PICO Search Assignment Worksheet
PICO #4- Uncontrolled Diabetes in Pregnancy - Tara Capo

**Brief description of patient problem/setting (summarize the case very briefly)**
Pt is a 37 YOF with PMHx of uncontrolled type II diabetes, G1P0 at 16 weeks gestation, who presents to the OB clinic for follow up from previous visit one week ago that showed hemoglobin A1C of 11.4%. She was not taking any medications for diabetes. At that time, a fetal US was performed which showed fetus with multiple anomalies, including shortened forearm, clubbed fingers, and decreased brain size. No amniocentesis or genetic testing was performed to date, therefore a definitive chromosomal or genetic diagnosis has not yet been established. Pt was educated on the risks and benefits of continuing with the pregnancy vs termination.

**Search Question: Clearly state the question (including outcomes or criteria to be tracked)**
In pregnant women with poorly controlled diabetes and a fetus diagnosed with congenital anomalies, does termination of pregnancy compared to continuation of pregnancy affect maternal morbidity and/or fetal/neonatal outcomes?

Question Type: What kind of question is this? (boxes now checkable in Word)

| | | |
|---|---|---|
| ☐Prevalence | ☐Screening | ☐Diagnosis |
| ☐Prognosis | ☐Treatment | ☐**Harms** |

**Assuming that the highest level of evidence to answer your question will be meta-analysis or systematic review, what other types of study might you include if these are not available (or if there is a much more current study of another type)? Please explain your choices.**
- If meta-analysis or systematic reviews are not available, I would prioritize observational studies due to ethical limitations. Because my PICO question includes pregnancy termination, fetal anomalies, and maternal outcomes, a randomized controlled trial would not be ethical or feasible. Cohort studies (including prospective or retrospective) are a great alternative because they compare outcomes over time (maternal morbidity, fetal/neonatal outcomes) between groups. Case-control studies can also be used because they are useful for rare outcomes, such as severe maternal complications, but more prone to bias.

**PICO search terms:**

| **P** | **I** | **C** | **O** |
|---|---|---|---|
| Pregnant women | Termination of pregnancy | Continuation of pregnancy | Maternal morbidity |
| Uncontrolled diabetes | Terminated pregnancy | Fetal monitoring | Fetal survival |
| Fetus with congenital anomalies | Abortion | Glycemic control | Fetal morbidity |
| Type II DM in pregnancy | Elective termination | High risk OB care | Quality of life |
| | | Expectant management | |

**Search tools and strategy used:**
**Please indicate what data bases/tools you used, provide a list of the terms you searched together in each tool, and how many articles were returned using those terms and filters. Explain how you narrow your choices to the few selected articles.**

Results found:
**PubMed**:
Pregnant AND diabetes AND congenital anomalies: 744 results
Filters: free full text, meta analysis, RCT, systematic review: 27 results

20 weeks gestation AND Diabetes AND Congenital anomalies AND Termination: 20 results
Filters: free full text, meta analysis, RCT, systematic review: 1 result

**Google Scholar:**
In pregnant women who have uncontrolled diabetes and fetus with anomalies, what are the risks vs benefits of termination?: 18,500 results
Filters: since 2022, review articles, sort by relevance: 1,710 results

Pregnant women and fetus with anomalies, termination vs continuation of pregnancy: 14,700 results
Filters: since 2026, review articles, sort by relevance: 809 results

**Cochrane**:
Uncontrolled diabetes AND fetal anomalies AND termination: 3 results
Fetus with congenital anomalies AND uncontrolled diabetes AND quality of life: 6 results

How I chose the articles:
There were a lot of articles to chose from based on my PICO question, especially because diabetes in pregnancy is a very relevant and important topic to learn about. When it came down to narrowing the articles based ospecifically fetal anomalies and termination vs continuation of pregnancy, it became more difficult. In addition to adding filters to narrow down the article choices, I looked at the titles and abstracts to see which ones were most relevant to my question. I ultimately chose articles that focused on the effects of uncontrolled diabetes on pregnancy and associated maternal and fetal outcomes. I also included studies that addressed decision-making and patient experiences in the setting of fetal anomalies, given the difficulty and emotional aspect of this decision.

**Identify at least 3 articles (or other appropriate reputable sources) that answer your specific question with the highest available level of evidence (you will probably need to look at more than 3 articles to get the 3 most focused and highest level articles to address your question). Please make sure that they are Medline indexed.**

**Please post the citation and abstract for each article (to include the journal and authors' names and date) and say why you chose it. Please also note what kind of article it is (e.g. meta-analysis, cohort study, or independent blind comparison with gold standard of diagnosis, etc.). At the bottom of each abstract, please comment on what your key points are from this article (including any points or concepts included in the article, but not present in the abstract – i.e. make the concepts understandable to the reader). Please note that if the evidence is not in the abstract, you must clearly summarize the evidence in your posting.**

(1) **Citation:** Ornoy, A., Becker, M., Weinstein-Fudim, L., & Ergaz, Z. (2021). Diabetes during pregnancy: A maternal disease complicating the course of pregnancy with long-term deleterious effects on the offspring. A clinical review. International Journal of Molecular Sciences, 22(6), 2965. https://doi.org/10.3390/ijms22062965

**Type of article:** Clinical review

**Abstract**
In spite of the huge progress in the treatment of diabetes mellitus, we are still in the situation that both pregestational (PGDM) and gestational diabetes (GDM) impose an additional risk to the embryo, fetus, and course of pregnancy. PGDM may increase the rate of congenital malformations, especially cardiac, nervous system, musculoskeletal system, and limbs. PGDM may interfere with fetal growth, often causing macrosomia, but in the presence of severe maternal complications, especially nephropathy, it may inhibit fetal growth. PGDM may also induce a variety of perinatal complications such as stillbirth and perinatal death, cardiomyopathy, respiratory morbidity, and perinatal asphyxia. GDM that generally

develops in the second half of pregnancy induces similar but generally less severe complications. Their severity is higher with earlier onset of GDM and inversely correlated with the degree of glycemic control. Early initiation of GDM might even cause some increase in the rate of congenital malformations. Both PGDM and GDM may cause various motor and behavioral neurodevelopmental problems, including an increased incidence of attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD). Most complications are reduced in incidence and severity with the improvement in diabetic control. Mechanisms of diabetic-induced damage in pregnancy are related to maternal and fetal hyperglycemia, enhanced oxidative stress, epigenetic changes, and other, less defined, pathogenic mechanisms.

**Key points:**

- Poorly controlled maternal diabetes is strongly linked to congenital anomalies. Hyperglycemia during organogenesis (weeks 3-8) increases risk of cardiac defects, neural tube defects, and caudal regression syndrome.
    - Evidence shows a dose-response relationship, where higher hemoglobin A1C levels correlate with higher anomaly risk.
- Maternal hyperglycemia causes teratogenic effects via oxidative stress by increasing reactive oxygen species (ROS), disrupting normal embryonic development.
- Adverse fetal and neonatal outcomes extend beyond structural anomalies in poorly controlled diabetes and pregnancy.
    - Includes macrosomia, neonatal hypoglycemia, respiratory distress, and perinatal mortality.
    - In utero exposure to hyperglycemia increases risk of obesity, type II DM, and metabolic syndrome later in life.
    - Tight glycemic control during pregnancy significantly reduces risks.
- Preconception care and strict glucose control during pregnancy is associated with lower rates of congenital anomalies and complications.

I chose this article because it provides strong background and pathophysiologic evidence directly relevant to my PICO population and outcomes. Even though it does not directly compare termination vs continuation, the article strengthens my discussion by providing biological rationale and summarizing existing evidence. The article focuses on pregnant women with diabetes, specifically assessing the effects of poor glycemic control. The article also explains the “why” behind outcomes, such as clearly describing how hyperglycemia leads to congenital anomalies (i.e. oxidative stress), which helps justify why outcomes may differ between termination vs continuation. It also aligns with my outcome measures, as it provides evidence on congenital anomalies, perinatal mortality, and long-term complications.

(2) **Citation:** Heaney, S., Tomlinson, M., & Aventin, Á. (2022). Termination of pregnancy for fetal anomaly: A systematic review of the healthcare experiences and needs of parents. BMC Pregnancy and Childbirth, 22, 441. https://doi.org/10.1186/s12884-022-04770-4

**Type of article:** Systematic review

Abstract
Background: Improved technology and advances in clinical testing have resulted in increased detection rates of congenital anomalies during pregnancy, resulting in more parents being confronted with the possibility of terminating a pregnancy for this reason. There is a large body of research on the psychological experience and impact of terminating a pregnancy for fetal anomaly. However, there remains a lack of evidence on the holistic healthcare experience of parents in this situation. To develop a comprehensive understanding of the healthcare experiences and needs of parents, this systematic review sought to summarise and appraise the literature on parents’ experiences following a termination of pregnancy for fetal anomaly.

Review question: What are the healthcare experiences and needs of parents who undergo a termination of pregnancy following an antenatal diagnosis of a fetal anomaly?

Methods: A systematic review was undertaken with searches completed across six multi-disciplinary electronic databases (Medline, Embase, PsycINFO, CINAHL, Web of Science, and Cochrane). Eligible articles were qualitative, quantitative or mixed methods studies, published between January 2010 and August 2021, reporting the results of primary data on the healthcare experiences or healthcare needs in relation to termination of pregnancy for fetal anomaly for either, or both parents. Findings were synthesised using Thematic Analysis.

Results: A total of 30 articles were selected for inclusion in this review of which 24 were qualitative, five quantitative and one mixed-methods. Five overarching themes emerged from the synthesis of findings: (1) Contextual impact on access to and perception of care, (2) Organisation of care, (3) Information to inform decision making, (4) Compassionate care, and (5) Partner experience.

Conclusion: Compassionate healthcare professionals who provide non-judgemental and sensitive care can impact positively on parents' satisfaction with the care they receive. A well organised and co-ordinated healthcare system is needed to provide an effective and high-quality service.

**Key points:**

- Termination for fetal anomaly is increasingly common due to improved prenatal detection. Advances in screening and imaging have increased identification of congenital anomalies, leading more parents to face decisions about termination.
- Parental experience is heavily influenced by quality of healthcare. The review of 30 studies identified key themes: access to care, organization of services, information for decision making, compassionate care, and partner involvement.
- Clear, timely information is critical for decision-making. Parents reported needing accurate, understandable information to make informed decisions about continuing vs terminating pregnancy.
    - Compassionate, non judgemental care improves outcomes and satisfaction
- Evidence shows that supportive healthcare providers and coordinated care systems significantly improve parental experience and coping.

I chose this article because it is a systematic review that adds important contextual and patient-centered evidence to my PICO question. It focuses on termination of pregnancy for fetal anomalies, which aligns with my PICO scenario. Because this is a sensitive and difficult topic for both clinicians and patients, this article helps explore the decision-making process. It provides insight into how patients navigate choices when faced with fetal anomalies. It also highlights healthcare and counseling factors, showing that quality of counseling and provider support significantly influences outcomes, which it's important when considering real-world management. While my PICO includes morbidity and neonatal outcomes, this article provides insight into psychological outcomes, which is clinically relevant.

(3) **Citation**: Galindo, A., García-Burguillo, A., Azriel, S., & de la Fuente, P. (2006). Outcome of fetuses in women with pregestational diabetes mellitus. Journal of Perinatal Medicine, 34(4), 323–331. https://doi.org/10.1515/JPM.2006.062

**Type of article:** Retrospective cohort study

Abstract
Objective: To investigate the effects of pregestational diabetes on pregnancy outcome.

Methods: Data of 126 women with pregestational diabetes prospectively collected and controlled in a single tertiary center. HbA1C levels at early pregnancy were registered. Adverse pregnancy outcome

was defined as spontaneous abortion, congenital defect, stillbirth, or neonatal death.

Results: There were 10 spontaneous abortions (7.9%) and 17 fetuses with congenital anomalies (13.4%), in- cluding 8 major malformations (6.3%). Compared with pregnancies with a favorable outcome, a higher HbA1C concentration in early pregnancy was observed in pregnancies with adverse perinatal outcome [mean (SD): 6.3 (1.6) vs. 7.2 (1.7), P=0.001x]. A positive correlation between increased maternal HbA1C levels and the rate of fetal malformations was observed, and the group of women with poor metabolic control (early maternal HbA1c concentration 7%) showed a 3 to 5-fold increase in the major malformation rate. Cardiovascular and genitourinary defects accounted for 58.8% of the anomalies, and the ultrasound examinations detected seven of them (41.2%). For major malformations, the detection rate was 50% (4/8). Perinatal mortality rate was 26‰ (3/116). There was almost 5-fold increase in the total pregnancy loss rate in the poor control group compared with the group with fair control w22.2% vs. 5.3%, OR (95% CI): 5.1 (1.4–17.1)x. Only 11.9% of mothers used a preconception care program.

Conclusions: Pregestational diabetes mellitus is a significant risk factor for the developing fetus. Spontaneous abortions and congenital defects are more common when a poor metabolic control is present in early pregnancy. It is most important to improve access to preconception care programs for achieving a good metabolic control in early pregnancy. Ultrasound examinations have a low performance for detecting congenital defects in diabetic pregnancies.

**Key points:**

- Pregestational diabetes is associated with significant adverse pregnancy outcomes
  - The study found 7.9% spontaneous abortion and 13.4% congenital anomalies, including 6.3% major malformations, showing a clear increased fetal risk.
- Poor glycemic control (high HbA1C) is strongly linked to worse outcomes
- Women with adverse outcomes had higher early pregnancy HbA1C levels, and levels >7% was associated with a 3-5x increase in major malformations.
  - Most defects were cardiovascular and GU (about 58.8%), highlighting patterns of diabetic embryopathy

I chose this article because it is a retrospective cohort study that focuses on women with pregestational and often poorly controlled diabetes, which aligns with my PICO. It reports rates of congenital anomalies, miscarriage, and perinatal outcomes, directly relating to my fetal/neonatal outcomes. The article also links glycemic control to severity of outcomes, showing that worse glucose control is associated with higher risk, which strengthens the clinical significance of my PICO question.

**What is the clinical “bottom line” derived from these articles in answer to your question?**
Based on the articles, in pregnant women with poorly controlled diabetes and fetal congenital anomalies, continuation of pregnancy is associated with significantly increased risks of adverse fetal and neonatal outcomes. These outcomes include major malformations, pregnancy loss, and perinatal morbidity, particularly when glycemic control is poor early in pregnancy. Although there is limited evidence on the direct comparison between continuation of pregnancy vs termination, the available data suggests that continuation carries substantial fetal risk, while termination may be considered in cases of severe anomalies. Decision making should be individualized and patient-centered, incorporating the severity of anomalies, maternal health, and patient values. In addition, comprehensive counseling and compassionate care are essential, as they significantly impact patient understanding, coping, and satisfaction with the decision-making process.