Riley Children’s Health is Indiana’s only full-service statewide pediatric health system. Riley Children’s Health offers complete, comprehensive pediatric care ranging from routine primary care checkups to the most complex acute care needs from highly skilled pediatric specialists. The system connects patients with 200 primary care and 400 specialty care physicians in 15 communities across the state of Indiana. Riley Physicians treat patients in their home communities, bringing top-notch care close to home. This statewide network is an extension of Riley Hospital for Children at Indiana University Health, one of the nation’s leading children’s hospitals.

rileychildrens.org
Welcome to Riley Children’s Health

We are pleased to present this annual report and overview of the medical specialties* that comprise Riley Children’s Health, one of the nation’s leading healthcare networks specifically for children. Focused on improving care, discovering novel therapies through research and creating programs of distinction, we are committed to making leading-edge medicine and high-quality, safe care available to more children and families in Indiana and beyond.

Whether you are well acquainted with Riley Children’s Health or learning about us for the first time, here are some important highlights of our children’s health system:

- The only hospital in Indiana to be ranked among the top children’s hospitals in the nation by U.S. News & World Report; ranked in eight specialties for 2018-19
- Part of nationally ranked Indiana University Health, the state’s largest health system
- Eighth-ranked children’s hospital in the United States for research funding
- Affiliated with Indiana University School of Medicine, one of the nation’s largest medical schools and one of the highest funded institutions for pediatric research by the National Institutes of Health (NIH)
- One of the select number of children’s hospitals in the nation to be verified by the American College of Surgeons as a Level I Pediatric Trauma Center
- Among fewer than 500 hospitals nationwide to earn Magnet® status from the American Nurses Credentialing Center, recognizing nursing excellence and high-quality clinical outcomes
- A partner in the Children’s Hospital Association and the Solutions for Patient Safety, a network of more than 130 hospitals throughout North America that share best practices to improve the safety and quality of pediatric care

We hope this report serves as a valuable resource for learning more about our breadth of services and the depth of our commitment to pediatric clinical care and research. Our physicians and team members work tirelessly each and every day to provide children with the kind of quality care and advanced treatment that makes it possible to live long and healthy lives.

* The surgical specialties of Riley Children’s Health are highlighted in a separate annual report. To view this report, visit rileychildrens.org/surgeryannualreport; print copies may also be requested from rileychildrens@iuhealth.org.
Riley Maternity and Newborn Health

Riley Maternity and Newborn Health is a comprehensive statewide program consisting of a hospital-based center and an expanded perinatal network. The program is designed to increase access to coordinated, high-quality medical care to improve the health outcomes for at-risk pregnant women and infants throughout Indiana. Offering obstetric, delivery, newborn and comprehensive pediatric subspecialty services, the integrated program will be a new model of coordinated care that essentially treats mother and baby as one patient, surrounding them with the medical support they need.

In addition to the Maternity Center at Riley Hospital for Children, Riley Maternity and Newborn Health includes:

A statewide network of maternal fetal medicine specialists
- Ten maternal fetal medicine physicians currently practice in five locations across the state.
- The program serves pregnant women, with specialists completing more than 11,000 patient visits annually.

Riley Fetal Center
- The center’s multidisciplinary approach supports pregnant women whose fetuses are diagnosed with congenital anomalies.
- In 2018, the center coordinated care for 200 referral patients.

Maternity and newborn health statewide simulations
- Riley facilitates educational simulations for maternity centers and neonatal units across Indiana.
- Thirty neonatal unit and eight maternity outreach simulation programs were completed in 2018.

Community initiatives
Maternal substances abuse. In 2018, the Riley maternal fetal medicine program at IU Health University Hospital facilitated nine centering groups to support 84 opioid-exposed pregnant women.

Infant mortality. Riley supports community infant mortality efforts and provides systems improvement expertise to the Indiana Perinatal Quality Improvement Collaborative.

“Riley Children’s Health is deepening its impact on the health of Hoosiers by expanding our focus to include comprehensive obstetric care for pregnant women while continuing our long-standing commitment to children. Indiana currently ranks poorly in infant mortality rates, and this program is designed to provide the best possible outcomes for expectant mothers and their newborns.”
Matthew Cook
President, Riley Children’s Health

Coming soon: Maternity Center at Riley Hospital for Children

Construction is underway for a comprehensive maternity and newborn health center that centralizes all obstetric services and neonatal care offered at the three downtown Indianapolis hospitals of IU Health. The $142 million building project includes renovation of one existing section of Riley Hospital for Children at IU Health, located adjacent to the original hospital lobby, as well as the fourth floor of the Riley Outpatient Center. The maternity center, which will provide care for routine to highly complex pregnancies, will include more than 60 beds for mothers.

Four floors at Riley at IU Health will be renovated to house inpatient services, including a labor and delivery (plus antepartum) unit, a Level III neonatal intensive care unit (NICU), and a postpartum unit. This will replace the existing inpatient labor and delivery, NICU, and postpartum spaces at IU Health Methodist Hospital.

The existing Level IV NICU at Riley at IU Health will stay in place, allowing mothers and babies who need the highest level of care to remain in the same building after birth. The combined 47-bed Level III NICU and 60-bed Level IV NICU will make Riley at IU Health home to the largest NICU in Indiana and among the largest in the country.

The project will also relocate the existing outpatient maternal fetal medicine offices from both IU Health University Hospital and IU Health Methodist Hospital to the Riley campus. The outpatient space will also house the Riley Fetal Center, which provides coordinated care for expectant mothers carrying a fetus with a suspected birth defect. The Riley Fetal Center is staffed by maternal fetal medicine physicians, neonatologists and pediatric subspecialists.

Riley Fetal Center
The Riley Fetal Center supports preeminent management of a broad range of complex or high-risk fetal conditions, while providing advanced, coordinated care to support families during this critical time.

- Advanced fetal imaging, including MRI, echocardiography and extensive ultrasonography.
- Personalized, multidisciplinary and family-centered care consultations with families and support team members.
- Multidisciplinary fetal conferences to discuss best practice and management plans for complex fetal diagnoses.
- Development of a fetal intervention program for delivery of evidence-based and innovative care for fetal anomalies.

Maternity and newborn health leadership
David W. Boyle, MD, is co-medical director of Riley Maternity and Newborn Health and the medical director of the Riley Fetal Center. He is also professor of pediatrics at IU School of Medicine. A graduate of the University of Medicine and Dentistry of New Jersey, Dr. Boyle completed a pediatric residency at Yale-New Haven Hospital and a neonatal-perinatal fellowship at the University of Colorado Health Sciences Center. He served on the Neonatal Resuscitation Program Steering Committee for the American Academy of Pediatrics from 1998-2004 and co-chaired the committee from 2001-2004. Until 2015, he was a member of the Neonatal Task Force for the International Liaison Committee on Resuscitation.

Frank P. Schubert, MD, is co-medical director of Riley Maternity and Newborn Health and the division chief for maternal fetal medicine at Riley Children’s Health. He is also assistant professor of clinical obstetrics and gynecology at IU School of Medicine. Dr. Schubert earned his medical degree at the University of Tennessee and completed an obstetrics and gynecology residency at IU School of Medicine, and a maternal fetal medicine fellowship at Loyola University. He is board certified in both obstetrics and gynecology and maternal fetal medicine, and is a member of the American College of OB/GYNs and the Society of Maternal-Fetal Medicine.
Adolescent Medicine
Dedicated to the care and treatment of young people ages 12 to 24, Riley at IU Health Adolescent Medicine is one of the largest and most active divisions of its kind in the United States for clinical care, training and research. Our fellowship-trained physicians, experienced in caring for the special needs of teenagers and young adults, treat a variety of adolescent health conditions, from eating disorders and reproductive health to sports injuries. The adolescent medicine team routinely works with other specialties at Riley, including cardiology, respiratory care, child development, diabetes, endocrinology, and pediatric and adolescent gynecology.

Adolescent Gynecology and Reproductive Healthcare
Our team evaluates and treats a variety of gynecological conditions, including delayed puberty, dysfunctional uterine bleeding, polycystic ovary syndrome, chronic pelvic pain and dysmenorrhea. We offer specialized gynecology and reproductive health services such as long-acting reversible contraceptive options.

In addition, our physicians have years of experience consulting with patients and families about fertility preservation for adolescents with complex illnesses, including heart transplants and congenital heart conditions, sickle cell disease, cystic fibrosis, childhood cancer, and diabetes mellitus.

Riley Gender Health Program for Children and Adolescents
Riley at IU Health is home to the only comprehensive program in Indiana aimed at meeting the special needs of transgender and gender non-binary children and adolescents. Our interdisciplinary program addresses the medical, psychological, nutritional, family, social, legal and school issues associated with diverse gender identities.

Charis Center for Eating Disorders
The most comprehensive eating disorders treatment program in the state, the Charis Center offers the full range of medical, psychological and family services for patients with eating disorders. Treating female and male patients of all ages, the center provides three levels of care:

- **Partial hospital program** – Eleven-hour therapy, five days per week
- **Intensive outpatient program** – Three-hour therapy, three days per week; provides group therapy targeted for patients who need more focused treatment
- **Outpatient care** – More than 10,000 outpatient visits annually

Meet the clinical leader

J. Dennis Fortenberry, MD, MS, is the division chief of adolescent medicine at Riley Children’s Health and professor of pediatrics at IU School of Medicine. Board certified in adolescent medicine and internal medicine, Dr. Fortenberry earned his medical degree at the University of Oklahoma School of Medicine in 1979, and completed residencies at the University of Oklahoma in Oklahoma City and Bryn Mawr Hospital in Pennsylvania. He also has a master of science in epidemiology and biostatistics from the University of Oklahoma School of Public Health. Dr. Fortenberry, who specializes in sexually transmitted infections and transgender health, has authored more than 340 peer-reviewed papers and book chapters.
Cardiology

The Riley Heart Center is one of the nation’s more highly respected programs for diagnosis and treatment of congenital and acquired heart conditions in children. Clinical patient care is managed by a skilled and experienced team of specialists, including cardiologists, cardiovascular surgeons, cardiovascular critical care specialists, cardiovascular anesthesiologists, neonatologists and adult cardiologists specializing in congenital heart disease.

The Riley Heart Center is currently one of only 12 hospitals in the U.S. with the highest quality rating (three star) from The Society of Thoracic Surgeons (STS). For more information on the three-star rating, refer to page 12.

Electrophysiology

Using the latest technologies and techniques, Riley’s cardiology team performs:
- 3D anatomic mapping, drastically reducing or eliminating fluoroscopy exposure
- Loop recorder implantation
- Pacemaker and implantable cardiac defibrillator (ICD) placement
- Complex ablations of atrial and ventricular arrhythmias in children and adults with the most complex congenital heart abnormalities

Single Ventricle Home Monitoring Program

Launched in 2010 to help decrease interstage mortality for babies born with hypoplastic left heart syndrome, this program has evolved to include all babies with single ventricle physiology discharged after initial intervention. Parents with questions or concerns are able to contact an on-call nurse practitioner via text message or phone, and there is 24/7 coverage by a cardiology staff physician. In 2017, Riley at IU Health implemented a novel, web-based iPad program to assist parents in tracking and enable the cardiac medical team to evaluate data in real time. Interstage mortality has decreased from 17 percent before home monitoring to less than 6 percent.

Adult Congenital Heart Disease Program

The only formalized comprehensive adult congenital heart disease program in Indiana, our program is jointly led by Riley cardiologists and adult congenital cardiologists from the IU School of Medicine Krannert Institute of Cardiology.

In 2017, the Riley Heart Center achieved a 100 percent success rate for ablation of arrhythmias, including supraventricular tachycardia, complex atrial arrhythmias and complex ventricular arrhythmias.

Cardiology team members

Larry W. Markham, MD
Division Chief

Ryan D. Aley, MD

Mark D. Ayers, MD

Randall L. Caldwell, MD

Thomas E. Capamanda, MD

Timothy M. Cordes, MD

Robert K. Darrah, MD

Eric S. Ebenroth, MD

Huda Elbeshehali, MD

Anne G. Farrell, MD

Mark H. Hoyer, MD

Michael W. Johansen, DO

Tiffanie R. Johnson, MD
W. Aaron Kay, MD
Adam C. Keen, MD, MPH
Benjamin J. Landis, MD
Jacqueline A. Malers, MD
John J. Parent, MD, MSCR
Jyoti K. Patel, MD
Ronald M. Payne, MD
Marcus S. Schambager, MD
Mouhammad Yabrodi, MD
Nichole M. Grolla, NP
Dana M. Hartman, NP

CLINICAL INTERESTS

Acquired heart disease
Atrioventricular canal defects
Atrioventricular disease
Aortic stenosis
Atrial arrhythmias
Atrial septal defects
Bicuspid aortic valve
Cardiomyopathy
Chest pain
Congenital heart disease
Congenital pulmonary anomalies
Connective tissue diseases
D Transposition of the great vessels
Heart block
Heart failure
Heart murmurs
Heterotaxy syndrome
High blood pressure
Hypertension
Hyperlipidemia
Hypertrophic left heart syndrome (HLHS)
Kawasaki disease
Leone-Dietz syndrome
Marfan syndrome

Adult Congenital Heart Disease Program outpatient visits

<table>
<thead>
<tr>
<th>Year</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
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<tr>
<td>Visits</td>
<td>275</td>
<td>400</td>
<td>617</td>
<td>1,325</td>
<td>1,500</td>
<td>1,600</td>
<td>1,850</td>
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</tbody>
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For information on cardiovascular genetics at Riley at IU Health, refer to page 32. For details on Riley’s Pulmonary Hypertension Program, refer to page 47.

Meet the clinical leader

Larry W. Markham, MD, is the division chief of pediatric cardiology at Riley Children’s Health and the Phillip Murray Professor of Pediatric Cardiology at IU School of Medicine. A pediatric and adult congenital cardiologist, Dr. Markham earned his medical degree at East Tennessee State University and completed an internal medicine-pediatrics residency at the University of Arkansas for Medical Sciences. He completed pediatric and adult congenital cardiology training and a research fellowship at Cincinnati Children’s Hospital Medical Center. Dr. Markham’s clinical interests and research investigations have concentrated on pediatric and adult congenital heart disease, as well as inherited conditions with a cardiovascular phenotype, specifically forms of muscular dystrophy-associated cardiomyopathies and aortopathies.

Cardiac MRI

With the only comprehensive cardiac MRI program for children in Indiana, the Riley Heart Center provides thorough, in-depth evaluation of cardiac structure and function in children and adults with all varieties of heart disease. Cardiac MRI does not use ionizing radiation and is not invasive, making the procedure easier for children to undergo. In some cases, it also offers an alternative to cardiac catheterization. Riley at IU Health performs more than 300 highly specialized cardiac MRI exams each year.

Cardiac catheterization

Riley Heart Center specialists are at the forefront of rapid advances in cardiac catheterization that make it possible to diagnose and treat cardiac birth defects without conventional surgery. Riley cardiologists perform the latest procedures, including atrial septal defect closure, ventricular septal defect closure, balloon valvuloplasty, transcatheter valve replacement and transcatheter closure of patent ductus arteriosus in tiny premature infants. We are among a small group of experts nationwide involved in clinical research trials for device therapy in congenital heart disease.

Since 1989, Riley cardiovascular surgeons have completed more than 150 pediatric heart transplants. In addition, Riley is one of the few pediatric heart centers capable of implanting mechanical support devices, including total artificial hearts.

Using the latest technology in world-class facilities, Riley’s skilled cardiology team provides the full continuum of care from fetuses and premature babies to adults who survive with congenital heart disease or discover it later in life.

Transesophageal and Fetal Cardiology Program

Transesophageal imaging volume: 2017

10,352 studies performed at Riley Children’s Health
5,773 studies referred to Riley cardiologists for interpretation
16,125 total volume

Part of the comprehensive Riley Fetal Center, the Fetal Cardiology Program provides in-depth diagnostic imaging during pregnancy to enable thorough evaluation and development of a treatment plan. Patient volume has nearly doubled in the past seven years.

Fetal Cardiology Program

2000: 763 evaluations performed
2017: 1,467 evaluations performed

Fetal echocardiograms are performed at five locations in Indianapolis with plans for extended statewide outreach.

Refer a patient: 317.274.8906

Medical Specialties Annual Report | 7
Child Development and Developmental Pediatrics

Riley Hospital for Children at IU Health has the expertise, experience and resources to care for infants and children with neurodevelopmental disabilities, including those who may have co-occurring behavioral or emotional concerns. Our child development and developmental pediatrics teams work together to build collaborative and specialized services to improve access and overall quality of care for our patients.

Multidisciplinary care

Through expert diagnosis, the multidisciplinary child development teams at Riley at IU Health help families understand their child’s health condition and develop personalized treatment plans to ensure each child receives the care he or she needs. Our teams are comprised of board certified physicians, pediatric nurse practitioners, psychologists, speech pathologists, social workers, dietitians and more. We often collaborate with other Riley subspecialists. For example, we recently partnered with Riley Ear, Nose & Throat (ENT) to launch a deaf and hard of hearing specialty program to serve children and families impacted by hearing loss. In addition to an educational consultant, the program includes specialists from ENT, genetics, developmental pediatrics and child psychiatry.

Complex inpatient care

In addition to providing outpatient services, Riley Developmental Pediatrics leads the complex care inpatient service at Riley Hospital. Our inpatient team serves children who have complex medical needs or existing chronic conditions and require a hospital stay. We deliver comprehensive and coordinated care, addressing both medical and social needs. The complex care inpatient approach allows healthcare providers to collaborate as they individualize and streamline each child’s care plan.

Community-focused care

Our team members are committed to providing individualized care for each child and family, with the goal of helping children develop to their fullest potential. Focused on the importance of community in the lives of children, we are knowledgeable about resources and committed to helping families make connections in their local communities.

Riley at IU Health also provides education and training for community agencies. Each year our faculty facilitate hundreds of presentations both in Indiana and nationally. Bringing our expertise to communities across the state, our teams have trained 2,000 Early Evaluation Hubs for early diagnosis of autism and also are piloting Growth and Development Hubs for follow-up care of children after newborn intensive care hospitalization.

Recognized leaders

Riley at IU Health child development and developmental pediatrics clinicians are recognized for their leadership in setting standards in a variety of fields, including Down syndrome, transportation of children with special needs and autism therapy. Marilyn Bull, MD, who is extremely well accomplished in transportation safety, recently received the C. Everett Koop Medal of Distinction. Riley is also home to Indiana’s only certified Early Start Denver Model therapist, Christine Raches, PsyD, HSPPP, who uses this behavior-based, early intervention approach with young children diagnosed with autism.

Meet the clinical leaders

Angela M. Tomlin, PhD, HSPPP, is the division chief of developmental pediatrics at Riley Children’s Health and professor of clinical pediatrics at IU School of Medicine. She is endorsed as an Infant Mental Health Mentor through the Alliance for the Advancement of Infant Mental Health. Dr. Tomlin’s areas of expertise include neurodevelopmental disorders such as autism spectrum disorder and early intervention. She earned her master’s and doctoral degrees at the University of Wisconsin-Milwaukee and completed an internship in clinical psychology at IU School of Medicine. As an author or co-author of more than 20 articles and chapters, and a book, Dr. Tomlin contributes to research in reflective practice skills in the early childhood workforce.

Thomas M. Lock, MD, is the division chief of developmental pediatrics at Riley Children’s Health and clinical professor of pediatrics at IU School of Medicine. Dr. Lock’s areas of interest include interdisciplinary care of children with disabilities, systems improvement for care of children with disabilities and the clinical care of children with autism spectrum disorders and complex attention deficit hyperactivity disorder. Board certified in neurodevelopmental disabilities and developmental-behavioral pediatrics, Dr. Lock completed his medical degree at the University of Wisconsin-Madison, his pediatric residency at the Yale-New Haven Hospital and a developmental pediatric fellowship at the Kennedy-Krieger Institute at the Johns Hopkins School of Medicine.
Child Protection Program

The Child Protection Program at Riley at IU Health provides multidisciplinary clinic services and education to improve the evaluation and care of maltreated children. Our program’s five physicians are board certified in child abuse pediatrics—a newly recognized subspecialty—and are the only board certified child abuse pediatricians practicing in Indiana.

The Riley child protection team offers consultation in cases of suspected child maltreatment. Consultations are evidence based, providing objective assessment to help determine the extent of injury and whether medical cause or accidental mechanism accounts for the injury pattern. Specifically, our team’s services include:

- Evaluation of suspected victims of child abuse and/or neglect
- Professional consultation for healthcare providers, child protection services, law enforcement and other professionals
- Crisis counseling for families
- Expert testimony in legal settings when required
- Professional education

Riley’s leadership in the field of child protection encompasses several programs:

**Pediatric Center of Hope.** Serving approximately 500 children each year, this program provides comprehensive medical evaluation for children alleged to have been sexually abused.

**Crisis Counseling Services.** An extension of the Pediatric Center of Hope, these services bridge the gap from the time a child is identified as a possible child sexual abuse victim to the four- to eight-week time frame in which formal ongoing counseling may become available. Riley provides these crisis counseling services to about 1,500 children annually.

**Trauma Treatment Services.** These services include providing cognitive behavioral therapy for victims of child maltreatment.

**Child Abuse Consultation Service.** This program provides comprehensive medical evaluations for children alleged to have been physically abused or neglected. Each year, our team members see approximately 350 children referred to our program by medical providers or child protective services.

**Pediatric Evaluation and Diagnostic Services (PEDS) Program.** Through PEDS, Riley at IU Health consults with the Indiana Department of Child Services on approximately 5,500 cases of suspected child maltreatment each year.

**Crisis Counseling for families.** Each year, our team members see approximately 350 children referred to our program by medical providers or child protective services.

**Comprehensive medical evaluations in cases of suspected child abuse.** Consultations have increased significantly since the Docs INCASE (Indiana Child Abuse Screening Evaluations) partnership was formed in 2013. This initiative is part of efforts to advance the medical role in child protection by increasing statewide access to resources and training.

**Medical impression in suspected maltreatment consultations: 2017-2018**

- **No injury:** 7%
- **Abusive head trauma:** 1%
- **Medical:** 3%
- **Other physical abuse:** 19%
- **Un确定ed:** 42%
- **Neglect:** 5%
- **Unknown:** 8%
- **Accidental:** 15%

Meet the clinical leader

**Roberta A. Hibbard, MD**, is the division chief of the Child Protection Program at Riley Children’s Health and professor of pediatrics at IU School of Medicine. Board certified in pediatrics and child abuse pediatrics, Dr. Hibbard is active in numerous efforts aimed at improving the knowledge, communication and coordination of services when child maltreatment is suspected. She is a member of the Indiana Children’s Justice Task Force, Indiana State Child Fatality Review Team, Marion County Child Protection Team and the International Society on the Prevention of Child Abuse and Neglect. Earning her medical degree at Case Western Reserve University, Dr. Hibbard completed her pediatrics residency at the University of California at Irvine and was a Robert Wood Johnson Fellow at the University of Rochester School of Medicine and Dentistry.

Refer a patient: 317.274.2617

Physical abuse consults by year

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<tbody>
<tr>
<td>Consults</td>
<td>703</td>
<td>864</td>
<td>993</td>
<td>2,044</td>
<td>3,485</td>
<td>5,441</td>
<td>5,172</td>
<td>6,692</td>
<td>5,425</td>
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Critical Care

Cardiac Critical Care

The Riley at IU Health pediatric cardiovascular intensive care unit (CVICU) provides care for more than 500 inpatients and over 270 cardiopulmonary bypass patients each year. With a 12-bed cardiovascular intensive care unit and an eight-bed, specialized neonatal cardiac unit, our cardiac critical care program is designed to treat critically ill newborns, infants, children, adolescents and adults with acquired or congenital heart disease. Additionally, Riley at IU Health is the only facility in Indiana that offers pediatric heart transplantation and ventricular assist device capability.

Comprehensive, patient-focused care

Our multidisciplinary approach focuses on patients and their families. Team members from cardiac surgery, cardiology, cardiac critical care, neonatology, nursing, respiratory therapy, nutrition and pharmacy are available for daily rounds to expedite care and improve coordination. This approach is primarily responsible for optimizing the hospital stay of our patients, with lengths of stay nearly 30 percent lower than expected for any given illness.

Advancing the treatment of pediatric heart disease

Riley's cardiac critical care team is committed to improving the care of critically ill children with congenital and acquired heart disease both at Riley and around the world. Faculty actively participate in clinical research that includes several multicenter studies. Riley at IU Health serves as the coordinating center for the Collaborative Research in Pediatric Cardiac Intensive Care network, which was founded by Riley cardiac intensive care physicians and includes 20 sites within the United States participating in several ongoing clinical research projects. In addition, our faculty are active in the Pediatric Cardiac Critical Care Consortium (PC4), an organization that uses registry data from 35 congenital heart programs to evaluate best practices and drive improvements in care. Riley cardiac physicians also take part in international medical missions treating children in Uganda, Jordan, China and Lebanon.

The Society of Thoracic Surgeons three-star rating

Riley is among the top 16 high-volume heart programs in the nation for effective outcomes and one of 12 institutions in 2017 to earn The Society of Thoracic Surgeons (STS) three-star rating, representing the highest category of quality. In seven out of 10 cardiothoracic surgery categories, Riley's mortality rate is lower than the overall mortality rate for programs contributing data to STS. With data from 119 programs and more than 500,000 surgeries, STS is the largest database in North America for pediatric and congenital heart surgery.

Indiana’s only pediatric hospital with emergency ECMO program

Riley's Extracorporeal Membrane Oxygenation (ECMO) Program provides cardiopulmonary bypass support in the CVICU setting for neonates and children suffering from cardiac failure that is refractory to conventional therapies. When benchmarked against other high-volume pediatric ECMO centers in North America, our adjusted mortality rate is tenth among all programs. For more on ECMO at Riley, refer to pages 15 and 34.

In addition, as one of the first pediatric heart programs in the U.S. to give a child a Berlin Heart ventricular assist device, we also offer mechanical ventricular support of children with heart failure refractory to medications.

Riley at IU Health is an ECMO Center of Excellence, as designated by the Extracorporeal Life Support Organization.

Specialized care, first-class training

Riley at IU Health is the only program in Indiana offering fellowship training in pediatric cardiac critical care. Fellows enjoy active participation in the collaborative care of all cardiology and cardiovascular surgical patients admitted to the CVICU. We also share our knowledge globally through lectures and humanitarian work to promote children's heart health.

Meet the clinical leader

Christopher Mastropietro, MD, FCCM, is the director of the cardiovascular intensive care unit at Riley Children’s Health and professor of clinical pediatrics at IU School of Medicine. Dr. Mastropietro earned his medical degree at Georgetown University, completed pediatric residency at New York Presbyterian Hospital/Cornell University and completed a pediatric critical care fellowship at New York Presbyterian Hospital/Columbia University. He has published more than 50 peer-reviewed articles and chapters and is actively engaged in several national academic societies. Dr. Mastropietro also serves as a mentor for trainees and junior faculty, ensuring that the next generation of critical care physicians at Riley continue to provide excellent care to this fragile and precious patient population.

Refer a patient: 317.963.3330 (IU Health 24/7 Transfer Center)

Medical Specialties Annual Report | 13
Critical Care

Pediatric Critical Care

As one of the highest acuity centers in the United States according to The Children’s Hospital Association, the Riley at IU Health pediatric intensive care unit (PICU) treats more than 2,500 patients annually. With 42 beds, our PICU is capable of caring for children with a variety of complex illnesses and offers services other hospitals are not equipped to provide, including extracorporeal membrane oxygenation (ECMO), inhaled nitric oxide therapy, dialysis and high-frequency oscillatory ventilation.

Pediatric critical care case volume: 2017

Promoting safe sedations

Led by a pediatric critical care physician and sedation nurse, the Riley at IU Health procedural sedation team manages the dispensing of medicines that reduce awareness, anxiety, pain and discomfort during medical procedures such as:
- Lumbar puncture and bone marrow aspiration
- Liver and kidney biopsies
- Hearing tests
- Dental care
- Imaging studies, including MRI, CT, ultrasound and interventional radiology procedures
- PICC placement

Skilled critical care transport

Bringing Riley’s standard of care to more than 4,000 critical care transports each year, our highly skilled transport team, led by pediatric critical care physicians, is specially trained to care for critically ill children in extremely complex situations. Our multidisciplinary team provides the following services:
- Air and ground transport
- Multiple forms of respiratory support, including high-flow nasal cannula, intubation and mechanical ventilation, and inhaled nitric oxide
- Invasive and noninvasive monitoring and point-of-care testing
- IV/IQ placement, needle decompression and chest tube placement
- Isolette transport for infants under 5 kilograms

Committed to patient safety, quality care and continuous improvement

Striving to continually improve critical care delivery, our team studies outcomes, reviews literature and performs process improvements aimed at reducing harm events.

Patient safety: The incidence of catheter-associated urinary tract infections at Riley at IU Health has decreased in each of the past three years.

Incidence of catheter-associated UTI

- 5 in 2015
- 4 in 2016
- 3 in 2017

Quality care: Our unplanned extubation rate remains very low at 0.2/100 ventilator days compared to national benchmarks of 1/100 ventilator days.

Focused on leading-edge research

Riley at IU Health participates in 10 studies through the multicenter Pediatric Lung Injury and Sepsis Investigators (PALISI) network with our critical care team currently leading studies through the Hematopoietic Stem Cell Transplant and Pediatric Extracorporeal membrane oxygenation (ECMO) subgroups of PALISI. In 2017, our faculty published more than 50 book chapters and articles in peer-reviewed journals.

Dedicated to training and education

Fellowship training: Riley at IU Health offers pediatric critical care fellowship training within a diverse and medically complex patient population associated with innovative research centers. In an environment created for young physicians to thrive, fellows are active in the collaborative care of all sub-speciality patients admitted to the pediatric intensive care units.

Community partnerships: Formed by Riley pediatric intensivists, the Pediatric Community Outreach Mobile Education (PCOME) project provides on-site training and education to community hospital healthcare providers for the initial stabilization and management of pediatric patients. Currently leading a multicenter simulation education project, PCOME is internationally recognized for its innovative approach to teaching for common pediatric conditions, as well as low-volume, high-acuity illnesses.

ECMO program: Vital support for critical care

Founded in 1987, the Riley at IU Health Extracorporeal Membrane Oxygenation (ECMO) program provides cardiopulmonary bypass support in the ICU setting for neonates and children with a variety of serious conditions:
- Mecoonism aspiration syndrome
- Persistent pulmonary hypertension of the newborn
- Congenital diaphragmatic hernia
- Septic shock and acute respiratory distress syndrome
- Post-cardiac surgery
- Cardiomyopathy

To date, our ECMO team has cared for more than 900 infants and children. For more on ECMO at Riley, refer to pages 13 and 34.

Meet the clinical leader

Mara E. Nitu, MD, MBA, is the division chief of pediatric critical care at Riley Children’s Health and professor of clinical pediatrics at IU School of Medicine. A graduate of Carol Davila Medical University and the IU Kelley School of Business, Dr. Nitu is an experienced physician leader with a history of creating a highly effective team. She is passionate about leading large interdisciplinary teams through multiple process improvements in a complex academic healthcare system focused on improved effectiveness, safety and value.

Pediatric Critical Care team members

Mara E. Nitu, MD, MBA
Division Chief

Kamal Abulebda, MD
Safer Abu-Sultan, MD
Veda L. Ackerman, MD
Andrew L. Beardsley, MD
Zachary J. Berns, MD, MPH
Matthew L. Friedman, MD
Courtney Pye, MD
Michael J. Hobson, MD
Brian D. Leland, MD
Riad Lutfi, MD
Chris G. Markham, MD
Daniele K. Maue, MD
Laura A. Pacholski, MD

Clinical interests:
- Asthma
- Extracorporeal membrane oxygenation (ECMO)
- End-of-life care
- Healthcare quality improvement
- Heart failure
- Hematopoietic stem cell transplant
- Home ventilation
- Implementation science
- Kidney transplant
- Liver transplant
- Mechanical circulatory support
- Mechanical ventilation
- Medical ethics
- Pediatric Acute Respiratory Distress Syndrome (PARDS)
- Patient and family engagement in the critical care setting
- Patient safety
- Renal replacement therapy
- Respiratory failure
- Sedation
- Sepsis
- Shock
- Simulation and medical education
- Transport medicine

Riley Children’s Health

Refer a patient: 317.963.3330 (IU Health 24/7 Transfer Center)

Medical Specialties Annual Report
Dermatology

From common dermatological conditions such as acne and eczema to more complex disorders of the skin, board certified pediatric dermatologists at Riley at IU Health provide high-quality care and the latest treatments. Treating children from birth to age 18, our dermatologists collaborate with other Riley specialists to provide comprehensive care, ensuring that each patient's individual needs are met.

Complete dermatology care
Riley dermatologists diagnose and treat a wide variety of conditions:

- Acne
- Alopecia areata
- Atopic dermatitis
- Drug reactions (skin)
- Genetic skin disorders
- Hyperhidrosis
- Infantile hemangiomas
- Melanoma and mole screening
- Nail disorders
- Pigmented birthmarks
- Psoriasis
- Skin infections
- Vascular malformations
- Vitiligo

Advancing treatment in dermatology
Dermatology specialists at Riley take part in clinical studies and research related to many skin, hair and nail conditions in children. Specific studies about vascular birthmarks are conducted through collaborative efforts, including the Pediatric Dermatology Research Alliance and the Hemangioma Investigator Group, an international consortium dedicated to advancing infantile hemangioma research. In addition, studies led by Riley dermatologists have received funding support from the National Institutes of Health.

Meet the clinical leader
Anita N. Haggstrom, MD, is the division chief of dermatology at Riley Children’s Health and associate professor of dermatology at IU School of Medicine. Board certified in dermatology and pediatric dermatology, Dr. Haggstrom is a fellow of the American Academy of Dermatology. Earning her medical degree at the University of Nebraska, she completed her dermatology residency at the Medical College of Wisconsin and a pediatric dermatology fellowship at the University of California, San Francisco. Dr. Haggstrom is past president of the Hemangioma Investigator Group, an international collaborative dedicated to improving care for patients with infantile hemangioma. She also is a member of the Society of Pediatric Dermatology and a co-leader of the birthmarks research group of the Pediatric Dermatology Research Alliance.

Riley Dermatology offers leading-edge treatments:

- Allergy patch testing
- Laser and excisional surgery
- Phototherapy
Diabetes and Endocrinology

Each year, the Riley at IU Health diabetes and endocrinology team treats thousands of infants, children and adolescents with diabetes and other endocrine disorders. Our endocrinologists are board certified, and all have received additional subspecialty training in pediatric endocrinology and pediatric diabetes. The team also includes certified diabetes educators who partner with physicians to provide a wide range of educational resources.

Providing comprehensive services for children with dysfunction of the endocrine glands, Riley at IU Health treats a variety of disorders, including:

- Type 1 and Type 2 diabetes
- Growth disorders
- Delayed and precocious puberty
- Congenital and acquired disorders of thyroid function
- Disorders of sex development
- Hypopituitarism
- Disorders of calcium metabolism
- Metabolic bone disease
- Turner syndrome
- Adrenal disorders (including congenital adrenal hyperplasia and adrenal insufficiency, diabetes insipidus, and anterior pituitary dysfunction)

Riley endocrinologists treat patients statewide, providing outpatient care in Indianapolis, Carmel, South Bend, Bloomington and Evansville. In addition, our experienced team offers extensive, multidisciplinary educational services for newly diagnosed patients and parents requiring specialized instruction. Family education, empowerment and psychosocial support are emphasized. All patients have 24/7 access to a nurse practitioner or physician.

Diabetes and Endocrinology specialized programs

- Type 1 Diabetes Program
- Type 2 Diabetes Comprehensive Care Program
- Pediatrics to Adult Program for Transitioning Adolescents
- Youth Diabetes Prevention Program
- Hip Hop Obesity Program
- Endocrine Hematology/Oncology Program
- Gender Health Program
- Congenital Adrenal Hyperplasia Program
- Prader-Willi Syndrome Program
- Turner Syndrome Program
- Growth Disorders Program
- Metabolic Bone Disease Program

Pediatric endocrinology outpatient visits

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<th>Year</th>
<th>New Endocrinology</th>
<th>New Diabetes</th>
<th>Return Endocrinology</th>
<th>Return Diabetes</th>
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<td>1,695</td>
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<td>2,718</td>
<td>13,898</td>
</tr>
</tbody>
</table>

Meet the clinical leader

Erica A. Eugster, MD, is the division chief of pediatric diabetes and endocrinology at Riley Children’s Health and professor of pediatrics at IU School of Medicine. She earned her medical degree from the Medical College of Pennsylvania and completed her pediatric residency at Marshfield Clinic in Marshfield, Wisconsin, and a pediatric endocrine fellowship at the University of Minnesota. Dr. Eugster lectures nationally and internationally and has published more than 150 articles and textbook chapters on a wide variety of pediatric endocrine topics. She has mentored numerous fellows, residents and medical students, and holds leadership positions in national academic organizations. She is passionate about providing superb patient care and about nurturing the next generation of pediatric endocrinologists at Riley Children’s Health.
Emergency Medicine

Riley at IU Health is home to Indiana's only Level I Pediatric Trauma Center. Our team of more than 30 emergency medicine physicians specializes in caring for infants and children up to 18 years old, and our nurses and other medical team members, including child life specialists, are trained and experienced in working with children and families during health-related emergencies.

Our emergency medicine team has access to the latest medical and information technology, including 24-hour access to pediatric radiology, all pediatric subspecialties and other resources found in a nationally ranked academic medical center. Our team members work closely with physician specialists and health professionals throughout the hospital to ensure coordinated, effective care for every patient. Committed to quality and safety, Riley emergency medicine physicians not only provide care in the ER, but some also have subspecialty expertise in global health, emergency medical services, informatics and pediatric ultrasound.

Indiana Network for Patient Care

Through membership in this care network, Riley at IU Health has access to medical records for most hospitals across Indiana. If a child has visited a participating hospital, Riley can retrieve critical information about the child's medical history, drug allergies and specific needs.

The only Level I Pediatric Trauma Center in Indiana

Verified by the American College of Surgeons (ACS) as a Level I Pediatric Trauma Center since 1992, Riley Hospital is one of a select number of children's hospitals in the nation to earn this designation. This verification program, established by the ACS in 1987, promotes the development of trauma centers in which verified centers provide not only the hospital resources necessary for trauma care, but also the entire spectrum of care to address the needs of injured patients from the prehospital phase through rehabilitation, as well as injury prevention.

Riley Emergency Department statistics: 2017

- Average daily census: 129
- ESI Level 1 or 2 (acuity): 14.5 percent
- Admission rate: 16.7 percent
- Median length of stay: 161 minutes
- Median door-to-doctor time: 19 minutes
- Average door-to-doctor time: 33 minutes

Source: 2017 Emergency Department Benchmarking Alliance National Survey

Meet the clinical leader

Elizabeth Weinstein, MD, is the division chief of emergency medicine at Riley Children’s Health and associate clinical professor of emergency medicine and pediatrics at IU School of Medicine. Earning her medical degree at the University of Massachusetts, Dr. Weinstein completed residency training in emergency medicine and pediatrics at IU School of Medicine. Board certified in both emergency medicine and pediatrics, she is the deputy medical director for pediatrics for Indianapolis Emergency Medical Services (EMS) and in 2009 was awarded the federally funded Emergency Medical Services for Children State Partnership Grant, a project she continues to oversee. Dr. Weinstein’s academic interests are primarily focused on pediatric emergency care, infrastructure and systems, including community paramedicine.

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Medical Specialties Annual Report | 21
Gastroenterology, Hepatology and Nutrition

Riley at IU Health provides expert, personalized care to children with conditions of the digestive tract, liver, pancreas, as well as nutritional issues. Through comprehensive evaluation, individualized treatment and extensive education, our board-certified pediatric gastroenterologists and skilled team members work with each child to improve health and ensure quality of life.

In addition to offices at Riley at IU Health in downtown Indianapolis and Riley Hospital for Children at IU Health North Hospital, our GI physicians see patients at several locations statewide, including Fort Wayne, South Bend, Evansville, Bloomington and Fishers.

Leading-edge technology

Riley at IU Health offers the latest technologies for the diagnosis and treatment of digestive and liver disease:

- Upper endoscopy and colonoscopy
- Capsule endoscopy
- Motility testing
- Gastric pacemaker
- Neurostim treatments
- Bravo wireless pH probe studies

Riley at IU Health transplant surgeons have performed 249 pediatric liver transplants since 1988. In recent years, our team has completed 10-12 liver transplants annually with a one-year survival rate of 100 percent.

Specialized care for complex conditions

Riley at IU Health offers patient-centered care programs for a number of gastrointestinal conditions.

- Aerodigestive Program
- Biliary Atresia Program
- Colorectal and Urogenital Health Center
- Cystic Fibrosis/GI Program
- Esophageal Diseases Program
- Fatty Liver Program
- Fecal Microbiota Transplant Program
- ImproveCareNow network center (for children and adolescents with Crohn's disease and ulcerative colitis)
- Inflammatory Bowel Disease Program
- Intestinal Rehabilitation Program
- Malone Antegrade Continence Enema (MACE) Program
- Motility Program
- Nutrition Support Team
- Pancreatitis Program
- Pediatric GI Psychology
- Weight Management Program

As part of a regional referral hospital, our gastroenterology team, led by 15 specialists (including two hepatologists) performs more than 2,700 endoscopies each year and conducts more than 16,000 outpatient visits.

Improving care through research

Riley at IU Health gastroenterology physicians are currently participating in 81 approved research studies to advance patient care and treatment of common and complex GI and liver disorders, including:

- Cholestatic liver disease
- Constipation
- Eosinophilic esophagitis
- Fatty liver
- Gastroesophageal reflux disease
- Hepatitis B and C
- Inflammatory bowel disease
- Irritable bowel syndrome
- Motility disorders
- Pancreatitis
- Short bowel syndrome

Riley GI specialists have published 47 peer-reviewed articles in the past two years.

Meet the clinical leader

Jean P. Molleston, MD, is the division chief of gastroenterology, hepatology and nutrition at Riley Children’s Health and professor of clinical pediatrics at IU School of Medicine. A medical school graduate of Washington University in St. Louis, Dr. Molleston completed both her residency and a pediatric gastroenterology, hepatology and nutrition fellowship at St. Louis Children’s Hospital. A pediatric hepatologist and transplant physician, Dr. Molleston has clinical and research interests in fatty liver (NASH), cholestatic liver disease, metabolic liver disease, cystic fibrosis-related liver disease and viral hepatitis. Committed to medical education, she has received multiple teaching awards.

Refer a patient: 317.944.3774
General Pediatrics and Primary Care

Riley Children’s Health provides high-quality, comprehensive pediatric primary care for children of all ages, including newborns, children, adolescents and young adults. Our strong network of board certified pediatricians, internal medicine/pediatricians and family medicine physicians see children in offices across Indiana, anchored by a community pediatrics division of Indiana University School of Medicine.

IU School of Medicine General and Community Pediatrics

Primary care

Through an on-site program at Riley Hospital, faculty physicians provide preventive care and disease management to children with a variety of neurodevelopmental and chronic conditions. More than 75 percent of the patients visiting the practice are children with special healthcare needs. Evidence-based medical management and a team-based approach promote high-quality care. The multidisciplinary care team includes skilled pediatricians, a nurse practitioner, pharmacist, nursing and medical assisting professionals, and a social worker. Integrated mental health services are also available.

Diagnostic office

Working closely with Riley specialty programs, pediatricians in this office provide care to children with more complex health issues. Services include:

- Infant Growth and Development Program. Physicians provide support to more than 60 infants each month who are discharged from the neonatal intensive care unit with feeding challenges.
- Autism Early Evaluation Program. An expert team of physicians evaluates children, ages 18-42 months, who are at risk for autism spectrum disorder. Following a patient’s initial visit, the team coordinates care, assisting families with initiating essential therapies and navigating healthcare financing.
- General Diagnostic Office. Offering hope for families of children with illnesses that are difficult to diagnose, our multidisciplinary team assesses the child’s illness from a variety of perspectives. Our team handles a variety of referral cases, including children with:
  - Unusual presentation of illnesses
  - Vague, persistent symptoms like fatigue or fever
  - Neurodevelopmental challenges
  - Possible genetic syndromes

Community-Based Primary Care

The primary care pediatricians, internal medicine/pediatricians and family medicine physicians at Riley Children’s Health are committed to meeting the highest quality, safety, educational and care standards. Our practice teams provide effective, evidence-based care that is personalized to meet the needs of each child.

- Well-child visits
- Get-to-know-you visits
- Sports physicals
- Sick and acute care visits
- Chronic disease management
- Immunizations
- Vision and hearing screenings

More than 200 primary care providers throughout Indiana

Patient volume: 2017
Patient visits: 9,480
Social work referrals: 960
Mental health integrated into primary care (visits): 632

Meet the clinical leader

Dorota A. Szczepaniak, MD, FAAP, is the division chief of general and community pediatrics at Riley Children’s Health and associate professor of clinical practice at IU School of Medicine. After completing her medical degree in Poland, Dr. Szczepaniak engaged in bench research on cell adhesion molecules at the University of North Carolina at Chapel Hill. After finishing her pediatric residency, also at UNC-Chapel Hill, she moved to Indiana and practiced general pediatrics for 10 years. Her rural practice received multiple service excellence awards from the Indiana State Department of Health. Dr. Szczepaniak’s clinical interests focus on behavioral pediatrics, managing common behavioral problems in the general office setting and improving education in the area of behavioral pediatrics.
Precision genomics: personalized treatment for aggressive cancer

Launched in 2016, the Riley at IU Health Precision Genomics Program is the only program in Indiana to offer individualized treatment for children with relapsed or aggressive cancer. Our innovative approach helps reveal new treatment options that may be effective when other treatments no longer work. We use genetic testing to identify DNA, RNA and proteins in cancer cells that can be precisely targeted with different treatments. After testing is interpreted, the team researches therapeutic options and facilitates tumor board in collaboration with the treating physician. Treatment options specific to the child’s needs are recommended.

So far, more than 220 pediatric patients have been evaluated through the program, and nearly a quarter of those patients are receiving recommended therapy. A fully integrated clinical research initiative, the program helps children receive advanced, evidence-based care. Our team is involved in research projects, including long-term studies of the benefits of precision genomics, new ways to treat relapsed cancer and techniques for identifying aggressive cancer.

Solid Tumor Program

Riley oncologists have extensive experience in diagnosing and treating solid tumor malignancies of all types. Our patients have access to leading-edge clinical trials, including the innovative antibody therapy for neuroblastoma known as Hu3FB. Riley at IU Health is the only hospital in Indiana offering this novel treatment.

2017 patient volume

- Neuroblastoma patients treated: 25
- Bone tumor patients treated: 45
- Soft tissue sarcoma patients treated: 43
- Wilms’ tumor patients treated: 32
- Liver tumor patients treated: 14
- Total solid tumor patients enrolled in clinical trial: 100

Neuro-Oncology Program

Led by three neuro-oncologists, Riley provides comprehensive care for patients with brain tumors. We offer a multidisciplinary pediatric brain tumor program with support from physical medicine and rehabilitation, endocrinology, neurology, neurosurgery and neuro-ontology to meet the unique needs of patients suffering from malignancies of the brain after treatment.

2017 patient volume

- Pediatric patients treated: 204
- Brain tumor patients enrolled in clinical trial: 51

Care and treatment of hematologic conditions

Riley evaluated over 700 new patients for non-malignant hematologic conditions or symptoms in 2017. Our hematology services include:

- Hemostasis and Thrombosis Program – Provides multidisciplinary care to children and adolescents with bleeding and clotting disorders.
- Hemoglobinopathy Program – Dedicated to offering advanced, evidence-based care to patients with hemoglobinopathies such as sickle cell disease and thalassemias.
- Bone Marrow Failure Program – Includes an internationally known, National Cancer Institute-funded research laboratory employing functional genomics and super-resolution imaging to understand the mechanistic origins of genomic instability in Fanconi anemia and other bone marrow failure/cancer predisposition syndromes.

Meet the clinical leader

Jamie L. Renbarger, MD, MS, is the division chief of hematology/oncology at Riley Children’s Health and associate professor of pediatrics at IU School of Medicine. A graduate of the St. Louis University School of Medicine, Dr. Renbarger completed her pediatric residency also at St. Louis University School of Medicine and a pediatric hematology/oncology fellowship at Baylor College of Medicine. Early in her residency, Dr. Renbarger developed a passion for pediatric hematology/oncology, ultimately choosing this field due to the opportunity to develop long-term relationships with patients and their families and to improve outcomes through translational research. Dr. Renbarger is a board-certified pediatric hematology/oncologist and pediatric oncologist who is part of a team of oncology specialists engaged in the Care of children and adolescents suffering from cancer and its treatment. She is the director of the Cancer Survivor Program, a comprehensive service for survivors of childhood cancer.
Committed to excellence in the care of hospitalized children, Riley at IU Health has one of the largest pediatric hospital medicine programs in the nation. Our team of more than 30 hospitalists strives to continually improve clinical care through quality improvement, collaboration with inpatient specialists and primary care providers, community outreach, and the education and training of future healthcare providers.

Serving more than 4,450 pediatric patients in 2017, Riley hospitalists have led family-centered rounds for nearly a decade. Conducted with physicians, learners and nursing team members at the bedside with the patient and family at the center of the discussion, this type of rounding allows for optimal communication and understanding of treatment plans, expected outcomes and length of stay.

Building clinical partnerships

Viewing their role as the “hospital medical home,” Riley hospitalists prioritize communication, collaboration and coordination of care with specialists and primary care providers. When patients are ready for discharge, our team ensures primary care providers are kept informed of the hospitalization, procedures, treatments and follow up.

Collaboration with subspecialty teams has resulted in the development of evidence-based, standardized treatment of patients hospitalized with pneumonia, febrile infants, bronchiolitis, neonatal abstinence syndrome, and infants born to mothers with chorioamnionitis.

Focus on high-quality inpatient care

By implementing best practices and participating in leading-edge research studies, Riley at IU Health hospital medicine sets the standard for inpatient pediatric care and strives for continuous quality improvement.

Communication with primary care providers. In more than 90 percent of cases, Riley hospitalists provide inpatient summaries to primary care providers within three days of patient discharge.

Safe sleep counseling. Key concepts of safe sleep are communicated verbally and documented on discharge information sheets for 100 percent of newborn families.

Herpes Simplex Virus (HSV) testing in febrile infants. Riley's hospital medicine team is committed to adherence to recommendations for HSV serum testing in infants younger than 21 days.

Project REViSE (Reducing Excessive Variability in Infant Sepsis Evaluation), Riley at IU Health is an ongoing participant in this national evidence-based research study aimed at decreasing antibiotic use in febrile infants.

Implementation of newborn sepsis calculator. Riley hospitalists have initiated a new care improvement program designed to reduce the use of antibiotics in infants born to mothers with chorioamnionitis.

Riley at IU Health

Riley at IU Health provides care to infants and children across central Indiana.

Riley Hospital for Children at IU Health
IU Health Academic Health Center, Indianapolis, Indiana
Care of hospitalized pediatric patients with attention to general pediatric health issues, as well as co-management of pediatric neurologic and rheumatologic issues

IU Health Methodist Hospital
IU Health Academic Health Center, Indianapolis, Indiana
Care of normal newborns

IU Health North Hospital
Carmel, Indiana
Care of hospitalized children in pediatric unit, as well as overnight care of pediatric intensive care unit patients; emergency department consultations

IU Health West Hospital
Avon, Indiana
Care of hospitalized children in the pediatric unit; emergency department consultations; attendance during deliveries and resuscitation of infants; care of normal newborns, as well as infants (32 weeks estimated gestational age or older) in the hospital’s Level II neonatal intensive care unit

Ongoing commitment to training future physicians

Providing instruction to more than 320 learners annually, the Riley hospital medicine team hosts pediatric residents and medical students at all four of its hospital sites and trains family practice residents at three hospital locations. Guided by Riley hospitalists, students and residents learn to care for hospitalized patients and communicate with families, specialists and support teams with a goal of improving clinical care quality.

Meet the clinical leader

Rebecca M. Dixon, MD, FAAP, is the director of pediatric hospital medicine at Riley Children’s Health and assistant professor of clinical pediatrics at IU School of Medicine. Dr. Dixon earned a bachelor of science in chemistry and a medical doctorate at the University of Florida in Gainesville, Florida. After completing her pediatric residency, also in Gainesville, she joined IU School of Medicine in 2003. Overseeing the growth of one of the largest pediatric hospital teams in the country, Dr. Dixon is passionate about excellence in the care of hospitalized children, as well as the mentorship and development of outstanding physicians and leaders.

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Hospital Medicine team members

Rebecca M. Dixon, MD, FAAP
Director
Richelle Baker, MD
Amanda Benaderet, MD
Sara Bland, MD
Melissa Boling, DO
Allison Burke, MD
Patrick Clements, MD
Angela Dietrich, MD
Blake Froberg, MD
Michael Goodman, MD
Amanda Gripe, MD
Fatima Jahi, MD
Eddie Kim, MD
Ellen Klink, MD
Hank Knouse, DO
Manasa Mantravadi, MD
Jon Morrell, MD
Rachel Peterson, MD
Emily Pittman, MD
Callyn Riggs, MD
Peter Ronco, MD
Laura Ruhl, MD
Jonathan Salisbury, MD
Michele Saysana, MD
Kim Schneider, MD
Andrew Shiner, MD
Nicole Steber, MD
Emily Webber, MD
Margaret Westwater, MD
Laurie Wilkie, MD
Janine Zee-Cheng, MD

Riley at IU Health was among the first 10 programs in the United States to develop a pediatric hospital medicine fellowship. Fellows benefit from a wide range of clinical experiences, leadership training and mentorship in scholarly activity.

Meet the clinical leader

Rebecca M. Dixon, MD, FAAP, is the director of pediatric hospital medicine at Riley Children’s Health and assistant professor of clinical pediatrics at IU School of Medicine. Dr. Dixon earned a bachelor of science in chemistry and a medical doctorate at the University of Florida in Gainesville, Florida. After completing her pediatric residency, also in Gainesville, she joined IU School of Medicine in 2003. Overseeing the growth of one of the largest pediatric hospital teams in the country, Dr. Dixon is passionate about excellence in the care of hospitalized children, as well as the mentorship and development of outstanding physicians and leaders.

Medical Specialties Annual Report | 29
Infectious Diseases

A leader in worldwide pediatric infectious disease clinical care, research and education, the Ryan White Center for Pediatric Infectious Diseases and Global Health at Riley at IU Health helps children and families affected by infectious diseases overcome or manage these conditions. Our specialists focus on prevention, diagnosis, treatment and ongoing care of children with infectious diseases. The center offers a number of services designed to provide comprehensive care for children with infectious diseases and to prevent infection and its complications in children.

Comprehensive inpatient and outpatient programs

Riley at IU Health provides one of the few dedicated inpatient pediatric infectious disease programs in the United States. Board certified pediatric infectious disease specialists care for children with a variety of issues related to infectious disease. Children can be transferred at any time and receive direct primary care from the specialists most familiar with infections and their complications.

Riley infectious disease specialists also provide complete outpatient care for children with infectious diseases. Patients can typically be seen within one week at Riley Hospital in downtown Indianapolis or at the Riley Children’s Health outpatient office in Carmel. The team strives to accommodate urgent visits that require even more rapid evaluation.

Pediatric infectious disease phone consultation

Riley infectious disease specialists are available 24 hours a day, seven days a week, to answer questions from community physicians about infectious disease concerns or to accept transfer of patients with complex infectious disease problems. Our team responds to hundreds of inquiries from community physicians each year.

Travel medicine program

Preparing children and families for a safe, healthy trip abroad, Riley infectious disease specialists provide health services before and after international travel, including preventive medicine, vaccinations, travel education, as well as support for parents of internationally adopted children. These services are provided to young travelers of all ages and the adults accompanying them on their trip.

In addition to our team’s expertise, Riley at IU Health laboratories are capable of diagnosing many travel-related conditions such as malaria and parasitic and dengue infections. Our travel medicine team also stays current on the latest alerts and advisories from the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO).

HIV primary care program

Riley infectious disease specialists evaluate and treat the majority of Indiana children with human immunodeficiency virus (HIV). The program is led by experts in all aspects of HIV and its complications, and includes professionals in nursing, pharmacy and social work to provide the best care for children with HIV.

Infection prevention and anti-microbial stewardship

Riley is committed to keeping the rates of hospital-acquired infections low. In addition, our anti-microbial stewardship program strives to not only prevent unnecessary antibiotic use that could lead to drug resistance or drug-related complications, but also encourages the use of the correct antibiotic when one is needed. A major component of our infection prevention program is the promotion of vaccines, which are the most effective means of preventing infection.

**Research expertise**

Physician researchers with the Ryan White Center at Riley at IU Health are dedicated to advancing treatment for malaria and HIV—among the leading causes of death and disability in children worldwide.

**Malaria research focus**

- Parasite and host factors that lead to severe malaria in children
- Complications of severe malaria, including neurodevelopmental impairment
- Malaria risks and other infections in children with sickle cell disease
- Effects of changing transmission on malaria immunity

**HIV research focus**

- Adherence to HIV medications
- Stigma in HIV
- Disclosure of HIV status to children
- Evaluation and treatment of HIV in adolescents
- Evaluation and treatment of neurodevelopmental impairment in infants exposed to HIV

As a major referral program, the Ryan White Center for Pediatric Infectious Diseases and Global Health provides care for more than 4,100 inpatient and outpatient visits annually.

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**Malaria research focus**

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- Adherence to HIV medications
- Stigma in HIV
- Disclosure of HIV status to children
- Evaluation and treatment of HIV in adolescents
- Evaluation and treatment of neurodevelopmental impairment in infants exposed to HIV

Meet the clinical leader

Chandy C. John, MD, MS, is the division chief of infectious diseases at Riley Children’s Health and the Ryan White Professor of Pediatrics at IU School of Medicine. A medical school graduate from the University of Michigan, Dr. John completed both a pediatric infectious disease fellowship and a master’s degree in epidemiology at Case Western Reserve University. He is an active clinician, specializing in pediatric infectious diseases and tropical medicine. He conducts research and training programs in Kenya in collaboration with colleagues at the Kenya Medical Research Institute and Moi University, and in Uganda in collaboration with colleagues at Makerere University. He is the author of more than 150 peerreviewed publications and 30 book chapters. Dr. John received the Pediatric Infectious Diseases Society’s Young Investigator Award in 2004, and the Bailey K. Ashford Medal from the American Society of Tropical Medicine and Hygiene in 2011. He is president of the American Society of Tropical Medicine and Hygiene.

Refer a patient: 317.944.7260

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**HIV research focus**

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Refer a patient: 317.944.7260
Medical and Molecular Genetics

The Medical and Molecular Genetics team at Riley at IU Health offers genetic counseling, genetic testing, treatment and referral services for individuals or families touched by inherited conditions or chromosomal disorders. Riley's genetics team provides care and management for all ages and a variety of conditions, including birth defects and multiple congenital anomalies, inborn errors of metabolism (IEM), intellectual disability or neurodevelopmental disorders, skeletal dysplasias, disorders of growth, cancer, family history of genetic disease, and more. We routinely care for patients with high medical complexity and rare disease.

Committed to excellence

Riley medical and molecular genetics team members have been the designated caregivers for patients with IEMs since the initiation of statewide newborn screening and have outstanding metrics in days from diagnosis to implementation of medical formula. We are leaders in establishing standardized, comprehensive diagnostic evaluation of infants with congenital heart defects. Our on-site diagnostic laboratories, including our new Biochemical Genetics Laboratory, allow for stat testing and rapid diagnosis in the most seriously ill infants and children with genetic disease.

As Indiana’s largest provider of genetics services, Riley at IU Health genetics specialists evaluated and treated patients during more than 4,000 inpatient and outpatient visits in 2017.

Clinical areas of expertise

Riley geneticists have expertise in a variety of subspecialty areas:

- **Cancer Genetics Program.** With a team comprised of board certified clinical geneticists and genetic counselors, we offer clinical cancer genetic services to children and adults who are diagnosed with, or have a family history of, cancer, polyposis, pancreatitis or other syndromes associated with increased cancer risk.

- **Cardiovascular genetics.** Providing multidisciplinary care to patients with potentially heritable cardiovascular disease, our cardiovascular genetics team includes cardiologists, geneticists and genetic counselors. With more than 1,100 patient encounters in 2017, we consult with a variety of programs, including cardiomyopathy, electrophysiology and arrhythmia, pulmonary hypertension, advanced lipid, and genetic counseling.

- **Metabolism program.** Riley at IU Health provides comprehensive outpatient evaluation and team-based management of patients with IEMs, including amino acidopathies, organic acidurias, lipid metabolism disorders, glycogen storage disorders, disorders of vitamin/co-factor metabolism, lysosomal storage disorders and mitochondrial disorders. Our patient population of more than 450 ranges from neonates identified through newborn screening to adults.

- **Genetic testing.** The Genetic Testing Laboratories at IU School of Medicine are national clinical reference laboratories and worldwide leaders in innovative laboratory research and development. These facilities offer an extensive array of highly complex and unique medical tests in the specialties of cytogenetics and cytagenomics, biochemical genetics, pharmacogenomics, and molecular genetics. Our labs process more than 14,000 genetic tests annually with turnaround time outperforming the national average in all areas.

Riley’s cardiovascular genetics team led or participated in 16 research studies in 2017, including five multi-state studies. The team has received research funding from the NIH, American Heart Association, March of Dimes and others.

Riley has the only physicians in Indiana who are double boarded in genetics and pediatric neurology, and genetics and maternal fetal medicine. These specialists provide advanced expertise in neurogenetics and prenatal genetics, respectively.

Medical and Molecular Genetics

**LEADER IN NIH FUNDING**

Riley medical and molecular genetics is ranked 15th nationally in National Institutes of Health funding for genetics research.

**Total research funding in 2017:**

- more than $13.3 million
  - *NIH and other sources

**Medical and Molecular Genetics team members**

- **Stephanie M. Ware, MD, PhD**
  - Director
- **Erin Conboy, MD**
- **Brett Graham, MD, PhD**
- **Bryan Haintine, MD, PhD**
- **Melissa Lab, MD**
- **Molly McPherson, MD**
- **Wilfredo Torres-Martinez, MD**
- **Gail Vance, MD**
- **Lawrence Walsh, MD**
- **David Weaver, MD**
- **Jennifer Weida, MD**
- **Theodore Wilson, MD**
- **Casandra Buning, PNP**

**Genetic counselors**

- **Sandy Prucka, LCGC**, director
- **Adult and pediatric cardiology**
  - Nick Case, LCGC
  - Sara Fitzgerald-Butt, LCGC
    - Katie Spoonamore, LCGC
    - LCGC

- **General genetics/pediatrics**
  - Katie Anderson, LCGC
  - Trisha Neidlinger, LCGC
  - Katie Burns, LCGC
  - Kayla Treat, LCGC
  - Paula Delk, LCGC

- **Metabolic genetics**
  - Sharon Lue, LCGC
  - Katie Sopp, LCGC

- **Adult and pediatric neurology**
  - Holly Roppel, LCGC
  - Katelyn Payne, LCGC

- **Oncology and precision medicine**
  - Cindy Hunter, LCGC
  - Jennifer Ivanovich, LCGC
  - Leigh Anne Stout, LCGC

**Clinical interests**

- **Birth defects**
- **Cancer genetics**
- **Cardiomyopathy, heritable arrhythmias and connective tissue disorders**
- **Craniofacial anomalies**
- **Inborn errors of metabolism**
- **Neurodevelopmental disability**
- **Neurogenetics**
- **Prenatal genetics**
- **Skeletal dysplasias**

**Meet the clinical leader**

**Stephanie M. Ware, MD, PhD.** is the director of medical and molecular genetics at Riley Children’s Health and professor of pediatrics at IU School of Medicine. She is board certified in pediatrics and medical genetics, and her areas of expertise include cardiovascular genetics and genetic syndromic conditions.

Dr. Ware completed her medical degree and PhD at the University of Cincinnati College of Medicine and completed a genetics residency and fellowship in medical genetics at Baylor College of Medicine. An author or co-author of more than 100 peer-reviewed journal articles, Dr. Ware is an internationally recognized expert in cardiovascular genetics. She has co-authored multiple guidelines on the genetic evaluation and care of pediatric patients with congenital heart defects or cardiomyopathy. In addition, she coordinates several multi-site studies centered on improving the diagnosis and management of patients and families with heritable cardiac disorders and has been continuously funded by the NIH since 2001.

Refer a patient: 317.944.3966

**Medical Specialties Annual Report | 33**
Neonatology

Offering the most advanced neonatology services in Indiana, Riley at IU Health is home to a 60-bed, Level IV neonatal intensive care unit (NICU). Treating nearly 700 newborns each year, our expert team, led by board-certified neonatologists, delivers the highest level of care available for neonatal patients in need of specialized, life-saving services. From diagnosis through treatment, we collaborate with Riley specialists in a number of fields, as well as the full spectrum of surgical and interventional subspecialists.

Our team is multidisciplinary with dedicated advanced practice providers who communicate with referring obstetricians, neonatologists, pediatrics and primary care physicians about infants being treated in our NICU.

Riley at IU Health provides leading-edge therapies, including whole-body therapeutic hypothermia, ECMO, continuous video EEG, peritoneal dialysis, inhaled nitric oxide and high-frequency jet and oscillatory ventilation.

NeuroNICU program

Focusing on safeguarding infant brain health, the NeuroNICU program brings together a comprehensive team of board-certified neonatologists, neonatal neurologists, neuroradiologists and neurodiagnostic specialists and team members dedicated to providing the highest level of care for infants born with:

- Neonatal encephalopathy
- Seizures
- Stroke
- Intraparenchymal hemorrhage
- Brain and spine malformations
- Meningitis
- Neuromuscular disorders
- Genetic and metabolic disorders

Riley Heart Center NICU

Riley offers a dedicated program to support babies with cardiovascular anomalies, providing care through a collaboration between neonatology, cardiology, cardiovascular surgery, cardiovascular intensives and care. Approximately 150 newborns with congenital heart disease are treated in the Riley Heart Center each year.

Bronchopulmonary dysplasia (BPD) team

For infants with severe lung disease acquired from extreme prematurity birth, specialists from pediatric pulmonology, neonatology, respiratory therapy, as well as advanced practice providers, collaborate to provide consistent, individualized care aimed at improving patient outcomes.

 Extracorporeal membrane oxygenation (ECMO) program

An ECMO Center of Excellence\(^*\), Riley has a high-volume ECMO program, treating over 40 infants and children annually and a total of more than 900 since 1987. Team members include neonatologists, pediatric surgeons, pediatric intensivists, pediatric cardiovascular surgeons, as well as nurses specially trained in ECMO. Survival rates for neonates undergoing ECMO for respiratory or cardiac failure at Riley are consistently above average in the ELSO network. For more on ECMO at Riley, refer to pages 13 and 15.

\(^*\) Designated by the Extracorporeal Life Support Organization (ELSO)

Committed to quality care, Riley Neonatology:

- Decreased CLABSI rate (per 1,000 line days) from 2.88 to 1.22 over the past three years.
- Maintains an unplanned extubation rate (per 100 ventilator days) of 0.37, less than the national goal of 1.
- Develops and implements evidence-based practice guidelines to standardize care and improve outcomes.
- Participates in the Vermont Oxford Network to continually evaluate care compared to other NICUs nationwide.
- Is a member of the Children’s Hospitals Neonatal Consortium of Level IV NICUs to improve care and outcomes.

Neonatal critical care transport

Managing care for more than 900 neonatal helicopter and ground transports each year, Riley’s neonatal transport team has access to specialized therapies, including high-frequency ventilation, inhaled nitric oxide and whole-body hyperthermia. IU Health LifeLine team members communicate directly with Riley neonatologists during transport. For more on pediatric transport, refer to page 14.

Riley neonatologists provide care throughout Indiana

Riley Early Years program

A care collaboration between neonatology, psychology, developmental pediatrics, general pediatrics and nutrition, the Riley Early Years program provides follow-up care for NICU patients after discharge. The program serves as a single screening and referral point for patients as they grow through infancy and early childhood.

For more about Riley’s infant care services, refer to the Cardiac Critical Care and Pediatric Critical Care sections on pages 12-13.

Each year, the NeuroNICU program treats about 210 infants, accounting for 30 percent of total Riley NICU admissions.

For families of critically ill newborns, Riley provides:

- An on-site human milk lab for storage and personalized supplementation to support optimal growth and development.
- NICView\(^*\), a camera system that allows parents to observe their newborns using any Internet-connected device when they are not at the baby’s bedside.

Meet the clinical leader

Laura S. Haneline, MD, is the division chief of neonatal-perinatal medicine at Riley Children’s Health and the Edwin L. Gresham Professor of Pediatrics at IU School of Medicine. Dr. Haneline has spent her entire medical career at IU School of Medicine, earning her medical degree and also completing both a pediatric residency and fellowship in neonatal-perinatal medicine. In addition to being a clinical neonatologist, she is a stem cell biologist whose research examines how adverse intrauterine environments impair fetal stem/progenitor cell function.

Laura S. Haneline, MD
Division Chief

Jayme D. Allen, MD
Alana L. Barbato, MD
David W. Boyle, MD
Bobbi J. Byrne, MD
Paulomi M. Chaudhry, MD
David W. Clapp, MD
Scott C. Conne, MD
Asuncion R. Dorotheo, MD
Matthew D. Durbin, MD
Mark L. Edwards, MD
Osa A. Ekhuaghere, MBBS
William A. Engle, MD
Levi Funches, Jr., MD
Veronica M. Guillory, MD
David E. Hertz, MD
Abbey C. Hines, PsyD
Sandra J. Hoesli, MD
Sara K. Kane, DO
Matthew A. Kardatzke, MD
Poornam Khurana, MBBS
Melissa D. Kiltzman, MD
K. Lim Kua, MD
James A. Lemons, MD
Matthew C. Lewis, MD
Edward A. Liechty, MD
Izlin Z. Lien, MBBS
Diane E. Lorenz, MD
JoAnn E. Matory, MD
Brock H. Medsker, MD
Jason Z. Niehaus, MD
Charles C. Nijsnman, MD
Rebecca R. Rose, MD
Zeypen N. Salih, MD
Gregory M. Sokol, MD
Anna E. Thomas, MD
Michael S. Trautman, MD
Elizabeth A. Wetzel, MD
Paul D. Winchester, MD

Refer a patient: 317.963.3330 (IU Health 24/7 Transfer Center)

Medical Specialties Annual Report | 35
Nephrology

Riley at IU Health is Indiana’s only provider of comprehensive evaluation and treatment services for children with kidney disease or kidney failure. With more than 100 combined years of experience, our nine pediatric nephrologists lead a specialty team recognized by U.S. News and World Report as one of the top 25 nephrology programs in the nation. In addition, Riley has the largest pediatric end-stage kidney disease program in Indiana and provides dialysis and transplantation for children throughout the state.

Riley Nephrology is a leader in employing novel technologies and research breakthroughs to launch new clinical programs that lead to better treatments for children impacted by kidney disease.

Specialized programs provide comprehensive care
Riley Nephrology delivers personalized care that focuses on individual patient and family needs. Our programs are designed to provide leading-edge patient care and treatment with a multidisciplinary, team-based approach.

Stone program
Focused on long-term kidney stone prevention and relief, the multidisciplinary stone program at Riley at IU Health focuses on educating patients on the importance of making meaningful diet and fluid intake changes to help prevent and control symptoms. With care plans customized for each patient, Riley nephrologists work closely with colleagues in pediatric urology on strategies to help reduce or eliminate the occurrence of kidney stones.

Transition program
Pediatric and adult nephrologists collaboratively manage patients with the goal of preparing adolescent patients for independence and establishing continuity with nephrologists in internal medicine at IU Health.

Outpatient dialysis program
On average there are 30 children on dialysis in the Riley Outpatient Dialysis Unit at any given time. The modality of dialysis is blended between hemodialysis and peritoneal dialysis. Riley’s unit is the only outpatient chronic hemodialysis unit in Indiana. Our treatment goal is for all children to receive a renal transplant.

Transplant program
The Riley at IU Health Pediatric Kidney Transplant Program is nationally ranked in the top 25 percent based on number of patients receiving transplants and its leadership in positive patient outcomes. Our transplant center is part of the Improving Renal Outcomes Collaborative (IROC), a nationwide pediatric end-stage kidney disease program in Indiana and provides dialysis and transplantation for children throughout the state.

Innovation leads to better care
Riley Nephrology recently launched a statewide Ambulatory Blood Pressure Monitor network that is in line with the current American Academy of Pediatrics blood pressure guidelines. The initiative allows for more timely and accurate blood pressure-related diagnoses without unnecessary testing or the need for patients to travel long distances.

Holistic care impacts quality of life
Riley Nephrology Music Program. The first initiative of its kind in the nation, the Riley Nephrology Music Program provides a diversion to help children better cope with multiple hours of inpatient dialysis. Each week during their treatment, patients participate in 30-minute private piano lessons. With philanthropic support from donors and the Riley Children’s Foundation, each child also is given a keyboard to practice at home.

Kidney Camp. Each year, children with kidney disease enjoy a week at Kidney Camp. Riley supports the camp by providing an on-site nephrologist, dialysis nurses and nurse practitioners who provide dialysis care and medical management.

IU School of Medicine and Riley at IU Health offer a three-year fellowship program that provides extensive training in all areas of clinical nephrology.

■ Certified by the American Board of Pediatrics
■ Six months of inpatient service and five months of outpatient experience
■ Two years of research to broaden understanding of renal disease

Research leader
With two R01-funded nephrologists, Riley is among the leading recipients of National Institutes of Health funding for pediatric nephrology.

■ Two laboratories that earned more than $1.1 million in NIH funding in 2017
■ 39 research publications in 2017-18
■ 18 presentations at national meetings
■ Active participation in numerous clinical trials and research consortia

Nephrology team members
David Hains, MD
Division Chief
Sharon P. Andreoli, MD
Myda Khalid, MD
Anne Kouri, MD
Corina Nailescu, MD
Neha Pottanat, MD
Andrew Schwaderer, MD
Amy C. Wilson, MD
Lyndsay Berman, NP
Beth Johnston, NP

CLINICAL INTERESTS
Acute and chronic hemodialysis and peritoneal dialysis
Acute kidney injury
Chronic kidney disease
Congenital diseases of the kidney
Continuous veno-venous hemofiltration
Gluomerulonephritis
Hematuria
High blood pressure
Kidney stones
Kidney transplant
Kidney tubular acidosis
Nephrotic syndrome
Proteinuria

Medial Specialties Annual Report | 37
Refer a patient: 317.274.2563
Neurology

The largest child neurology group in Indiana, Riley Neurology is ranked among the top pediatric neurology programs in the nation by U.S. News and World Report. With 14 board certified pediatric neurologists and three nurse practitioners, our neurology team provides comprehensive, seamless care for families. Riley neurology specialists consult with patients from throughout the Midwest, routinely treating the most complicated conditions. Committed to treating any neurologic condition, our team has developed a number of specialized services, including programs for headache and refractory epilepsy.

Providing inpatient and outpatient care, Riley Neurology outpatient services are centered at Riley Hospital for Children with a satellite office in Carmel, Indiana, and outreach programs in Avon, Lafayette and Bloomington. Neurologists offer inpatient coverage and manage epilepsy monitoring units at Riley Hospital in downtown Indianapolis and Riley Hospital for Children at IU Health North Hospital in Carmel.

Subspecialty programs meet a variety of neurologic needs

Pediatric epilepsy: Six pediatric neurologists specially trained in epilepsy oversee our refractory epilepsy program, ketogenic and modified Atkins diet programs, vagal nerve stimulator management, and six-bed epilepsy monitoring unit. Through our recently expanded pediatric epilepsy surgery program, Riley neurologists, in cooperation with our pediatric neurosurgeons, work diligently to improve identification and surgical treatment of epilepsy patients with medically refractory epilepsy. As the only facility in Indiana to offer such a program, Riley is increasing its use of intracranial electroencephalogram (EEG) monitoring, including stereo EEG. We also are leaders in the use of the vagus nerve stimulator.

Neuromuscular/MDA. A certified Muscular Dystrophy Association (MDA) Care Center, Riley offers a multispecialty MDA program that meets weekly with oversight from two neuromuscular neurologists, a neurogeneticist and specialists from physiatry, cardiology, pulmonology, genetic counseling, social work and physical therapy. The team has been active in clinical trials of several agents for Duchenne muscular dystrophy and is a leader in administering nusinersen, a new and revolutionary therapy for spinal muscular atrophy (SMA). In 2017, Riley performed 396 electromyograms and through a newly formed collaboration with adult neurology, neurosurgery, pediatric rehabilitation, neuropsychology and physical therapy. The team will soon add a school teacher for additional patient support.

Movement disorders. Riley offers the only pediatric movement disorders program in the state, which includes collaboration with a neurosurgeon experienced in deep brain stimulation.

Pediatric headache center. Riley is the only facility in Indiana with a center focused exclusively on pediatric headache symptoms. This multidisciplinary center, led by a pediatric neurologist board certified in headache medicine, a clinical pain psychologist and a nurse practitioner, offers medical management, biofeedback, cognitive behavioral therapy, cranial nerve blocks (309 in 2017), botulinum toxin and trigger point injections.

Neurogenetics. Directed by a pediatric neurogeneticist, genetic counselor and a neurodevelopmental pediatrician, Riley’s neurogenetics team specializes in the diagnosis of neurological disorders via clinical evaluation and expanded genetic testing, particularly next generation and whole exome sequencing. The program also facilitates treatment of those disorders for which interventions are available.

Neonatal neurology. Through the first and only program of its kind in Indiana, Riley’s neonatal neurologists collaborate with NICU specialists to examine outcomes and develop best practices for term and preterm neonates with neurologic injury, disease or seizures. For more, refer to the NeuroNICU program on page 34.

Concussion. Riley neurologists consult and treat pediatric concussions through a newly formed collaboration with adult neurology, neurosurgery, pediatric rehabilitation, neuropsychology and physical therapy. The team will soon add a school teacher for additional patient support.

Through a partnership of five physicians, a genetic counselor and a nurse practitioner, Riley Neurology offers the largest program in Indiana focused on neurocutaneous syndromes such as neurofibromatosis and tuberous sclerosis.

Meet the clinical leader

Christopher T. Jackman, MD
Director
Robert Blake, MD
Celine Christensen, MD
Susan Conrad, MD
Sarah Delima, MD
Marcia Felker, MD
Meredith Golomb, MD
Aline Hamati, MD
Kelly Kramer, MD
Lisa Smith, MD
Deborah Sokol, MD, PhD
Kristyn Tekuwe, MD
Laurence Walsh, MD
Sarah Wing, MD
Jennifer Zimmer, MD
Holly Klepek, MS
Patricia Grayson, CPNP
Diana Goynn, CPNP
Yvonne Hayden, CPNP

Patient volume: 2017

3,375 new outpatient consults
10,672 return patient visits

Electrophysiological monitoring: 2017

2,319 standard EEGs
2,078 prolonged outpatient video EEG and inpatient neurotelemetry studies
19 surgical electrocorticograms

Refer a patient: 317.948.7450
Palliative Care

Launched in 2014, Riley at IU Health Palliative Care offers comprehensive pediatric palliative care services for children with a variety of life-limiting or life-threatening medical conditions. With the goal to help patients live the best quality of life possible, our team supports families in medical decision-making, goals of care discussions, advance directives, and complicated pain and symptom management. We also oversee end-of-life care for patients in pediatric hospice.

Clinical visit volume
As Riley’s newest subspecialty, our program has experienced significant growth. Palliative care team members conduct inpatient and outpatient clinical visits and offer home-based care in partnership with hospice services.

<table>
<thead>
<tr>
<th>Year</th>
<th>Patient Visits</th>
<th>New Consultations Annually</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>760</td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>1,950</td>
<td>240</td>
</tr>
</tbody>
</table>

Strong focus on education and training
Supporting palliative care as an emerging field, Riley contributes to education and training at all levels—from undergraduates and medical students to residents, fellows, and nursing and physician colleagues. Our team has been building a national and international reputation for our work with opportunities to teach in several different states, as well as international programs such as Bugando Medical Center in Tanzania, the International Society of Nurses in Cancer Care in Auckland, New Zealand, and hosting the first-ever pediatric End-of-Life Nursing Education Consortium (ELNEC) training course at Beijing Medical Center in China. Affiliated with Indiana University School of Medicine, Riley Palliative Care participates in ongoing education training in Vital Talk, an empathic communication training skills curriculum, as well as ELNEC and the Pediatric End-of-Life Education Curriculum for Pediatric Residents.

Directors of home-based pediatric hospice care
Committed to serving children and families across Indiana, our team collaborates with 13 hospices statewide, serving as the medical directors for home-based pediatric hospice services. Patients and families have 24/7 on-call access for guidance and support. These hospices include:
- Center for Hospice Care
- Community Hospice
- Deaconess Hospice
- Family Life Care
- Good Samaritan Hospice
- Guardian Angel
- Hospice of the Wabash Valley
- IU Health Hospice (Bloomington, Lafayette and Indianapolis)
- Our Hospice
- Seasons Hospice
- Unity

Our program is developing end-of-life education for hospices across the state to continually improve the home-based experience for pediatric patients. In addition, we continue to expand education for IU Health system team members to enhance the quality of our care, improve communication and promote effective and timely care delivery.

Meet the clinical leader

Adam B. Hill, MD, is the division chief of pediatric palliative care at Riley Children’s Health and assistant professor of clinical pediatrics at IU School of Medicine. A graduate of Butler University and IU School of Medicine, Dr. Hill completed his pediatric residency training at St. Louis University, a hematology/oncology fellowship at Duke University and a palliative medicine fellowship at Indiana University. He has received several awards for his clinical and service work, including a Gold Humanism Honor Society induction, Mindie Ballie Red Shoes Award, IU School of Medicine pediatric faculty of the year honors and a Butler University distinguished alumni award for career achievement. Dr. Hill is a nationally known speaker on the topics of physician wellness and self-care, which includes the upcoming publication of his memoir, “Long Walk Out of the Woods.”

Refer a patient: 317.944.3478

Riley at IU Health palliative care team
- 2.5 full-time physicians
- 2 advanced practice nurses
- 1 palliative care social worker

Our program also offers training tracks for palliative care chaplain residents and clinical palliative care medicine fellows.

Referral sources within Riley at IU Health
Integrated across specialties, our palliative care team receives referrals for new consultations from multiple departments.

Each year, Riley Palliative Care directs home-based hospice care for 40 to 50 patients with an average length in hospice stay of 53.9 days.
Physical Medicine and Rehabilitation

Certain medical conditions or injuries can impair a child’s ability to move, perform activities of daily living and interact with family, school and the community. Led by expert physiatrists, the Riley at IU Health physical medicine and rehabilitation team offers medical management to optimize health, function and overall well-being. Working with Riley specialists across multiple disciplines to understand each patient's challenges, our team develops interdisciplinary, customized treatment plans to address specific functional goals.

Riley Physical Medicine and Rehabilitation specializes in treating the functional needs of children and adolescents affected by a variety of diseases and conditions, including:

- Brain injury
- Trauma
- Amputation
- Neuromuscular disorders
- Severe burns
- Cancer
- Congenital diseases
- Spinal cord injury
- Stroke
- Rhizotomy/Baclofen pump placement

Inpatient rehabilitation: Individualized program, coordinated care, seamless recovery

Riley Hospital at IU Health is home to Indiana’s only pediatric inpatient rehabilitation center, providing a level of expertise and care coordination unlike any other. With a goal to facilitate seamless recovery, our physiatrists and multidisciplinary team members work with patients and families to help children return home, to school and to their community as soon as possible.

Additional support resources

To promote recovery and functional improvement, our pediatric rehabilitation gym offers equipment and toys for children of all stages and levels of mobility and function. Because families play an important role on the inpatient rehabilitation and recovery care team, our center provides sleeping arrangements in patient rooms if parents choose to stay with their children in the hospital.

Acute inpatient rehabilitation facility – Riley at IU Health also offers a more advanced rehabilitation center at our downtown Indianapolis hospital for patients requiring more intensive or interdisciplinary therapy and support, such as occupational therapy, physical therapy or speech/language therapy.

Outpatient rehabilitation: Continuity of care

Outpatient rehabilitation is essential to prevent complications and continue improvement after hospital discharge. In addition to therapy, the pediatric physical medicine and rehabilitation medical team provides adaptive tools, education on lifestyle changes and support to help each child function comfortably at home and thrive as they grow.

Patients have access to several multidisciplinary programs, including:

- Traumatic Brain Injury Program
- Neuro-Oncology Program
- Cerebral Palsy Program
- Spina Bifida Program
- Muscular Dystrophy Program

Riley at IU Health offers structured therapy programs designed to maximize children’s function and mobility so they can return to regular activities. While in the hospital, early treatment is essential to ensure patients retain any current mobility and to help prevent any future decline in function.

Children and adolescents may be admitted to Riley’s inpatient rehabilitation center if they are:

- Medically stable
- Able to tolerate at least three hours of therapy a day
- In need of active and ongoing multidisciplinary intervention

Riley at IU Health physical medicine and rehabilitation care teams provide personalized care for each patient that includes:

- Documented plan of care within the first four days of admission with weekly team meetings to evaluate progress and modify care plan, as needed.
- Daily visit from a physiatrist.
- Family meetings to coordinate care, provide updates and plan for care following discharge.
- A teacher who works with the child’s school to facilitate schoolwork during hospitalization and to provide assistance once the child returns to school.
- Emotional and social support from family support services.
- Recommendations for and provisions of resources to ensure a safe transition from hospital to home.

INPATIENT VOLUME AND OUTCOMES

In 2017, the Inpatient Pediatric Rehabilitation Center at Riley Hospital for Children admitted 141 children ranging from 3 months to 19 years old. While the physical medicine and rehabilitation team treats children with a variety of conditions, the top three admitting diagnoses were traumatic brain injury, major multiple trauma and debility. The WeeFIM II® System, provided by Uniform Data Systems (UDS), allows the Riley team to compare pediatric rehabilitation outcomes to similar facilities across the country, including gains in independence and length of stay. The Riley Inpatient Pediatric Rehabilitation Center has a shorter length of stay (16.4 days) when compared to similar facilities nationwide that also use the UDS system.

Meet the clinical leader

Francisco Angulo-Parker, MD, is the division chief of pediatric physical medicine and rehabilitation at Riley Children’s Health and assistant professor of clinical pediatrics at IU School of Medicine. After graduating from medical school in El Salvador, Dr. Angulo-Parker completed his residency at the University of Kentucky and a fellowship at Cincinnati Children’s Hospital Medical Center. He is passionate about multidisciplinary patient care.

Refer a patient: 317.944.2353
Psychiatry and Psychology

The psychiatry and psychology specialists at Riley at IU Health provide diagnosis and treatment services for children of all ages. Our expert team includes child and adolescent psychiatrists, clinical child psychologists and psychiatric social workers who work with children and families to evaluate the circumstances and develop a treatment plan to address each child's mental health needs.

Riley psychiatric specialists provide expert care focusing on advanced, evidence-based evaluations and treatments for psychiatric diagnoses and behavioral problems. These evaluations and treatments include:

- **Diagnostic evaluation.** Our specialists conduct thorough interviews and use the latest assessment methods to identify problems and establish a diagnosis.
- **Psychological testing.** In-depth psychological testing can be used to provide specific, quantifiable results explaining the nature and severity of psychological challenges.
- **Individual psychotherapy.** Working one-on-one, our specialists help children learn coping strategies to build skills and address challenges in feelings, beliefs and behaviors with the goal of moving toward desired changes.
- **Family therapy and behavior modification.** Through consultation with children and family members, Riley specialists work to change family interactions and structure to improve children's behavior and mental well-being.
- **Pharmacotherapy.** As a result of thorough evaluation, our physician team may recommend treating certain psychological conditions with medicines that help regulate brain-based psychological and behavioral problems.

**Specialized programs address unique needs**

**Christian Sarkine Autism Treatment Center**

Dedicated to treating children with autism spectrum disorder, this center offers leading-edge care for children with autism who struggle with social interactions, communication and other developmental abnormalities.

**ADHD/Disruptive Behavior Disorders Program**

Offering evaluation and treatment for children with persistent, severe patterns of inattention, hyperactivity and impulsivity, this program also provides diagnostic and treatment services for other issues such as oppositionality, defiance, outbursts, rule breaking and anger control issues.

**Mood Disorders Program**

Riley at IU Health facilitates evaluation and care for children with mood disturbances, including:

- Depression
- Loss of interest or pleasure in normal activities
- Irritability
- Social isolation
- Suicidal ideation

**OCD/Tic/Autism Disorders Program**

Through this program, Riley at IU Health specialists diagnose and treat children and adolescents with any of the following symptoms:

- Recurrent obsessions or compulsions that are severe enough to significantly impair daily living
- Recurrent tics, vocal noises or outbursts
- Anxiety/fearfulness/apprehension
- Trichotillomania

**Dual Diagnosis Program**

This outpatient program is designed for children and teens with psychiatric disorders who also struggle with substance abuse. This concentrated treatment program for children and teens ages 10 to 18 years helps patients and families deal with the challenges of each circumstance to promote recovery and improved well-being. The program uses a treatment model called ENCOMPASS that incorporates cognitive behavioral therapy, motivational enhancements, parent management training and medication-assisted treatment.

**Pediatric Psychology Testing Program**

Riley at IU Health offers standardized psychological tests for many issues, including:

- Attention and learning problems
- Intellectual ability strengths and weaknesses
- Memory problems
- Severe/unexplained emotional, behavioral or personality problems

**Improving clinical care through research**

Innovative research is being conducted by Riley psychiatrists—faculty members at IU School of Medicine—to better understand how behaviors, emotions, abilities and skills develop in children and adolescents and how disorders surface at different ages and stages of development. Our investigators lead research to uncover new insights for a variety of disorders:

- Autism-spectrum disorder
- ADHD
- Addictions
- Mood disorders
- Disruptive behavior disorders
- Language and learning disorders

Using the latest technology and treatment protocols, active studies are underway to better identify, evaluate and treat these and other psychiatric disorders in children and adolescents. Findings are used to improve clinical care at Riley at IU Health, paving the way for new interventions.

**Meet the clinical leader**

**David W. Dunn, MD,** is the division chief of psychiatry at Riley Children’s Health and the Arthur B. Richter Professor of Child Psychiatry and professor of psychiatry and neurology at IU School of Medicine. He received his bachelor of arts and medical degrees at Tulane University. He completed an internship at Charity Hospital in New Orleans, residencies in pediatrics and neurology at Tulane, a fellowship in child neurology at Columbia Presbyterian Hospital, and residencies in psychiatry and child and adolescent psychiatry at Indiana University. Dr. Dunn is certified by the American Board of Psychiatry and Neurology in neurology with special competence in child neurology, psychiatry, child and adolescent psychiatry, and epilepsy. He is the author of over 200 articles and chapters and has participated in NIH-sponsored research on behavioral and cognitive aspects of childhood epilepsy and industry-sponsored psychopharmacology trials for ADHD, Tourette syndrome and bipolar disorder.

Refer a patient: 317.944.8162
Pulmonology, Allergy and Sleep Medicine

Riley physicians have contributed to defining and improving clinical care through leadership and participation in these organizations:

- Cystic Fibrosis Foundation
- American Thoracic Society
- American Board of Pediatrics
- American Academy of Pediatrics
- Childhood Interstitial Lung Disease Research Network
- Pulmonary Hypertension Association

Allergy

Led by three specialists in pediatric allergy, Riley’s allergy program is committed to clinical excellence. Our specialists participate in multidisciplinary programs such as the Gastrointestinal Digestive Disease Program and the High-Risk Asthma Program.

Designated as a center of excellence by the Food Allergy Research and Education Network, the allergy program at Riley at IU Health conducts 200 oral food challenges annually—more than any other facility in the state. Allergy physicians at Riley are involved in trials of food immunotherapy and in nationally recognized studies of the developing airway microbiome.

Pediatric Sleep Medicine Program

This program, accredited by the American Academy of Sleep Medicine, includes four board certified sleep medicine physicians, two behavioral sleep psychologists, a team of respiratory therapists and registered polysomnographic technologists.

Our research focus

In 2017, Riley pediatric respiratory disease researchers conducted 67 clinical studies and published 34 manuscripts related to:

- Cystic fibrosis
- Primary ciliary dyskinesia
- Asthma
- Preterm lung disease
- Sickle cell disease
- Food allergies
- Sleep disorders
- Pulmonary hypertension

Education and training

Riley at IU Health has two active fellowship programs in pediatric pulmonology and allergy. In addition, our program has earned a National Institutes of Health T32 adult/pediatric pulmonology training grant.

Meet the clinical leader

James Chmiel, MD, MPh, is the division chief of pulmonology, allergy and sleep medicine at Riley Children’s Health and professor of pediatrics at IU School of Medicine. A graduate of the University of Notre Dame, Dr. Chmiel earned his medical degree and master of public health degree at the University of Michigan. He completed his pediatrics residency at Children’s Memorial Hospital/Northeastern University Medical School and a pediatric pulmonology fellowship at Rainbow Babies and Children’s Hospital/Case Western Reserve University School of Medicine.

Dr. Chmiel’s research involves understanding the inflammatory response of the lung, particularly as it relates to cystic fibrosis and asthma, and the impact of anti-inflammatory therapeutics on that response. He is chair of the Cystic Fibrosis Foundation’s Anti-Inflammatory Working Group and a member of the foundation’s Clinical Research Committee. In 2014, Dr. Chmiel began serving on the Pediatric Pulmonary Sub-board of the American Board of Pediatrics and served as the chair in 2017 and 2018.

Refer a patient: 317.948.7208

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Radiology
Performing thousands of imaging examinations annually, the pediatric radiology team at Riley at IU Health specializes in the diagnosis of health conditions and injuries in infants, children and adolescents. Our expert team uses advanced radiologic technologies tailored to the needs of children:

- 1.5T magnetic resonance imaging (MRI) scanners that produce and process images quickly
- An on-site interventional radiology suite
- Computed tomography (CT) scanners that allow organs to be viewed in different planes or as three-dimensional images
- Digital radiology (DR) units that produce high-quality images quickly and shorten exam times
- Fluoroscopy rooms that use advanced low-dose fluoroscopy equipment and can reduce X-ray dosage by as much as 70 percent
- Ultrasound units specifically designed for pediatric imaging

Leading-edge technology
Riley at IU Health offers groundbreaking EOS X-ray technology, which provides the highest quality images with the lowest possible dose of radiation. SPECT/CT allows a cross-sectional rendering of nuclear medicine images. The CT image is fused to the nuclear medicine image for precise localization of areas on the SPECT image, allowing for a more accurate diagnosis. Riley at IU Health is one of the only facilities in the region to offer SPECT/CT technology.

Highly trained team of radiology specialists
Ten fellowship-trained pediatric radiologists; team members have training in a variety of specialized areas, including:

- Pediatric musculoskeletal imaging
- Pediatric genitourinary imaging
- Cardiac imaging
- Fetal imaging
- Pediatric oncologic imaging

Four pediatric neuroradiologists
One pediatric nuclear medicine specialist
Two pediatric interventional radiologists

Wide range of radiologic and imaging services

- Anesthesia for diagnostic and interventional procedures
- Computed tomography (CT)
- EOS
- Fluoroscopy
- Magnetic resonance imaging (MRI)
- Nuclear medicine
- Procedural sedation
- Ultrasound

Interventional radiology: Effective methods for diagnosis and treatment
Riley at IU Health interventional radiology includes a variety of minimally invasive procedures to diagnose and treat many pediatric conditions. By minimizing the physical trauma associated with open surgery, our program contributes to decreased infection rates, faster recoveries and shorter hospital stays. Pediatric patients benefit greatly from this approach to treatment, which often results in less pain than standard procedures.

Specially trained Riley interventional radiologists use X-ray, computed tomography or ultrasound to see inside the body and guide tools such as catheters, stents and needles to:

- Diagnose conditions
- Obtain biopsies
- Treat:
  - Joint pain
  - Tumors
  - Blocked or damaged arteries or veins
  - Bile ducts that are blocked or damaged
  - Blockages in the urinary tract
  - Stop internal bleeding caused by organ trauma or pelvis fractures
  - Stop intestinal bleeding

Meet the clinical leaders

Matthew L. Cooper, MD, is the co-division chief of pediatric radiology at Riley Children’s Health and assistant professor of clinical radiology and imaging sciences at IU School of Medicine. Prior to completing his radiology residency at IU School of Medicine, Dr. Cooper attended the University of Cincinnati College of Medicine. His subspecialty focus is pediatric radiology, with particular interest and expertise in CT and MRI imaging of children with pulmonary disease and congenital heart disease.

Donald D. Corea, DO, is the co-division chief of pediatric radiology at Riley Children’s Health and assistant professor of clinical radiology and imaging sciences at IU School of Medicine. A graduate of the University of North Texas Health Sciences Center, Dr. Corea completed his residency at Osteopathic Medical Center of Texas. He specializes in pediatric radiology and pediatric genitourinary disorders.
Rheumatology

Riley at IU Health has one of the nation's largest programs specializing in inflammatory, autoimmune diseases and arthritis in childhood. Riley's eight rheumatologists—the only board-certified pediatric rheumatologists in Indiana—and five dedicated rheumatology nurses offer the latest and most promising treatments, some of which are only available through research trials. Our specialists are involved in clinical trials of novel medications and drug combinations that are defining how to treat these chronic inflammatory diseases in children.

Riley Rheumatology provides care for approximately 4,000 patients each year, and annually our physicians conduct about 1,300 new patient consultations.

Using a multidisciplinary team approach, Riley rheumatologists focus on treatment and patient education, as well as communication with families and primary care providers. Treatment teams may also include nurse specialists, counselors, physical and occupational therapists and psychiatry specialists.

A partner in new treatment discovery

Multi-institutional collaborations. Riley rheumatology physicians and nurses are active participants and leaders in clinical research to understand the mechanisms of these uncommon and often rare diseases, and in clinical trials of new medications for pediatric rheumatic disorders. Our physicians and researchers are members of:

- Childhood Arthritis and Rheumatology Research Alliance (CARRA)
- Pediatric Rheumatology Collaborative Study Group (PRCSG)

Riley rheumatologists lead CARRA work groups studying juvenile idiopathic arthritis, dermatomyositis, transition to adult rheumatic care, spondyloarthropathies, chronic non-bacterial osteomyelitis, systemic lupus erythematosus, lupus brain disease, scleroderma, ANCA-associated vasculitis and vasculitis of the central nervous system. Additionally, Riley is involved in the CARRA- and Arthritis Foundation-sponsored pediatric rheumatic disease registry, a database of information about a broad range of childhood rheumatic diseases and their outcomes over time.

Observational research studies. Riley specialists monitor long-term outcomes of children taking approved medications over the course of several years. These registries help identify drug benefits and safety issues only seen after years of medication use. Our pediatric rheumatologists also participate in studies of various biomarkers that may help predict an individual child’s response to a medication, including potential risks for side effects or especially positive responses.

Meet the clinical leader

Kathleen O’Neil, MD, is the division chief of pediatric rheumatology at Riley Children’s Health and professor of clinical pediatrics at IU School of Medicine. Dr. O’Neil studied at Tufts University School of Medicine, the Yale-New Haven Hospital and Johns Hopkins School of Medicine. Her clinical interests include all pediatric conditions, with particular emphasis on severe multisystem disorders (systemic lupus erythematosus (SLE), juvenile dermatomyositis, vasculitis, scleroderma and autoinflammatory diseases). A founding member of the Childhood Arthritis and Rheumatology Research Alliance (CARRA), Dr. O’Neil participates in multi-center research and coordinates a study of hormone effects during puberty on disease activity and autoimmunity in childhood SLE. She is interested in furthering the understanding of why autoimmune diseases are more frequent in girls and why many of these diseases begin or worsen near puberty. Dr. O’Neil participates in multicenter trials of novel medications in childhood rheumatic diseases and is a leader in national and international research organizations.

Refer a patient: 317.274.2172
Adolescent Medicine
J. Dennis Forntberry, MD, MS
Division Chief
Rachel Katzenellenbogen, MD
Eric Meiningher, MD, MPH
Mary Ott, MD, MA
Cynthia Robbins, MD, MS
Mary Rouse, MD
Marcia Shew, MD, MPH
Rebekah Williams, MD, MS
Kelly Donahue, PhD, HSPP
Beth Thielking, MSN, CPNP, CDE

Developmental Pediatrics
Thomas M. Lock, MD
Division Chief
Rebecca H. McNally Kureen, PhD, HSPP
Christine M. Raches, PsyD, HSPP
Maura Rouse, PsyD, HSPP
Lynne A. Sturm, PhD, HSPP
Paula A. Sullivan, PhD, HSPP
Caitlin Martin, MS, CCC-SLP
Sarah Mikul, MS, CCC-SLP

Pediatric Critical Care
Mara E. Nittis, MD
Division Chief
Kamal Abulebda, MD
Samer Abu-Sultaneh, MD
Veda L. Ackerman, MD
Andrew B. Brashear, MD
Zachary J. Berns, MD, MPH
Matthew L. Friedman, MD
Courtney Frye, MD
Michael J. Hobson, MD
Brian D. Leland, MD
Rudi Luft, MD
Chris G. Markham, MD
Danielle K. Maue, MD
Laura A. Pacholski, MD
Courtney M. Rowan, MD
Nathan D. Swinger, MD
Alvaro J. Tori, MD
Matthew L. Yuknis, MD
Janine Zee-Cheng, MD
Monica Broo, NP
Angela Finley, NP
Christina Geis, NP
Jennifer Hamilton, NP
Sandra Kennedy, NP
Ann McCallister-Mills, NP
Kim McGinnis, NP
Anita Paul, NP
Natalie Szczypiorski, NP

Dermatology
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Division Chief
Sarah Skillman, MD

Diabetes and Endocrinology
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Division Chief
Linda A. DiMeglio, MD
Jamie Felton, MD
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Namie G. Haddad, MD
Tamar S. Hannon, MD
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Heba Ismail, MD
Nancy B. Johnson, MD

Gastroenterology, Hepatology, and Nutrition
Jean P. Mollenston, MD
Division Chief
William E. Bennett, MD
Molly A. Bozic, MD
Joseph M. Croffle, MD
Joseph F. Fitzgerald, MD
Elaine Gilbert, PsyD, HSPP
Kathryn E. Harlow, MD
Emily C. Hon, MD

Emergency Medicine
Elizabeth Weinstein, MD
Division Chief
Sheryl E. Allen, MD
Tyler S. Arnold, MD
Stephen J. Cico, MD, MEd
Robert W. Collins, MD
Gregory W. Faris, MD
Geoffrey P. Hays, MD
Melanie S. Heniff, MD
Susan M. Hoffert, MD
Christine Huang, MD
Jessica M. Kanis, MD
Heather Kelker, MD
Jennifer L. Kersey, MD
Roxanna Lefort, MD, MPH
Karl A. Lemme, MD
Benjamin K. Nii, MD
Brian C. Phillips, MD
Kyra D. Reed, MD
Christina M. Ricks, MD
Debra S. Rusk, MD
Heather R. Saavedra, MD
Halig V. Svarakian, MD
Cory D. Showalter, MD
Sandy Shwab, MD
Sean M. Thompson, MD
Mary Vergheese, MD
Brian E. Wagers, MD
Jennifer D. Walthall, MD, MPH
Anne Whitehead, MD
Kyle B. Yoder, MD, MPH

Breathing "Heart" - The Work of the Heart
Amanda A. Cohn, MD
Division Chief
Sarah Thompson, MD

Child Development and Community Pediatrics
Donata S. Szczypiorski, MD, FAAP
Division Chief
Beth A. Barron, MD
James T. Blackwell, MD
Mary P. Bradley, MD
Stephan M. Downs, MD, MS
Sarah H. Gangadhar, MD
Robert Gonzalez, MD
Mitchell A. Harris, MD
Dawn P. Haut, MD, MPH
Jill V. Holphilipine, MD
Manchester M. Herrera, MD
Henry L. Jones, MD
Thomas K. Klausmeier, MD
Mallory R. Neff, MD
Debra S. Rusk, MD
Heather R. Saavedra, MD
Halig V. Svarakian, MD
Cory D. Showalter, MD
Sandy Shwab, MD
Sean M. Thompson, MD
Mary Vergheese, MD
Brian E. Wagers, MD
Jennifer D. Walthall, MD, MPH
Anne Whitehead, MD
Kyle B. Yoder, MD, MPH

Brain: Numbers Game
Rebecca A. Elmer, MD
Division Chief
Sara E. Chelius, MD
John T. Erlichman, MD, MPH
Kareen N. Hartman, MD
Molly A. McIvor, MD
Matthew E. Melrose, MD
Mary P. Quigley, MD
Sarah H. Schenker, MD
Emily C. Hon, MD

Cardiology
Larry W. Markham, MD
Division Chief
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Mark D. Ayers, MD
Randall L. Caldwell, MD
Thomas E. Capannari, MD
Timothy M. Cordes, MD
Mark H. Hoyer, MD
Michael W. Johansen, DO
Tiffanie R. Johnson, MD
J. Dennis Fortenberry, MD, MS
Division Chief
Adolescent Medicine

Rebekah Williams, MD, MS
Kelly Donahue, PhD, HSPP
Beth Thielking, MSN, CPNP, CDE

Bryan M. McFerron, MD
Sara K. Naramore, MD
Marian D. Pfefferkorn, MD
Erin Phipps, MD
Kanika Puri, MD
Girish S. Rao, MD
Steven J. Stelzer, MD
Charles P. Vanderpool, MD
Shamalia Waseem, MD
Jim M. Lindgren, CPNP

Genitourinary Program
Blair J. Gordon, MD, PhD
Division Chief
Erica A. Eugster, MD
Division Chief
Linda A. DiMeglio, MD
Natalie S. St. John, MD

Hematology/Oncology
Jamie L. Renbarger, MD, MS
Division Chief
Amy E. Armstrong, MD
Sanjivani Ratna, MD
Jacquelyn L. Carter, MD
Scott I. Coven, DO, MPH

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## Hospital Medicine
- Rebecca M. Dicon, MD, FAAP  
  Director
- Richelle Baker, MD
- Amanda Benaderet, MD
- Sara Bland, MD
- Melissa Boling, DO
- Allison Burke, MD
- Patrick Clements, MD
- Angela Dietrich, MD
- Blake弗莱, MD
- Michael Goodman, MD
- Amanda Gripe, MD
- Fatima Jafari, MD
- Eddie Kim, MD
- Ellen Klini, MD
- Hank Knouse, DO
- Manasa Mantravadi, MD
- Jon Morrell, MD
- Rachel Peterson, MD
- Emily Pittman, MD
- Calfy Riggs, MD
- Peter Ronco, MD
- Laura Ruhl, MD
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- Michele Saysana, MD
- Kim Schneider, MD
- Emily Scott, MD
- Andrew Shin, MD
- Nicole Steber, MD
- Emily Webber, MD
- Margaret Westwater, MD
- Laurie Willke, MD
- Janine Zee-Cheng, MD

## Infectious Diseases
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  Division Chief
- John C. Christenson, MD
- Elaine G. Cox, MD
- Leslie A. Enane, MD
- Annette S. Foti, MD
- Alka Khattan, MD
- Michelle L. Kussin, PharmD
- John J. Manalou, MD
- Megan S. McHenry, MD, MS
- Bree A. Weiser, MD
- James A. Wood, MD, MS

## Medical and Molecular Genetics
- Stephanie M. Ware, MD, PhD  
  Director
- Erin Conboy, MD
- Brett Graham, MD, PhD
- Bryan Hammett, MD, PhD
- Melissa Lah, MD
- Molly McPherson, MD
- Wilfredo Torres-Martinez, MD
- Gail Vance, MD
- Lawrence Walsh, MD
- David Weaver, MD
- Jennifer Weida, MD
- Theodore Wilson, MD
- Casandra Bunting, PNP

## Genetic counselors
- Sandy Prucka, LGCC, director
- Adult and pediatric cardiology
- Nick Case, LGCC
- Sara Fitzgerald-Burt, LGCC
- Ben Helm, LGCC
- Katie Spoonoore, LGCC
- General genetics/pediatrics
- Katie Anderson, LGCC
- Kate Burns, LGCC
- Paula Delk, LGCC
- Trisha Neidlinger, LGCC
- Kayla Treat, LGCC

## Metabolic genetics
- Sharon Luu, LGCC
- Katie Sopp, LGCC

## Adult and pediatric neurology
- Holly Klepek, LGCC
- Katey Payne, LGCC

## Oncology and precision medicine
- Cindy Hunter, LGCC
- Jennifer Ivanovich, LGCC
- Courtney Schoen, LGCC
- Leigh Anne Stout, LGCC

## Neonatology
- Laura S. Haneline, MD  
  Division Chief
- Jayme D. Allen, MD
- Alana L. Barbatto, MD
- David W. Boyle, MD
- Bobbi J. Byrne, MD
- Paulomi M. Chaudhry, MD
- D. Wade Clapp, MD
- Scott C. Denne, MD
- Assuncion R. Dorotheo, MD
- Matthew D. Durbin, MD
- Mark L. Edwards, MD

## Nephrology
- David Hains, MD  
  Division Chief
- Sharon P. Andreoli, MD
- Myda Khalid, MD
- Anne Kouri, MD
- Corina Nalluscu, MD
- Neha Pottanat, MD
- Andrew Schwaderer, MD
- Amy C. Wilson, MD
- Lyndsay Berman, NP
- Beth Johnston, NP

## Neurology
- Christopher T. Jackman, MD  
  Director
- Robert Blake, MD
- Lan Chen, MD
- Celanie Christiansen, MD
- Susan Conrad, MD
- Sarah Delima, MD
- Marta Felker, MD

## Psychiatry and Psychology
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  Division Chief
- Jennifer Downs, MD
- Juliane Gust, MD
- Leslie Huselid, MD
- Amber Hunt, DO
- Carrie Girvan, DO
- Mallory Nett, MD
- Martin Pianowski, MD, PhD
- Kristen Schroeder, MD
- Kelda Walsh, MD
- Rachel Yoder, MD
- Katie Feeneey, NP

## Pulmonary, Allergy and Sleep Medicine
- James Chemel, MD, MPH  
  Division Chief
- Anuja Bandopadhyay, MD
- A.J. Cristea, MD, MS
- Ameet S. Dattary, MD
- Angela O. Delecaris, MD
- Deborah C. Gilman, MD
- Michelle S. Howestine, MD
- Hasnain E. Jafel, MD
- Nadia L. Krupp, MD
- Evans M. Machogu, MD
- Jeffrey D. Mackie, MD
- Gregory S. Montgomery, MD
- Stacey L. Peterson-Carmichael, MD
- Sandeep Purani, MD
- Don B. Sanders, MD
- John C. Stevens, MD
- Robert S. Tepper, MD
- Michael S. Tsangaris, MD
- Tiffany Turner, MD
- Andrea Weist, MD
- Katey Walsh, PsyD
- Cecilia Beekler, NP, RN, MSN
- Grace Godfrey, NP, RN, MSN
- Aries Lowden, NP, RN, MSN
- Lauren Utt, NP, RN, MSN
- Nancy J. Valentine, NP, RN, MSN

## Allergy
- Gishch V. Vitalaps, MD
- Xia J. Jin, MD, PhD
- Kirsten M. Kloepefe, MD, MS
- Olivia Swanger, NP, RN, MSN

## Sleep Medicine
- Anuja Bandopadhyay, MD
- Deborah C. Gilman, MD
- Stephanie J. Jackson, MD
- Hasnain E. Jafel, MD
- Sarah M. Hankefer, PhD, HSP, CBSM
- Katey Walsh, PsyD
Refer a patient

Riley Children’s Health cares for children in Indiana, across the nation and around the world. Same-day appointments are available for some providers. To schedule an appointment, or to speak with a medical specialty section administrator, please call:

<table>
<thead>
<tr>
<th>SECTION</th>
<th>PHONE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescent Medicine</td>
<td>317.274.8812</td>
</tr>
<tr>
<td>Cardiology</td>
<td>317.274.8906</td>
</tr>
</tbody>
</table>
| Child Development and Developmental Pediatrics | 317.944.8167 (Child Development)  
                                           | 317.944.4846 (Developmental Pediatrics)         |
| Child Protection Program               | 317.274.2617                                     |
| Critical Care                          |                                                  |
| Cardiac Critical Care                  | 317.963.3330 (IU Health 24/7 Transfer Center)    |
| Pediatric Critical Care                | 317.963.3330 (IU Health 24/7 Transfer Center)    |
| Dermatology                            | 317.944.7744                                     |
| Diabetes and Endocrinology             | 317.944.3889                                     |
| Emergency Medicine                     | 317.963.3330 (IU Health 24/7 Transfer Center)    |
| Gastroenterology, Hepatology and Nutrition | 317.944.3774                                    |
| General Pediatrics and Primary Care    | 1.888.IUHEALTH                                   |
| Hematology/Oncology                    | 317.944.2143                                     |
| Hospital Medicine                      | 317.963.3330 (IU Health 24/7 Transfer Center)    |
| Infectious Diseases                    | 317.944.7260                                     |
| Medical and Molecular Genetics         | 317.944.3966                                     |
| Neonatology                            | 317.963.3330 (IU Health 24/7 Transfer Center)    |
| Nephrology                             | 317.274.2563                                     |
| Neurology                              | 317.948.7450                                     |
| Palliative Care                        | 317.944.3478                                     |
| Physical Medicine and Rehabilitation   | 317.944.2353                                     |
| Psychiatry and Psychology              | 317.944.8162                                     |
| Pulmonology, Allergy and Sleep Medicine | 317.948.7208                                    |
| Radiology                              | 317.962.3580  
                                           | 317.948.6315 (Reading Room)                     |
| Rheumatology                           | 317.274.2172                                     |

Submit a referral online at rileychildrens.org/refer.
Riley Children’s Health
Indiana University Health

Riley Children’s Health is Indiana’s only full-service statewide pediatric health system. Riley Children’s Health offers complete, comprehensive pediatric care ranging from routine primary care checkups to the most complex acute care needs from highly skilled pediatric specialists. The system connects patients with 200 primary care and 400 specialty care physicians in 15 communities across the state of Indiana. Riley Physicians treat patients in their home communities, bringing top-notch care close to home. This statewide network is an extension of Riley Hospital for Children at Indiana University Health, one of the nation’s leading children’s hospitals.

rileychildrens.org

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