeks (N=100)
BIRTHWEIGHT VS EFW				
Using birthweight	25.5 (18.7, 33.2)	42.4 (31.7, 49.8)	62.2 (53.4, 71.0)	79.0 (65.3, 84.8)
Using ultrasound EFW	26.5 (17.6, 34.6)	41.0 (33.3, 49.3)	62.0 (51.9, 68.6)	77.7 (66.9, 83.9)
P-value	0.646	0.771	0.617	0.471
No PPROM*	27.4 (17.7, 33.2) (N=24)	42.1 (30.5, 49.7) (N=51)	60.3 (51.5, 67.6) (N=67)	74.7 (62.4, 83.2) (N=66)
PPROM*	23.7 (20.2, 32.2) (N=8)	48.7 (38.3, 53.5) (N=13)	70.5 (65.2, 75.0) (N=12)	83.1 (77.8, 87.4) (N=34)
P-value	0.880	0.218	0.003	0.001
No HDP	24.2 (18.5, 33.1) (N=26)	42.6 (33.2, 49.9) (N=51)	65.5 (59.6, 71.9) (N=54)	82.8 (76.1, 87.4) (N=63)
HDP	28.3 (20.7, 33.3) (N=6)	38.5 (27.0, 49.7) (N=13)	53.2 (47.3, 59.0) (N=25)	66.4 (60.4 (78.6) (N=37)
P-value	0.809	0.297	<0.001	<0.001
No SPTB+	24.0 (19.5, 30.2) (N=7)	39.1 (28.5, 44.9) (N=18)	56.5 (48.5, 64.2) (N=34)	70.3 (60.7, 79.8) (N=54)
SPTB+	26.4 (18.5, 33.4) (N=25)	45.2 (35.3, 52.1) (N=46)	66.3 (61.2, 73.6) (N=45)	83.2 (78.6, 87.9) (N=46)
P-value	0.558	0.051	< 0.001	< 0.001

^ % Predicted Survival (Median with IQR) p-value using the Wilcoxon signed rank test to compare BW with EFW and the Wilcoxon test to compare the obstetric characteristics
* PPROM as primary reason for hospital admission
+ Includes individuals admitted with PPROM who labored spontaneously
EFW = ultrasonographic estimated fetal weight; PPROM = preterm premature rupture of membranes; HDP = hypertensive disorders of pregnancy; SPTB = spontaneous preterm birth

1173 Three-dimensional fetal body composition and organ volume growth patterns in hypertensive disorders of pregnancy

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OBJECTIVE: Hypertensive disorders of pregnancy (HDP) complicate 5-8% of pregnancies and are associated with lower birthweight and fetal growth restriction. No studies have evaluated the association between HDP and three-dimensional (3D) measures of fetal body composition, such as lean and fat tissue, and organ volumes across pregnancy. Differential accumulation of fetal lean and fat tissue, or organ volume growth, may be a more sensitive marker for abnormal fetal growth.

STUDY DESIGN: In the NICHD Fetal 3D Study (n=2430 pregnancies), fetal body composition and organ volumes were measured at up to five 3D ultrasounds between 15 to 40 weeks by certified sonographers per protocol. Women were identified as having severe preeclampsia (PE) (n=32, 1.3%), mild PE (n=52, 2.1%), gestational hypertension (GH) (n=84, 3.5%), or no hypertension (referent; n=2262, 93.1%). Trajectories of 3D fetal measures were modeled using linear mixed effect models. Overall and weekly mean differences in the trajectories, by hypertensive status, were tested after adjustment for covariates.

RESULTS: Compared to pregnancies without hypertension, fetuses of women who developed severe PE had smaller fractional lean arm and thigh volumes starting at 15 and 18 weeks, respectively, prior to PE diagnosis and continuing through term, reaching statistical significance at 15-17 and 28-34 weeks for arm and 27 weeks for thigh (Table). Fetuses of women who developed mild PE had larger maximum abdominal and thigh SCTT starting, on average, at 23 weeks through term, and larger cerebellar volume starting at 19 weeks (Table). Lastly, fetuses of women who developed GH had smaller fractional arm and thigh volumes (overall and lean) and abdominal area starting in the 2nd half of pregnancy, larger maximum abdominal SCTT starting at 29 weeks, and larger cerebellar volume at 17-23 weeks (Table).

CONCLUSION: Patterns of lean and fat tissue growth and cerebellar volume varied across HDP categories. Future investigation is needed to determine whether these findings have clinically important implications for offspring cardiometabolic function and health.

Table. Summary of overall and weekly comparisons of fetal 3D body composition and organ volumes across hypertensive disorders of pregnancy; NICHD Fetal 3D Study.

		Weekly Comparisons		
Outcome	Global Comparison	Gestational Hypertension	Mild PE	Severe PE
Body Composition	**Adjusted p-value**	**Gestational Weeks; Direction of Association**		
Fracticnal arm volume, cm^3	**0.02**	22-30; Smaller	-	-
Fracticnal lean arm volume, cm^3	**0.0002**	26-34; Smaller	-	15-17, 28-34; Smaller
Fracticnal fat arm volume, cm^3	0.09	-	-	-
Maximum arm SCTT, cm	0.13	22-28; Smaller	-	-
Abdominal area, mm^2	**0.01**	21-26; Smaller	-	-
Maximum abdominal SCTT, cm	**0.0003**	29-31, 33-38; Larger	23-37; Larger	-
Fracticnal thigh volume, cm^3	**0.01**	23-31; Smaller	-	-
Fracticnal lean thigh volume, cm^3	**0.01**	24-31; Smaller	-	27; Smaller
Fracticnal fat thigh volume, cm^3	0.13	27-28; Smaller	-	-
Maximum thigh SCTT, cm	**0.001**	-	18, 25-34; Larger	-
Organ Volumes				
Cerebellar volume, cm^3	**0.001**	17-23; Larger	19-34; Larger	-
Average lung volume, cm^3	0.37	-	-	-
Average kidney volume, cm^3	0.76	-	-	-
Liver volume, cm^3	0.35	-	-	-

PE = preeclampsia
Linear mixed models were adjusted for: maternal age, race/ethnicity, parity, pre-pregnancy BMI, education, infant sex, insurance, marital status, and full-time employment status
Dashes indicate no gestational age for which pairwise comparisons were different
Women without hypertension during pregnancy were the referent group for all analyses

1174 Placental Inflammation is More Common in A2 versus A1 Gestational Diabetes

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OBJECTIVE: It is well-known that worse obstetric outcomes are observed in pregnancies complicated by A2 compared to A1 gestational diabetes mellitus (GDM). Insulin resistance is thought to exaggerate placental immune responses. We hypothesize that there is greater placental inflammation in patients with A2GDM compared to A1GDM. Inflammatory responses in the placenta are mediated, in part, by macrophages (aka Hofbauer cells). To test our hypothesis, we compared macrophage abundance and proinflammatory gene expression in placentas from patients with A2GDM versus A1GDM.

STUDY DESIGN: Intervillous placental biopsies were collected and analyzed from term, unlabored patients delivered by planned cesarean. Insulin was the sole treatment modality for all A2GDM patients in this analysis. Histological analysis by CD163 staining was conducted to quantify the number of macrophages. The expression of 732 macrophage-related genes were compared between placentas from pregnancies complicated by A2GDM versus A1GDM (n=12/condition). Gene expression was also referenced to uncomplicated pregnancies using the NanoString nCounter system.

RESULTS: The number of macrophages (CD163+ cells) did not differ between A2GDM and A1GDM (Figure 1.A). However, in placentas from patients with A2GDM, 47 genes were significantly upregulated, and 3 downregulated when compared to those with A1GDM (Figure 1.B). The most significantly upregulated genes promote macrophage inflammation, including *LTB4*, *CD160* and *IRF5*.

CONCLUSION: While that the number of macrophages did not differ between groups, significant upregulation of macrophage associated inflammatory genes was observed in placentas from patients with A2GDM. Placental inflammation is thought to contribute to adverse obstetric outcomes such as preeclampsia. Further research is warranted to evaluate if placental inflammation is associated with specific adverse outcomes observed in GDM.

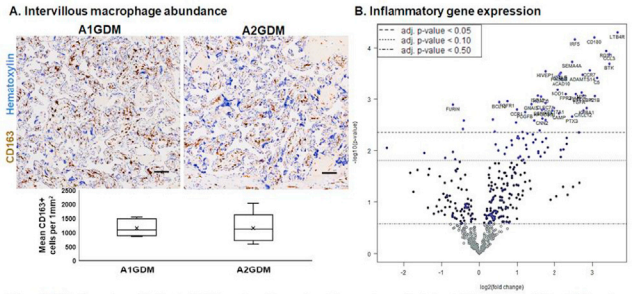

Figure 1. A. Staining and quantification for CD163 a marker of human placental macrophages. Scale bar = 100um. Box and whisker plot shows the number of CD163+ macrophages counted within 1mm² areas of tissue. Means are denoted by x's within each box. No significance was observed between A2GDM compared A1GDM. **B.** Volcano plot for differential expression between A2GDM versus A1GDM placentas (n=12/condition). Horizontal axis represents log transformed fold change, vertical depicts log transformed p-values. Horizontal lines denote Benjamin-Hochberg adjusted p-values, legend in top left of plot. The top 20 genes are annotated with abbreviations and fall above the line for adj p<0.05.

1175 Pregnancy outcomes in hepatitis E-associated hospitalizations in the United States: a nationwide study

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OBJECTIVE: Hepatitis E virus (HEV) is typically asymptomatic in developed countries but can be severe in certain populations including pregnancy. However, in the U.S. there is limited data on the effects of the endemic genotype of HEV on the pregnant population, thus, we aim to investigate a large cohort of pregnant women and describe the characteristics and pregnancy outcomes in those with HEV from 1998-2020.

STUDY DESIGN: We utilized the National Inpatient Sample and extracted cases of HEV-associated hospitalizations using ICD-9/10 diagnostic codes. Demographic, clinical, and pregnancy data were extracted and analyzed by chi-square.

RESULTS: We identified 3,354 cases of HEV-associated hospitalizations, among those, 226 (6.7%) involved pregnant women. The median age was 30 years compared to 28 years in the non-HEV pregnant cohort (p=0.021). The race/ethnic distribution was 35.0% non-Hispanic White, 15.0% non-Hispanic Black, 10.6% Hispanic, 13.3% Asian/Pacific Islander. There were no cases of maternal death in the HEV pregnant cohort. Diabetes was found to be more common in the HEV pregnant cohort, 6.2% versus 1.1% (p< 0.001). Additionally, hepatitis B co-infection (31.9% vs 0.1%, p< 0.001), hepatitis C co-infection (11.1% vs 0.3%, p< 0.001), intravenous drug use (6.6% vs 0.6%, p< 0.001), coagulopathy (4.0% vs 0.3%, p< 0.001), and thrombocytopenia (6.2% vs 0.9%, p< 0.001) were significantly more common in the HEV pregnant cohort compared to the non-HEV pregnant cohort. Fetal heart rate/rhythm abnormalities were more frequent in the HEV pregnant cohort, 24.3% versus 12.4% (p=0.015). There were no differences in frequency of obesity, HIV infection, and pre-eclampsia (p >0.05). Among the 226 HEV pregnancies, 172 (76.1%) were hospitalized for delivery. There were no cases of stillbirth, and the frequencies of preterm and post-term births were similar to non-HEV pregnant cohort.

CONCLUSION: Among U.S. pregnant patients with hepatitis E, comorbidities such as co-infection with other hepatitis viruses were more common, but maternal and fetal outcomes were favorable and similar to the non-HEV pregnant population.

1176 Risk factors associated with intensive care unit admission during the Peripartum period: A retrospective study

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OBJECTIVE: The aim of this study was to identify risk factors associated with peripartum admission to intensive care unit (ICU) including baseline characteristics, pregnancy data, and delivery outcomes.

STUDY DESIGN: This was a retrospective cohort study. Study group consisted of all patients admitted to the ICU during the peripartum period between January 2011 and January 2022. A control group included individuals who delivered at the same medical center during the specified time frame. We matched each study case with

five control cases according to medical staff and delivery day. Baseline characteristics, pregnancy and delivery outcomes were compared between the two groups. Additionally, we analyzed the indications for ICU admission. Nonparametric statistics were applied for analysis.

RESULTS: A total of 113 patients were admitted to the ICU, which accounted for 0.1% of all births at our medical center during the same period. The controls consisted of 565 individuals. The median maternal age was significantly higher in the ICU group than in the control group. Patients admitted to the ICU had a significantly lower rate of spontaneous conception and higher rates of multifetal gestation, hypertensive diseases, preterm labor (PTL), and Cesarean sections (CS) (Table). Neonates born to patients admitted to the ICU tended to have a lower median birth weight and a longer hospitalization period, with higher rates of low Apgar scores, stillbirth, NICU admission, mechanical ventilation and cooling treatment (Table). Among the study group, observation for background disease was the leading cause for ICU admission (34.5%), followed by hematological complications (14.2%). Ten patients (8.8%) had hysterectomies, 5 (4.4%) had cardiac arrest and one patient (0.9%) had anoxic brain damage. Maternal death rate was 2.65%.

CONCLUSION: Advanced maternal age, multifetal pregnancy, and hypertensive diseases are associated with peripartum maternal ICU admission. Patients admitted to ICU have higher rates of PTL, CS and neonatal complications. Identifying these risk factors may help in the early detection of high-risk individuals.

Table. Baseline demographic, pregnancy characteristics and neonatal outcomes

Baseline demographic and pregnancy characteristics			
	Study group- admitted to ICU n = 113	Control group n = 565	p-value
Maternal age (Years)	34 (30-39)	33 (29-36)	**0.003**
Maternal age = 40	25 (22.1)	60 (10.6)	**0.002**
BMI before pregnancy (Kg/m2)	24.2 (21.1-27.4)	22.5 (20.0-25.9)	**0.002**
BMI before delivery (kg/m2)	28.2 (25.6-32.5)	27.6 (24.9-30.8)	**0.003**
Smoker	6 (5.5)	29 (5.2)	0.818
Gravidity	2 (1.5-4)	2 (1-4)	0.45
Parity	1 (0-2)	1 (0-2)	0.967
Previous abortions	0 (0-1)	0 (0-1)	0.473
Previous Cesarean sections	0 (0-1)	0 (0-0)	**0.001**
Spontaneous conception	80 (70.8)	459 (81.2)	**0.015**
Multiple pregnancy	12 (10.6)	26 (4.6)	**0.022**
Pregestational diabetes mellitus	2 (1.8)	5 (0.9)	0.33
Gestational diabetes mellitus	9 (8)	58 (10.3)	0.604
Chronic hypertension	1 (0.9)	5 (0.9)	1
Hypertensive disease of pregnancy	10 (8.8)	18 (3.2)	**0.016**
Coagulopathy	3 (2.7)	7 (1.2)	0.224
Gestational age at delivery (weeks)	36 (33-37.5)	39 (38-40)	**<0.0001**
Preterm labor<37 weeks	70 (61.9)	55 (9.7)	**<0.0001**
PPROM	1.2 (10.6)	30 (5.3)	0.051
Mode of delivery			**<0.0001**
Vaginal delivery	17 (15)	402 (71.2)	
Cesarean section	96 (85)	163 (28.8)	
Neonatal outcomes			
	n=125	n=591	
Weight (grams)	2398 (1897-2880)	3200 (2822-3525)	**<0.0001**
Apgar at 5 min < 7	24 (19.2)	6 (1)	**<0.0001**
Stillbirth	10 (8)	5 (0.8)	**<0.0001**
NICU admission	48 (38.4)	33 (5.6)	**<0.0001**
Mechanical ventilation	14 (11.2)	11 (1.9)	**<0.0001**
Hospitalization period (days)	10.5 (6-23)	3 (3-5)	**<0.0001**
Neonatal death less than 24 hours	2 (1.6)	1 (0.2)	0.08
Cooling protocol	2 (1.6)	0 (0)	**0.03**

Data are presented as median and interquartile range (IQR) or n (%). BMI—Body Mass Index, PPROM-Preterm prelabour rupture of membranes. NICU-Neonatal intensive care unit, HIE-Hypoxic-ischemic encephalopathy

1177 Low maternal cardiac index is associated with a high rate of fetal growth restriction

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OBJECTIVE: A paucity of prior studies has described a relationship between maternal cardiac function and fetal growth using equipment not accessible to obstetricians. Our objective was to determine whether a low maternal cardiac index (CI) is associated with fetal growth restriction (FGR) in gravidas with and without hypertension (HTN) using a readily available adult cardiac probe compatible with obstetrical ultrasound machines.

STUDY DESIGN: We conducted a prospective cross-sectional study of healthy gravidas and those with FGR with or without HTN recruited from two outpatient clinics and one antepartum hospital ward. The maternal descending aorta was imaged via the suprasternal notch using a Samsung P2-4BQ Cardiac Sector probe. The aortic diameter distal to the left subclavian artery was measured and the pulsed Doppler waveform obtained. Maximum velocity, velocity time integral, ejection time, and R-R interval were measured. Maternal CI ($L/min/m^2$) was calculated and z-scores and their corresponding centiles were computed using a recently reported calculator derived from 400 control patients (Am J Obstet Gynecol. 2023 Aug;229(2):155.e1-155.e18.) Charts were abstracted for maternal characteristics, fetal biometry and Dopplers. Mann-Whitney and Fisher's exact tests were used for comparisons.

RESULTS: Thirty-six gravidas (control 21; FGR 15) between 24-37 weeks of gestation met inclusion criteria. Two cases of FGR had chronic HTN and 1 had preeclampsia. The relationship between CI and EFW is shown in Figure 1a. Mean CI centile was significantly lower in the FGR group (control 26.8 $\pm$ 16.0 vs FGR 12.4 $\pm$ 13.0; p=.0112). In gravidas with CI $< 20^{th}$ centile, the rate of FGR was higher (p=.0022; Figure 1b). In the low CI FGR group, 8 of 13 (62%) had EFW $< 3\%$ and/or abnormal Dopplers.

CONCLUSION: Maternal CI $< 20^{th}$ centile for gestational age is associated with a higher rate of FGR. Simple assessment of maternal cardiovascular parameters using a readily available adult cardiac ultrasound probe in FGR pregnancies is feasible and holds promise as a strategy for risk stratification and development of novel treatments.

Figure 1a - Maternal Cardiac Index and Estimated Fetal Weight Centiles

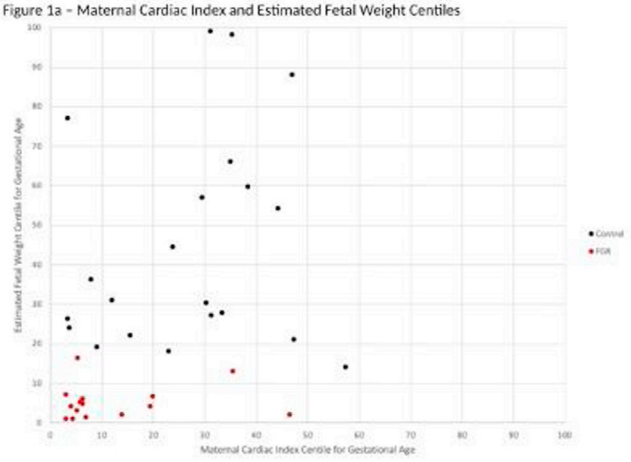


Figure 1b - Maternal Cardiac Index and Fetal Growth Restriction

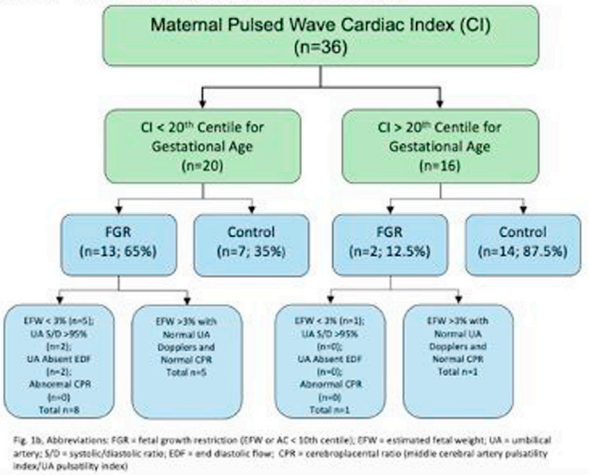


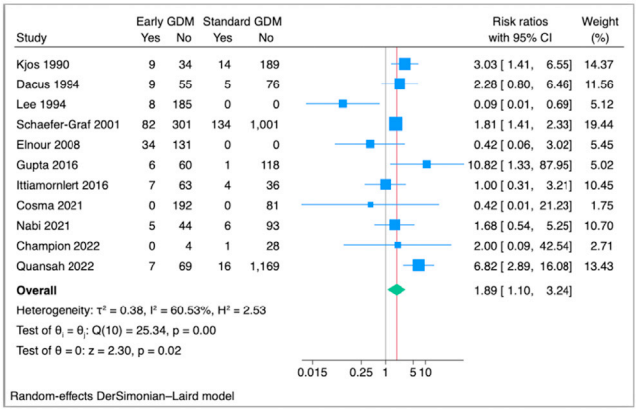
Fig. 1b. Abbreviations: FGR = fetal growth restriction (EFW or AC < 10th centile); EFW = estimated fetal weight; UA = umbilical artery; S/D = systolic/diastolic ratio; EDF = end diastolic flow; CPR = cerebroplacental ratio (middle cerebral artery pulsatility index/UA pulsatility index)

used, results were presented as relative risk (RR), 95% confidence intervals (CI). Post-hoc subgroup analyses were performed for the primary outcome among studies in the USA, used 2-hour or 3-hour oral glucose tolerance test (oGTT) for GDM screening, and early GDM diagnosed at < 24 weeks or < 20 weeks.

RESULTS: Of 5682 studies screened, 11 met inclusion criteria. Seven were prospective cohorts, two were retrospective cohorts and two were secondary analyses of RCTs. Of 1305 patients with early GDM, 248 (19.0%) had DM compared to 181 (6.1%) of 2972 with standard GDM (RR 1.89, 95% CI 1.10-3.24). This persisted for the primary outcome among studies in the USA (RR 2.04, 95% CI 1.53-2.73), used 3-hour oGTT (RR 1.95, 95% CI 1.31-2.90), and defined early GDM < 20 weeks (RR 2.31, 95% CI 1.09-4.87). However, this was no longer significant with studies that used 2-hour oGTT (RR 1.08, 95% CI 0.17-6.73) or defined early GDM < 24 weeks (RR 1.39, 95% CI 0.50-3.87).

CONCLUSION: The rate of DM diagnosed postpartum was higher in patients with early GDM compared to standard GDM diagnosis. Although at higher risk, the majority (81%) of patients with early GDM were not found to have DM postpartum. Thus, early GDM should not be a presumed diagnosis of DM.

Figure 1 – Forest plot of the frequency of diabetes mellitus diagnosis on postpartum screen



1178 Postpartum diabetes mellitus among patients with early gestational diabetes mellitus: A systematic review and meta-analysis

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OBJECTIVE: Patients diagnosed with early gestational diabetes mellitus (GDM) are commonly managed as pregestational DM. However, little is known whether early GDM is gestational or pregestational DM diagnosed in pregnancy. Our objective was to assess if the rate of DM diagnosed postpartum differs between patients with early GDM (< 24 weeks) and those with standard GDM (24-28 weeks).

STUDY DESIGN: This was a systematic review and meta-analysis registered with Prospero (CRD42022372568). An electronic search was conducted of PubMed, EMBASE, World Health Organization International Clinical Trials Registry Platform, Clinicaltrials.gov, and Cochrane Library through March 2023. Randomized controlled trials (RCTs) or observational studies of postpartum patients with early diagnosis of GDM were included. The primary outcome was rate of DM diagnosed postpartum. DerSimonian-Laird method was

1179 Risk of recurrent spontaneous preterm birth among those with persistent cervical HPV infection

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OBJECTIVE: This retrospective cohort study aims to determine the risk of recurrent preterm premature rupture of membranes (PPROM) or preterm labor (PTL) among those with cervical high-risk human papillomavirus (cHPV) infection and a history of previous PPROM/PTL; and examine clinical characteristics of cHPV infection among patients with PTL/PPROM.

STUDY DESIGN: Following IRB approval we performed a chart review of obstetric at Mayo Clinic Rochester or Mayo Clinic Health System, included patients with ≥ 1 spontaneous birth due to PPROM/PTL and positive cHPV testing from 5/1/2018- 12/31/2021. Demographics, cervical cytology, and placental pathology from the index and subsequent pregnancies were abstracted. cHPV persistence (testing during obstetric care) was defined as >1 pregnancy with positive cHPV testing.

RESULTS: Of 164 eligible patients, 54/164, 18/54, and 3/18 had one, two, and three subsequent pregnancies (Table 1). 21/75 (28%) had recurrence of PPROM/PTL which occurred in 8/32(25%) with persistent cHPV and 13/43(31%) without (p=0.57). HPV strain (16,18, or other high risk) was available for 99 patients, and 0/32 (0%) of patients with subsequent pregnancies and cHPV persistence changed strain type. Progression of CIN occurred in 9/16(56%), 5/9(56%), 1/2(50%) of those with persistent cHPV in subsequent pregnancies; 61/77(79%) in patients with no subsequent pregnancies. 53% of patients in index and subsequent pregnancies (1st 51%, 2nd 53%, 3rd 67%) underwent pre-pregnancy cervical excisional procedures. Histologic evidence of chorioamnionitis in the placenta was noted in 20/139(14%) of index pregnancies and 5/12 (42%) of subsequent pregnancies with persistent cHPV, but 0/19 patients without persistent cHPV (p=0.005).

CONCLUSION: High rates of PPROM/PTL recurrence, chorioamnionitis and CIN progression were noted in patients with persistent cHPV. No difference in rates of recurrent PPROM/PTL were noted in those whose cHPV testing transitioned to negative. Study of a larger population with higher cHPV prevalence may provide more clarity.

Table 1. Pregnancy details and cHPV results

	Pregnancy						
	Index Pregnancy (+cHPV) (N=164)	Subsequent Pregnancy 1 (+cHPV) (N=19)	Subsequent Pregnancy 1 (-cHPV) (N=35)	Subsequent Pregnancy 2 (+cHPV) (N=10)	Subsequent Pregnancy 2 (-cHPV) (N=8)	Subsequent Pregnancy 3 (+cHPV) (N=3)	P-value
Group Type, N (%)							<.0001[1]
PPROM	77 (48.1%)	2 (10.5%)	1 (2.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Preterm labor	83 (51.9%)	5 (26.3%)	7 (20.6%)	1 (10.0%)	5 (62.5%)	0 (0.0%)	
Normal	0 (0.0%)	12 (63.2%)	26 (76.5%)	9 (50.0%)	3 (37.5%)	3 (100.0%)	
Missing	4	0	1	0	0	0	
History of PPROM in previous pregnancy, N (%)							<.0001[1]
Yes	8 (5.0%)	8 (42.1%)	17 (50.0%)	5 (50.0%)	2 (28.6%)	0 (0.0%)	
No	152 (95.0%)	11 (57.9%)	17 (50.0%)	5 (50.0%)	5 (71.4%)	3 (100.0%)	
Missing	4	0	1	0	1	0	

[1]Chi-Square p-value

1180 Social Disparities in Patients with a history of prior Cesarean

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OBJECTIVE: Since ACOG's call to decrease incidence of non-medically indicated cesarean deliveries (CDs), many providers encourage trial of labor after cesarean (TOLAC). Since social factors impact TOLAC and vaginal birth after cesarean (VBAC), this study reviewed disparities in characteristics of patients choosing a TOLAC vs. elective repeat cesarean delivery (ERCD) at a single New York hospital.

STUDY DESIGN: This was a retrospective cohort of 1,369 deliveries of patients with a history of prior CD between April 29, 2015 – April 29, 2020. Subjects were divided by delivery choice (opting for a TOLAC or ERCD) and had one of two delivery outcomes (VBAC or a repeat CD). Disparities were examined among different social categories including race/ethnicity (White, Asian, Black/ African American, Hispanic/ Latina, Other), health insurance (commercial, public), and pre-pregnancy body mass index (BMI) (< 30, 30-39.9, >40). Chi-squared tests examined proportional differences.

RESULTS: There were significant disparities between patients regarding both cohort and delivery outcome. Patients with a race/ethnicity of "Hispanic/Latina" or "Other" more often opted for and delivered by CD ($p < 0.001$). Patients with public insurance more often chose TOLAC and delivered by VBAC ($p < 0.001$). Patients with a pre-pregnancy BMI of 40+ more often chose TOLAC ($p < 0.001$) but had a lower VBAC rate ($p < 0.01$). Intersections of these categories exist such that publicly insured patients had higher BMI ($p < 0.001$) and certain racial/ethnic groups were more likely to be publicly or privately insured ($p < 0.001$).

CONCLUSION: These findings suggest that certain patients more often elect for repeat CD while others more often choose TOLAC and deliver by VBAC. Race and ethnicity reflect social determinants of health such that disparities may reflect systemic racism within the delivery space. The picture is more complicated at the intersection of insurance and BMI. Additional research among patients with a history of CD is needed.

	Total = 1,029 n (%)	Total = 340 n (%)	χ^2	p
Race & Ethnicity			235.5	< 0.001
White	795 (80.5)	192 (19.5)		
Asian	61 (77.2)	18 (22.8)		
Black/African American	159 (80.3)	39 (19.7)		
Hispanic/Latina	11 (19.0)	47 (81.0)		
Other	3 (6.4)	44 (93.6)		
Health Insurance			22.9	< 0.001
Commercial	541 (70.4)	228 (29.6)		
Public	488 (81.6)	110 (18.4)		
Pre-pregnancy BMI			38.5	< 0.001
< 30	597 (75.7)	192 (24.3)		
30 - 39.9	361 (90.3)	39 (9.7)		
40+	56 (87.5)	8 (12.5)		
	Repeat CD Total = 532 n (%)	VBAC Total = 837 n (%)	χ^2	p
Race & Ethnicity			158.0	< 0.001
White	303 (30.7)	684 (69.3)		
Asian	37 (46.8)	42 (53.2)		
Black/African American	97 (49.0)	101 (51.0)		
Hispanic/Latina	49 (84.5)	9 (15.5)		
Other	46 (97.9)	1 (2.1)		
Health Insurance			21.9	< 0.001
Commercial	340 (44.2)	429 (55.8)		
Public	190 (31.8)	408 (68.2)		
Pre-pregnancy BMI			12.87	0.002
< 30	278 (35.2)	511 (64.8)		
30 - 39.9	118 (29.5)	282 (70.5)		
40+	33 (51.6)	31 (48.4)		
	Private Insurance Total = 694 n (%)	Public Insurance Total = 559 n (%)	χ^2	p
Pre-pregnancy BMI			65.4	< 0.001
< 30	499 (63.2)	290 (36.8)		
30 - 39.9	181 (45.3)	219 (54.7)		
40+	14 (21.9)	50 (78.2)		
Race & Ethnicity			110.7	< 0.001
White	622 (63.1)	363 (36.9)		
Asian	51 (65.4)	28 (34.6)		
Black/African American	52 (26.3)	146 (73.7)		
Hispanic/Latina	17 (29.3)	41 (70.7)		
Other	27 (57.4)	20 (42.6)		

1181 Maternal and fetal tissue specific response to phthalate exposure in the third trimester

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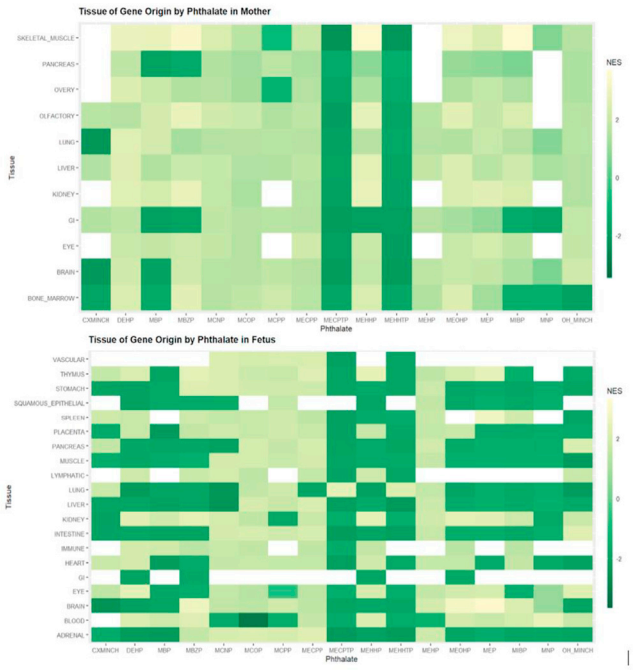
OBJECTIVE: Exposure to phthalates, a class of endocrine disruptors, is pervasive in the modern environment. Exposure during pregnancy has been associated with outcomes like preterm birth, gestational diabetes, and preeclampsia. We hypothesized that high exposure levels will yield specific responses in maternal and fetal tissues.

STUDY DESIGN: Using matched urine and plasma samples collected in 57 singleton women (median 25 weeks gestation), the

concentrations of 17 urinary phthalate metabolites were measured using quantitative mass spectrometry, and maternal cell free RNA was characterized via RNA sequencing. Samples above and below the median for each metabolite were considered high and low exposure, respectively. The fgsea package from Bioconductor was used for gene set enrichment analysis. The cell type signature gene set collection (C8 v2023.1.Hs) from the Molecular Signatures Database was used to identify affected maternal and fetal tissues. Normalized enrichment scores (NES) were compared by high vs low exposure level for each phthalate metabolite. P-values adjusted for multiple testing.

RESULTS: The heat maps displayed NES significance at an adjusted p-value < 0.01 for tissue-specific gene sets by phthalate metabolite. Tissues with altered NES in both maternal and fetal tissues included pancreas, brain, gastrointestinal, kidney, liver, lung, eye. Among fetal gene sets, adrenal, blood, heart, immune, lymphatic, muscle, placental, splenic, stomach, thymic, and vascular showed altered NES. Among maternal gene sets bone marrow, olfactory, ovary, and skeletal muscle showed altered NES. Affected tissues were primarily endocrine and high metabolizing tissues.

CONCLUSION: This novel analysis of gene set expression in response to high vs. low phthalate exposure during the early third trimester demonstrated both up and down regulation in gene expression across a wide variety of fetal and maternal tissues. The patterns of gene set alteration differed between the maternal and fetal context and may suggest potential mechanisms that underly observed associations between phthalate exposure and pregnancy outcomes.



1182 Racial Disparities Impact on Perinatal Outcomes in Patients with Twin-Twin Transfusion Syndrome

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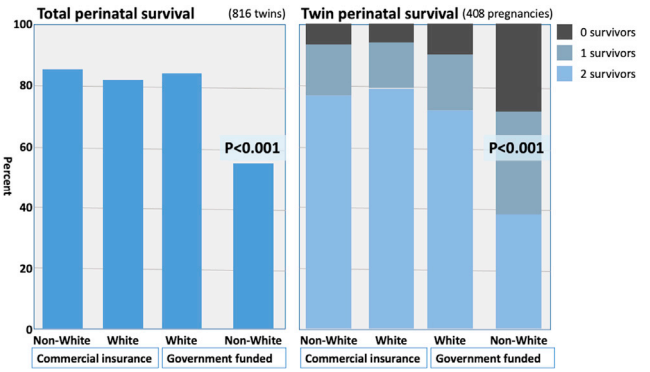
OBJECTIVE: Racial disparities are a recognized factor for adverse outcomes in medicine. The impact of racial disparities on fetal therapy outcomes is largely unexplored. We sought to evaluate the impact of race on outcome in patients with Twin-Twin Transfusion Syndrome (TTTS) presenting for fetoscopic laser surgery (FLS).

STUDY DESIGN: Single site secondary analysis of patients presenting for TTTS evaluation between July 2014 to March 2023. Groups were compared between 5 race categories (White, Black, Hispanic, Asian, and other) and then compared between White and nonwhite groups. Demographics, TTTS characteristics, and FLS outcomes were compared using Fisher's exact Chi-square, Kruskal-Wallis and Mann-Whitney U-tests. Logistic regression was performed based on significance at univariate analysis.

RESULTS: Of 408 patients with TTTS, 301 (73.8%) were White, 47 (11.5%) Black, 38 (9.3%) Hispanic, 20 (4.9%) Asian, and 2 (0.5%) were classified as other. Prior preterm birth was more common in Black patients ($p = 0.04$). Nonwhite patients presented for evaluation later (20.1 [13 − 28.1] vs 18.6 [12.4-28.1] weeks, $p=0.011$) and at more advanced TTTS stages ($p=0.001$). Evaluation to laser interval was 0-1 day for all groups (NS). There was no difference in gestational age (GA) at delivery however perinatal survival was lower in nonwhite patients (160/214 (74.8%) vs 516/602 (85.4%), $p< 0.001$) due to lower double birth survival, 71/107 (66.4%) vs 243/301 (80.7%), $p=0.007$, and they were twice as likely to have no survivors at birth, 15/107 (14%) versus 21/301 (7%), $p=0.01$. The two greatest determinants of laser survival were insurance type and race ($p< 0.001$) [Figure].

CONCLUSION: Nonwhite patients with government insurance have the lowest perinatal survival after laser. Disparities significantly contribute to worse outcomes in patients with TTTS. The reason for these findings is likely complex and multifactorial, skewed by the nature of fetal therapy referral patterns, and demands further study.



1183 The Impact of Body Mass Index on Cesarean Delivery Duration

Mary Taylor Winsten[1], Alexandra Piselli[2], Kylie Mulvaney[1], Babatamilore Alade[2], Taylor Martin[2], Julisa Nunez[2], Fatimah Z. Fahimuddin[3], Gerald Kolm[4], Felicia Hamilton[1]

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OBJECTIVE: Prolonged operative durations are known to increase complications. In obstetrics, prolonged operative times in repeat cesarean deliveries (CD) are known to be a marker for adverse maternal outcomes, with higher maternal body mass index (BMI) potentially being a risk factor. In this study, we sought to compare the length of operative times of CDs across various BMI categories to determine how elevated BMI impacts operating time.

STUDY DESIGN: We performed a single center, retrospective study comparing CD operating times and maternal BMI from July 2021 to December 2022. In this review, we compared total length of time in the operating room (OR), time from skin closure to OR exit, and time from placental delivery to exit. BMI ranges were defined as $<30 m/kg^2$, 30-39.9 m/kg^2, 40-49.9 m/kg^2, and ≥ 50 m/kg^2. Patient exclusion criteria included multifetal gestation and emergent CD. Linear regression models compared BMI categories. Covariates included the total blood loss, concern for bladder or bowel injury, and number of prior CDs.

RESULTS: A total of 1647 patients were included in the study, with 47 being omitted due to missing data. Regression analysis comparing total OR times showed BMI <30 m/kg^2 required significantly less OR time than the 40-49.9 m/kg^2 [95%CI (6.83-19.85), $p=< 0.001$] and ≥ 50 m/kg^2 [95%CI (39.67-61.79), $p=< 0.001$]. Patients with BMI ≥ 50 m/kg^2 had significantly greater total time in the OR compared to BMI 40-49.9 m/kg^2. For placental delivery to exit, the BMI of < 30 m/kg^2 group was significantly less than all other categories. Skin closure to exit times was significantly faster than the group of BMI ≥ 50 m/kg^2 [95%CI (24.58-34.46), $p=< 0.001$], but there was no significant difference between patients with BMIs $<30 m/kg^2$ and those with BMIs of 30-39.9 m/kg^2 or 40-49.9 m/kg^2.

CONCLUSION: Operative times vary based on patients' BMI, with heavier patients having significantly longer procedures. Body mass index ≥ 50 m/kg^2 had the greatest impact on increased total OR time. Given this data, increased BMI may be associated with an increased risk of operative complications and hospital costs.

Table 1. Linear Regressions of Stages of Cesarean Delivery by BMI Categories

	Variable	Regression Coefficient	95% Confidence Interval	p value
Regression of total OR time (minutes)	**BMI category**			
	< 30	Reference		
	30-39.9	3.96	-1.19 : 9.11	0.131
	40-49.9	13.34	6.83 : 19.85	< 0.001
	≥ 50	50.73	39.67 : 61.79	< 0.001
	Covariates			
	Blood loss	0.03	0.03 : 0.04	< 0.001
	Injury concern	31.09	16.30 : 45.87	< 0.001
	Prior CS	9.93	7.73 : 12.13	< 0.001
	Constant	69.66	63.96 : 75.36	< 0.001
Regression of time from placenta delivery to out of OR (minutes)	**BMI category**			
	< 30	Reference		
	30-39.9	2.82	0.23 : 5.41	0.033
	40-49.9	5.09	1.82 : 8.37	0.002
	≥ 50	38.44	32.88 : 44.00	< 0.001
	Covariates			
	Blood loss	0.03	0.03 : 0.03	< 0.001
	Injury concern	22.91	15.48 : 30.34	< 0.001
	Prior CS	1.24	0.13 : 2.35	0.028
	Constant	31.26	28.39 : 34.13	< 0.001
Regression of time from skin closure to exit (minutes)	**BMI category**			
	< 30	Reference		
	30-39.9	1.02	-1.30 : 3.33	0.388
	40-49.9	0.21	-2.71 : 3.14	0.886
	≥ 50	29.52	24.58 : 34.46	<0.001
	Covariates			
	Blood loss	0.01	0.01 : 0.01	<0.001
	Injury concern	7.58	0.99 : 14.18	0.024
	Prior CS	-0.11	-1.11 : 0.87	0.824
	Constant	17.99	15.42 : 20.56	< 0.001

1184 The association between being born small for gestational age and childhood inflammatory bowel disease

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OBJECTIVE: The pathogenesis of inflammatory bowel disease (IBD) is considered multifactorial. Genetic changes, environmental factors and mostly dysregulated immunity, all play a role in the pathogenesis of IBD. Being born small for gestational age (SGA) is known to be related to immunologic aberrations and endothelial dysfunction leading to abnormal placentation. As both IBD and being born SGA share common pathophysiologic features, we sought to investigate the association between being born SGA and childhood IBD.

STUDY DESIGN: A population-based cohort study was conducted. Deliveries occurred between the years 1991-2021 in a tertiary medical center, infants followed up to the age of 18 years. Data for the diagnosis of IBD was extracted from community-based clinics and hospitalization records. Kaplan-Meier survival curve was used to compare the cumulative incidence of childhood IBD of SGA and

non-SGA infants. A Cox proportional hazard model was used to control for confounders.

RESULTS: During the study period, 356,356 singleton deliveries occurred, of which 16,210 (4.5%) infants were born SGA. Being born SGA, was not associated with childhood IBD (0.2% vs. 0.1%, p=0.118, Table). The Cox proportional hazard model adjusted for maternal and gestational age demonstrated that being born SGA was not independently associated with childhood IBD (Adjusted HR 0.94, 95% CI 0.63-1.39, p=0.761, Table).

CONCLUSION: Being born SGA is not a risk factor for childhood IBD.

Table. The association between SGA and childhood IBD; Univariate analysis and results from a Cox proportional hazard model

	SGA infant (n=16,210) n (%)	Non- SGA infant (n=340,146) n (%)	Odds Ratio	95%CI	p value	Adjusted* HR	95%CI	p value
Inflammatory bowel disease	27 (0.2%)	416 (0.1%)	1.36	0.92-2.01	0.118	0.94	0.63-1.39	0.761

* Adjusted for gestational age, maternal age at birth

Outcomes	Balloon (n=40)	Dilapan-S (n=40)	P value
Change in Bishop score	3.0 (2.0,4.5)	3.0 (2.0,5.0)	0.91
Overall patient satisfaction[γ]	8 (5,9)	9 (8,10)	<0.01
Cervical ripening failure*	15 (37.5%)	7 (17.5%)	0.045
Unscheduled medical contact	14 (35.0%)	3 (7.5%)	<0.01
Vaginal Delivery	30 (75%)	30 (75%)	1
Time to delivery (hours)	17.0 (11.7,28.4)	20.1 (13.9,26.2)	0.89
Maternal length of stay (days)	2.9 (2.7,3.9)	3.2 (2.7,4.7)	0.98
Maternal morbidity composite[α]	8 (20%)	8 (20%)	1
Neonatal morbidity composite[β]	0 (0%)	1 (2.5%)	1

Data are presented as number (percentage) or median (quartile 1, quartile 3).
[γ] On scale of 0-10
* Defined as inability to place CR or need for further cervical ripening post removal
[α] Maternal composite: transfusion, chorioamnionitis, endometritis, wound infection, venous thromboembolism, hysterectomy, or ICU admission
[β] Neonatal composite: sepsis, transfusion, therapeutic hypothermia/HIE, or IVH

1185 Single-balloon catheter versus Dilapan-S placement for outpatient cervical ripening: A single-blind randomized controlled trial

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OBJECTIVE: To compare Dilapan-S to cervical balloon for outpatient cervical ripening (CR).

STUDY DESIGN: This was a single-blind, randomized controlled trial at a single tertiary hospital between May 2022 and July 2023. Term patients with no prior c-section and a singleton, vertex fetus scheduled for outpatient CR per hospital policy were eligible. Prior to CR, an NST and exam to confirm Bishop score < 6 were performed. Patients were then consented and randomized to CR catheter with 60mL in the intrauterine balloon or 3 to 5 Dilapan-S hydroscopic dilators then discharged home. Patients returned in 6-24 hours per policy or if clinically indicated. CR agent was removed, blinded exam performed, and patients completed a satisfaction survey. Further induction was per the obstetrical provider. Primary outcome was change in Bishop score. Secondary outcomes included patient satisfaction, time to delivery, mode of delivery, cervical ripening failure (failure to place or need for further ripening) and composite maternal and neonatal morbidity.

RESULTS: 80 patients were randomized with no difference in baseline demographic data, percent nulliparous, starting dilation, or Bishop score. There was no significant difference in change in Bishop score between Dilapan-S and balloon (median change 3 (interquartile range (IQR) 2-5) vs 3 (IQR2-4.5) respectively, p=0.91). There was no difference in time to delivery, mode of delivery or maternal or neonatal outcomes (Table 1). Patients with Dilapan-S were significantly more satisfied with their experience (scale 0-10, median 9(IQR 8-10) vs 8(IQR 5-9), p=0.008) and significantly less likely to experience cervical ripening failure (7(17.5%) vs 15(37.5%), p=0.045) or have unscheduled contact with the medical team (3(7.5%) vs 14(35%);p< 0.01).

CONCLUSION: Dilapan-S was non-inferior to cervical balloon catheter for outpatient cervical ripening based on change in Bishop score. Patients were significantly more satisfied with Dilapan-S and significantly less likely to experience cervical ripening failure or have unscheduled contact with the medical team compared to single balloon catheter.

1186 Pre-Pregnancy BMI Associated with Increased Perceived Stress During Pregnancy and Adverse Pregnancy and Neonatal Outcomes

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OBJECTIVE: The association between Body Mass Index (BMI) and perceived stress is understudied. We hypothesized that a greater BMI is associated with increased maternal stress and adverse pregnancy and neonatal outcomes.

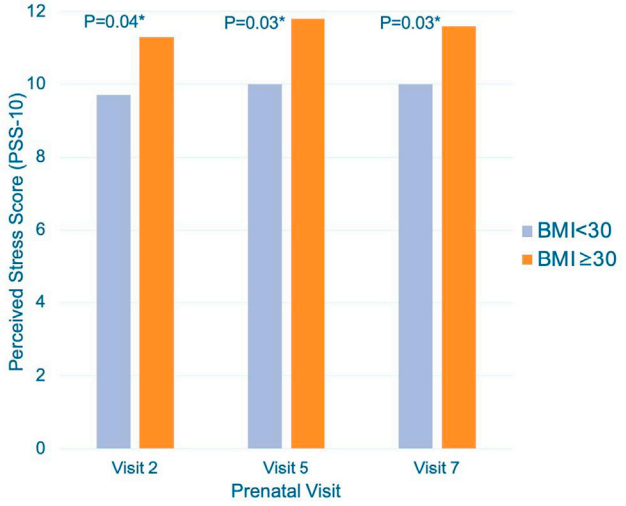
STUDY DESIGN: This 2° retrospective analysis of the Kellogg Vitamin D Pregnancy Study included women aged 18−45 who presented to MUSC obstetric clinics within 14 weeks' gestation between January 2013−May 2016. Baseline maternal health and sociodemographic information was collected during first study visit. Birth outcomes and infant parameters were collected at birth. Linear regression analyses used to show association between maternal Perceived Stress Scale (PSS-10) scores and maternal and infant characteristics; and logistic regression analyses used to show factors associated with pregnancy outcomes and maternal PSS-10 scores. Generalized linear mixed effect models created to measure the relationship between maternal PSS-10 scores and BMI, marital status, race, education, insurance status, planned pregnancy, gestational diabetes, and visit.

RESULTS: 212 women completed PSS-10 at 16, 28, and 36 wks GA and were the basis for these analyses (154 had BMI< 30, 58 had BMI ≥30). BMI≥30 associated with increased PSS-10 scores at each visit (p< 0.05). Women with BMI≥30**:** more likely unmarried, Black/Hispanic, less college, Medicaid insurance, and lower 25(OH)D (p< 0.05). In mixed effect models, increased PSS-10 scores associated with BMI≥30, unmarried, planned pregnancy, and decreased maternal 25(OH)D. BMI≥30 associated with lower maternal weight gain, lower maternal 25(OH)D 1 month before delivery, and AUC (p< 0.05). Neonates born to women with BMI≥30 were more likely admitted to higher acuity care, had shorter gestational age, and lower 25(OH)D (p< 0.05).

CONCLUSION: Pregnant women with BMI≥30 had sociodemographic differences and greater vitamin D deficiency, perceived stress, and adverse neonatal outcomes. BMI remained a strong predictor of

higher neonatal acuity and shorter gestational age. Public health efforts should be directed at effective, sustained treatment to reduce BMI prior to pregnancy.

Figure 1. Perceived Stress Scores at Visits 2, 5, and 7



BMI ≥30 associated with increased perceived stress scores at visits 2, 5, and 7.

1187 Placental abruption and antepartum hemorrhage delivery hospitalization trends, risk factors, and outcomes

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OBJECTIVE: Placental abruption is a serious condition involving early separation of the placenta. The objective of this study was to identify trends and adverse outcomes associated with placental abruption.

STUDY DESIGN: The 2000-2020 National Inpatient Sample was used for this repeated cross-sectional study. Delivery hospitalizations to women age 15-54 years were identified. Temporal trends in abruption were analyzed with joinpoint regression to determine the average annual percentage change (AAPC) with 95% CIs. The association between hospital, demographic, and clinical factors and placental abruption was analyzed with logistic regression models. Logistic regression models were then used to assess odds of adverse outcomes associated with placental abruption accounting for demographic, hospital, and patient factors.

RESULTS: Of 80.2 million deliveries from 2000 to 2022, 1.1 million had an abruption diagnosis. Placental abruption risk increased from 1.2% of deliveries in 2000 to 1.6% in 2020 (AAPC 0.5). Placental abruption was associated with multiple gestation, hypertensive diagnoses, diabetes, asthma, and Medicaid insurance. In unadjusted and adjusted analyses, placental abruption was associated with a range of adverse outcomes with adjusted odds highest for transfusion (aOR 6.9, 95% CI 6.7, 7.0) and preterm birth (aOR 8.4, 95% CI 8.2, 8.5) (Table). Risk for several adverse outcomes associated with abruption increased over the study period including postpartum hemorrhage (from 4.4% to 9.2%, AAPC 4.1%) and transfusion (3.9% to 6.2%, AAPC 2.7%).

CONCLUSION: Risk for placental abruption increased over the study period and was associated with several adverse outcomes. Among deliveries with abruption, risk for several complications increased significantly including transfusion and postpartum hemorrhage. Given trends in both increasing incidence and related complications, placental abruption is likely to continue to be a significant source of adverse obstetric outcomes.

Table. Risk for adverse obstetric outcomes associated with placental abruption

Adverse outcomes	No Abruption		Abruption		Unadjusted model		Adjusted model	
	N	%	N	%	OR	95% CI	aOR	95% CI
Transfusion	671,097	0.9%	53,564	6.3%	7.91	7.72, 8.11	6.86	6.70, 7.03
Non-transfusion severe maternal morbidity	530,082	0.7%	26,452	3.1%	4.79	4.65, 4.94	4.04	3.92, 4.17
Preterm delivery	4,811,247	6.1%	300,582	35.5%	8.52	8.38, 8.65	8.38	8.24, 8.52
Postpartum hemorrhage	2,449,688	3.1%	48,449	5.7%	1.90	1.86, 1.95	1.77	1.73, 1.81
Disseminated intravascular coagulopathy	151,097	0.2%	11,545	1.4%	7.24	6.88, 7.62	6.41	6.10, 6.74
Critical care procedures	63,474	0.1%	4,107	0.5%	6.08	5.39, 6.87	4.84	4.34, 5.40
Hysterectomy	62,040	0.1%	3,334	0.4%	5.05	4.66, 5.47	4.24	3.90, 4.60
Cesarean delivery	24,324,599	30.7%	491,111	58.0%	3.12	3.06, 3.18	3.07	3.01, 3.12
Chorioamnionitis/endometritis	2,396,856	3.0%	46,062	5.4%	1.85	1.79, 1.91	1.81	1.75, 1.86

OR, odds ratio. *aOR*, adjusted odds ratio. Adjusted models accounted for demographic factors, hospital factors, and clinical factors.

1188 Sonographic versus birth weight for fetal growth curves in twins

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OBJECTIVE: Twin gestations are subjected to higher rates of growth abnormalities. Accurate locally customized reference values may contribute to accurately diagnosing abnormal fetal growth. We aimed to determine reference values for ultrasound-based estimated fetal weight (EFW) and compared them to the actual birth-weight curve for twins.

STUDY DESIGN: A multicenter retrospective longitudinal analysis of sonographically EFW evaluations of twin gestations performed between 2009 and 2022 in 10 medical centers in Israel. Estimated fetal weight at 14-40 gestational weeks was calculated using the Hadlock 1985 formula. No exclusions were made on grounds of chorionicity. The non-parametric Quantile Generalized Additive Model (QGAM) approach was employed. Following the calculation of the 10th, 50^{th,} and 90th percentile for each gestational week and the construction of ultrasound-based curves, we compared the 10th percentile at 22 to 37 gestational weeks with that calculated using the Israeli local twin specific actual birth weight curve.

RESULTS: After cleaning procedures, the dataset comprised data from 5,506 mothers with approximately 26,500 sonographic evaluations of EFW (median 5 evaluations per pregnancy). Values corresponding to the 50th, 10^{th,} and 90th percentiles were calculated with the construction of the ultrasound-based reference curve. The 10th percentile of the sonographic EFW curve was about 100-200 grams

higher than the 10th percentile of the birth-weight curve, matching the 15-20 growth percentiles (figure).

CONCLUSION: The sonographic EFW curve and the actual birth-weight curve established different cutoff values for the 10th percentile in twin gestation. Choosing the appropriate growth curve is important to avoid misdiagnosis of growth abnormalities.

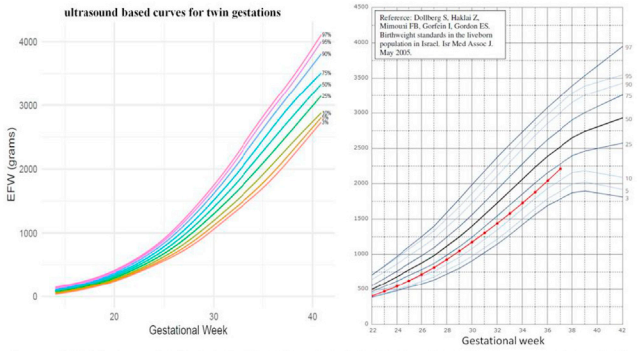

Figure. Left panel: The sonographic estimated fetal weight . Right panel: The birth-weight curve (blue and black lines) and the 10th percentile of the calculated sonographic estimated fetal weight (red line)

1189 The effect of fetal surveillance on fetal outcomes in pregnancies with fetal growth restriction

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OBJECTIVE: There is no consensus regarding the appropriate follow-up frequency in fetal growth restriction (< 10th percentile; FGR). We examined whether FGR would benefit from careful monitoring with stratification for normal and pathological cerebro-placental ratio (CPR).

STUDY DESIGN: This was a retrospective cohort study conducted between 2016 and 2020 in two medical centers. Women with suspected FGR (with (N=135) and without (N=269) pathological CPR underwent a strict monitoring regimen (1-2 well being assessments per week and Doppler flows once a week). These groups were compared to two control groups - fetuses identified only after birth as small for gestational age (SGA; N=693), and fetuses appropriate for gestational age (AGA; N=864) in which routine follow-up was done. Twins were excluded. The primary outcomes were (1) a composite outcome of cesarean deliveries (CD) due to suspected fetal distress, Apgar score< 7 at 5 min, cord pH< 7.1, neonatal intensive care unit admission, need for neonatal oxygen support and intrauterine fetal death, and (2) The rate of women in whom the strict follow-up led to induction of labor/CD before 37 weeks.

RESULTS: Study outcomes are presented in the table. The composite outcome was significantly different between the pathological CPR, normal CPR, SGA and AGA groups (61%, 34%, 24%, 12% respectively; P< 0.0001). Following logistic regression to control for background characteristics, the difference in the rate of the composite outcome was statistically significant between all groups except from the normal CPR group versus the SGA group (table). The strict follow-up led to a higher rate of induction of labor/CD before week 37 in the group with the pathological CPR (23 [18%]) compared to those with normal CPR (11 [4%]), P< 0.0001.

CONCLUSION: The knowledge of FGR led to additional interventions, but without improving the outcomes of the newborn. CPR measurement may have a role in the assessment and adjustment of the follow-up plan. In cases where the CPR was normal, the rate of interventions before week 37 was low, and close follow-up may not be necessary in these cases.

Table - Maternal and fetal outcomes

	Suspected FGR with pathologic CPR (n=135)	Suspected FGR with normal CPR (n=269)	fetus identified as FGR only after birth (n=693)	AGA fetus (n=864)	P- value
univariable analysis					
Delivery week	36.5±2.9	38.2±1.7	39.4±1.5	39.5±1.7	<0.0001
Preterm birth	50 (37%)	30 (11%)	25 (4%)	26 (3%)	<0.0001
Induction of labor	64 (47%)	151 (56%)	225 (32%)	262 (30%)	<0.0001
Delivery type:					
- Vaginal	51 (38%)	162 (60%)	476 (69%)	683 (79%)	<0.0001
- CD	82 (61%)	94 (35%)	150 (22%)	133 (15%)	
- Vacuum	2 (1%)	13 (5%)	67 (10%)	48 (6%)	
CD for suspected fetal distress	45 (33%)	39 (15%)	73 (11%)	32 (4%)	<0.0001
Fetal malformations	16 (12%)	31 (12%)	52 (8%)	35 (4%)	<0.0001
Neonatal oxygen support	31 (23%)	34 (13%)	79 (11%)	44 (5%)	<0.0001
Neonatal mechanical ventilation	15 (11%)	10 (4%)	22 (3%)	8 (1%)	<0.0001
Respiratory distress	13 (10%)	4 (1%)	13 (2%)	9 (1%)	<0.0001
Phototherapy	48 (36%)	59 (22%)	85 (12%)	106 (12%)	<0.0001
Hypoglycemia	31 (23%)	19 (7%)	40 (6%)	21 (2%)	<0.0001
Admission to NICU	67 (50%)	63 (23%)	88 (13%)	40 (5%)	<0.0001
Days at NICU	11.7±21.8	3.2±10.2	1.2±4.7	0.7±5.0	<0.0001
Intrauterine fetal death	0 (0%)	1 (0.4%)	2 (0.3%)	1 (0.1%)	0.74
Intrapartum fetal death	0 (0%)	0 (0%)	0 (0%)	0 (0%)	-
Neonatal fetal death	1 (1%)	1 (0.4%)	3 (0.4%)	1 (0.1%)	0.51
APGAR score < 7 at 5 min	4 (3%)	5 (2%)	12 (2%)	2 (0.2%)	0.004
APGAR at 1 min	8.4±1.5	8.6±1.3	8.6±1.4	9.0±0.9	<0.0001
APGAR at 5 min	9.3±1.3	9.4±1	9.4±1.1	9.7±0.7	<0.0001
Blood cord pH<7.1	2 (2%)	8 (4%)	12 (3%)	22 (3%)	0.68
Composite Outcome*	83 (61%)	91 (34%)	167 (24%)	105 (12%)	<0.0001
Follow-up led to induction of labor/CD before 37 GW	23 (18%)	11 (4%)	---------	----------	<0.0001

Multivariable analysis for the composite outcome

Comparison group	Reference group	OR_{adj} 95%CI
Suspected FGR with pathologic CPR	Suspected FGR with normal CPR	**2.0 [1.3-3.2]**
Suspected FGR with pathologic CPR	Fetus identified as SGA only after birth	**2.5 [1.7-3.3]**
Suspected FGR with pathologic CPR	AGA fetus	**5.3 [3.4-8.3]**
Suspected FGR with normal CPR	Fetus identified as SGA only after birth	1.2 [0.9-1.6]
Suspected FGR with normal CPR	AGA fetus	**2.6 [1.8-3.7]**
Fetus identified as SGA only after birth	AGA fetus	**2.2 [1.7-2.9]**

Values are presented as Mean ± SD or number (percent)
* The composite outcome comprised of cesarean deliveries due to suspected fetal distress, Apgar score<7 at 5 min, cord pH<7.1, neonatal intensive care unit admission, need for neonatal oxygen support and intrauterine fetal death
Odds ratio (OR) was adjusted to ethnicity, smoking, hypertensive diseases of pregnancy, maternal age, number of previous pregnancies, number of previous deliveries and delivery week
Abbreviations – AGA, appropriate for gestational age; CD, cesarean delivery; FGR, fetal growth restriction; GW, gestational week; NICU- neonatal intensive care unit ; OCT- oxytocin challenge test

1190 Presence of SSA/SSB antibodies and risk of preeclampsia in patients with autoimmune disease

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OBJECTIVE: The presence of anti-Sjogren's syndrome-related antibody A (SSA) or B (SSB) in pregnant patients is associated with neonatal lupus and heart block. However, data on adverse maternal outcomes is limited. We hypothesized these antibodies are associated with a higher risk of adverse maternal outcome. We sought to assess

the association of SSA/SSB antibodies with the development of preeclampsia and other adverse obstetric outcomes in gravidas with autoimmune disease.

STUDY DESIGN: This is a historical matched case-control study of all patients with positive SSA or SSB antibodies from 1/2010 to 8/2022 who delivered at a tertiary referral center. The study group was matched by age, parity, and autoimmune disease to gravidas with autoimmune disease without SSA/SSB antibodies. Primary outcome was preeclampsia with or without severe features. Secondary outcomes were gestational hypertension, cesarean delivery and spontaneous preterm birth. Categorical variables were compared using Chi-square and Fisher's exact test. Student t-test or Mann Whitney test were used for continuous variables. Multivariable logistic regression analysis was performed to adjust for confounders (age, obesity, parity, antiphospholipid syndrome, chronic hypertension, pregestational diabetes).

RESULTS: 124 SSA/SSB antibody positive patients were compared to 86 SSA/SSB negative patients. The characteristics and outcomes are presented in Table 1. The incidence of preeclampsia was significantly higher in patients with positive SSA/SSB antibodies compared to those without antibodies (21.0% vs 10.5%, p=0.04). There was no difference in the incidence of gestational hypertension, spontaneous preterm birth or cesarean delivery. After adjusting for confounders, positive SSA/SSB antibodies remained an independent risk factor for preeclampsia (OR 2.66, 95% CI 1.04-6.84, p=0.04).

CONCLUSION: In our historic cohort, the presence of SSA/SSB antibodies in patients with autoimmune disease appears associated with an increased incidence of preeclampsia. Additional larger and prospective studies are necessary to further examine this possible association.

Table 1. Characteristics and outcome of patients with autoimmune disease and positive versus negative SSA or SSB antibodies

	SSA/B positive (n=124)	SSA/B negative (n=86)	P value
Age, years (mean ±SEM)	30.5 ±0.5	31.5 ±0.6	0.2
Parity (median, IQR)	1 (2)	1 (2)	0.5
BMI, kg/m² (mean ±SEM)	28.9 ±0.6	29.6 ±0.9	0.9
Race/Ethnicity			0.06
Non-Hispanic White	6 (5.2)	5 (6.4)	
Non-Hispanic Black	22 (19.1)	28 (35.9)	
Hispanic	59 (51.3)	38 (48.7)	
Gestational age at delivery, weeks (median, IQR)	38 (2)	38 (3)	0.3
Preeclampsia	26 (21.0)	9 (10.5)	0.04
Gestational hypertension	27 (22.5)	12 (14.0)	0.1
Spontaneous preterm birth	14 (11.6)	10 (11.8)	0.9
Cesarean delivery	47 (38.2)	36 (42.4)	0.5

1191 Prophylactic TXA prior to skin incision in high-risk cesarean deliveries: Does it make a difference?

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OBJECTIVE: The objective of this study was to evaluate the implementation and impact of a quality improvement (QI) protocol focused on prophylactic tranexamic acid (TXA) administration prior to skin incision in cesarean deliveries (CD) at high-risk for postpartum hemorrhage (PPH).

STUDY DESIGN: We undertook a QI initiative centered on prophylactic TXA given prior to skin incision in CDs at medium to high risk for PPH. We evaluated perioperative outcomes in 2 successive cohorts – 3 months before and after implementation, from November 2022 to April 2023. Our protocol entailed: 1 gm IV infusion 10 minutes prior to skin incision in CDs with no contraindications to TXA. Demographic characteristics and perioperative outcomes were abstracted from electronic records and compared across the 2 groups using Student's t-test and c^2 or Fischer's exact test for continuous and categorical data, respectively. Statistical significance was set at $p \leq .05$. Our primary implementation outcome was % of eligible CDs receiving prophylactic TXA per protocol and primary effectiveness outcomes were quantitative blood loss (QBL) and need for transfusion.

RESULTS: 250 patients were included in this analysis: 125 each, pre and post-implementation. Demographic characteristics were similar across both groups, including BMI, number of prior CDs, type of anesthesia, uterine incision, timing, type and duration of CD, and gestational age at delivery. Of all eligible patients, 62.1% (n=72) in the pre- and 90.4% (n=103) in the post-implementation group received TXA per protocol ($p < .01$). QBL was similar across groups; however, the post-implementation group had lower rates of transfusion, including number of packed red blood cells (PRBC), total units transfused, and cases requiring >2 units PRBC, which trended towards significance (p=.07). Changes in hemoglobin, need for additional uterotonic agents, and arterial embolization/cesarean hysterectomy rates were similar.

CONCLUSION: Prophylactic TXA administration may have limited clinical utility in high-risk CDs, however the optimal timing of administration and effectiveness needs further evaluation.

Table 1: Perioperative Outcomes from Prophylactic TXA Administration Prior to Skin Incision

Outcome	Pre-Protocol n=125	Post-Protocol n=125	P
Eligible candidate for TXA	116 (92.8)	114 (91.2)	.64
TXA administered	75 (60.0)	109 (87.2)	<.0001
TXA given (if candidate)	72 (62.1)	103 (90.4)	<.0001
Additional uterotonics/management	33 (26.4)	35 (28.0)	.12
1	18 (14.4)	24 (19.2)	
>1	15 (12.0)	11 (8.8)	
Vacuum or balloon intrauterine device	7 (5.6)	1 (0.8)	
Postpartum blood loss, ml	1068 ± 627.9	1055 ± 555.7	.85
< 1000 ml	71 (56.8)	65 (52.0)	.45
≥ 1000 ml	54 (43.2)	60 (48.0)	
Product Transfusion	22 (17.6)	12 (9.6)	.07
# Red cell units transfused	0.4 ± 1.1	0.2 ± 0.7	.07
# Total units transfused	0.6 ± 1.9	0.2 ± 0.9	.07
≥ 2 units PRBC	15 (12.0)	7 (5.6)	.07
Postoperative hemoglobin	9.4 ± 1.3	9.4 ± 1.3	.92
Peripartum Δ in hgb	-1.8 ± 1.0	-1.6 ± 1.1	.095
Peripartum decrease > 2 g/dl	46 (37.7)	40 (32.0)	.35
Arterial embolization, emergency surgery for PPH, or hysterectomy	4 (3.2)	2 (1.6)	.41

Data presented as n (%) or mean ± standard deviation; TXA, tranexamic acid; PRBC, packed red blood cells; hgb, hemoglobin; PPH, postpartum hemorrhage

1192 The Evolving Landscape of Biomedical Informatics for Postpartum Hypertension: A Scoping Review

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OBJECTIVE: Postpartum hypertension (PPHTN) affects more than 10% of deliveries and can affect multiple systems such as neurological and renal systems in the mother while also affecting the infant negatively. The objective of this scoping review is to investigate the role of biomedical informatics in the identification and management

of PPHTN, with a focus on the use of machine learning/artificial intelligence (ML/AI) for early identification.

STUDY DESIGN: A structured search was used to query Scopus, PubMed, IEEE Xplore for relevant articles. The scoping review identified studies that described the application of ML/AI for prediction, prevention, or early detection of adverse events in each of the harm domains. Inclusion criteria**:** Included PPHTN or high blood pressure occurring within the first six weeks following childbirth, studies based on humans, ML studies with PPHTN, and ML studies in postpartum related complications. Exclusion criteria removed papers unrelated to the postnatal period, meta-analyses, any review, prenatal or gestational only studies.

RESULTS: A total of 462 articles were obtained with the keywords "machine learning", "artificial intelligence", with the following keywords "postpartum hypertension", "high blood pressure", "postnatal hypertension". Four articles were selected after screening according to the inclusion and exclusion criteria. Data used to predict PPHTN were electronic health records (EHR) (75%), medical records (25%). In 3 studies, the main metrics used were**:** Area under the curve, sensitivity, specificity, and accuracy. Most common ML methods used were logistic regression and XGBoost. Out of the ML approaches used, the best results were found using XGBoost technique with an AUC score of 0.85.

CONCLUSION: Our results demonstrate that AI-based methods to reduce PPHTN have been limited to a small number of studies that focus on structured EHR data elements. In conclusion, our findings highlight the potential for AI to improve diagnosis and treatment of patients with PPHTN by overcoming various problems related to early identification, and management of postnatal hypertension.

Ref	Time of data collection	Number patients	Outcome	Validation technique	ML technique	Performance metric				
						AUC	Sen (%)	Spec (%)	Acc (%)	F1 - score
Hoffman et al. (2020)	Deliveries between January 2015 – August 2019	25,559	Readmission within 42 days with hypertension after delivery	10-fold cross validation with 10% random suppression of data	XGBoost	0.85 in derivation cohort 0.81 in validation cohort	-	-	-	-
Wang et al. (2021)	Hospitalized women with preeclampsia from January 2010 – April 2019	907	Postpartum cardiovascular risk	10-fold cross validation	LR SVM NB XGBoost RF	0.687 0.606 0.629 0.683 0.711	0.802 0.796 0.802 0.802 0.815	0.994 0.981 0.987 0.977 0.984	0.810 0.799 0.801 0.803 0.817	-
Li et al. (2022)	Combination of patients admitted to hospital between June 2017 – May 202 and September 2019-May 2020	1,000	Classification of low, medium, and high-risk individuals of persistent postpartum hypertension	-	Latent Class cluster analysis	-	-	-	-	-
Venkatesh et al. (2023)	Deliveries from 2 different health systems: Southern US from 2014-2015 Northeast US 2017-2019	28,201	Postpartum readmission for hypertension or pre-eclampsia	Internal-external cross validation	Logistic Regression	0.80	-	-	-	-

1193 The Yield of Amnioinfusion in the Prevention of Postpartum Hemorrhage

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OBJECTIVE: Previous report highlighted the role of amnioinfusion in the prevention of uterine atony (Wetta et al., AJOG 2013). However, whether or not amnioinfusion decreases the risk of postpartum hemorrhage (PPH) is unknown. This study aimed to determine whether amnioinfusion reduces the risk of PPH.

STUDY DESIGN: This was a retrospective study of all laboring individuals at a single tertiary center between 01/2013 and 12/2022 at $\geq$ 34 weeks. Individuals with planned cesarean delivery (CD), known major fetal anomalies, stillbirth, or missing delivery records were excluded. The primary outcome was a composite outcome including any of the following**:** PPH (estimate blood loss of $\geq$1,000 mL or blood loss accompanied by signs or symptoms of hypovolemia within 24 hours from delivery) blood transfusion, need for uterotonic (in addition to oxytocin), mechanical tamponade, surgical management of PPH, or relaparotomy or hysterectomy. Multivariable regression models were used to estimate adjusted odd risks (aOR), controlling for variables identified in the univariate analysis.

RESULTS: Of 109,989 deliveries during the study period, 89,321 (81%) met the inclusion criteria. Of those, 4,452 (5%) had amnioinfusion during labor. Laboring individuals with amnioinfusion, compared to those without, were more commonly nulliparous (61.2% vs. 34.7%; P< 0.01), had polyhydramnios (3.8% vs. 2.7%; P< 0.01), had a higher rate of labor induction (56.0% vs. 28.8%; P< 0.01), and had a higher CD rate (35.3% vs. 10.4%; P< 0.01). Following a multivariable regression, there was no difference in the rate of composite outcome among individuals that had an amnioinfusion versus those that did not. The rates of infectious morbidity, including surgical site infection and postpartum fever, were higher among individuals with amnioinfusion than those without (Table).

CONCLUSION: Among laboring individuals $\geq$ 34 weeks, intrapartum amnioinfusion was not associated with a significant reduction in the rate of postpartum hemorrhage, though amnioinfusion was associated with a higher likelihood of infectious morbidity.

Table: Intrapartum amnioinfusion during labor and maternal outcomes

Outcomes	Amnioinfusion N=4,452	No Amnioinfusion N=84,869	P-value	aOR (95% CI)#
Composite outcome*	116 (2.6)	2732 (3.2)	0.53	0.94(0.77,1.14)
PPH	116 (2.6)	2732 (3.2)	0.53	0.94(0.77,1.14)
Blood transfusion	40 (0.89)	897 (1.1)	0.45	0.88(0.64,1.22)
Uterotonic**	14 (0.31)	437 (0.5)	0.24	0.72(0.42,1.24)
Surgical Management***	1 (0.0)	3 (0.0)	0.10	6.35(0.66,61.11)##
Re-laparotomy or hysterectomy	0(0.0)	3(0.0)	0.99	NC
Endometritis	54 (1.2)	497 (0.6)	0.15	1.24(0.92,1.67)
Surgical site infection	**15 (0.95)**	**53 (0.59)**	**0.03**	**1.88(1.05,3.38)###**
Postpartum fever	**90 (2.0)**	**928 (1.1)**	**0.01**	**1.33(1.06,1.67)**

Data presented as N (%)
aOR: adjusted odds ratio, CI: confidence interval, PPH: postpartum hemorrhage; NC, not calculated
#Adjusted for nulliparity, intrapartum fever, mode of delivery, and induction.
Unadjusted OR
Adjusted for the mode of delivery. The rate is only among cesarean sections.
*Defined as PPH (blood, need for uterotonic apart from prophylactic oxytocin, blood transfusion during labor or postpartum admission or need for surgical management of PPH or re-laparotomy or hysterectomy.
** Defined as the need for uterotonic apart from prophylactic oxytocin or mechanical tamponade (balloon) for atony
***Defined as need for surgical management of PPH (O'Leary stitch, B'Lynch, uterine artery embolization, hysterectomy and relaparotomy)

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