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The Influence of Intrapartum Interventions on the Development or Prevention of Postpartum Mood Disorders

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THE INFLUENCE OF INTRAPARTUM INTERVENTIONS ON THE DEVELOPMENT OR PREVENTION OF POSTPARTUM MOOD DISORDERS

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THE INFLUENCE OF INTRAPARTUM INTERVENTIONS ON THE DEVELOPMENT OR PREVENTION OF POSTPARTUM DEPRESSION

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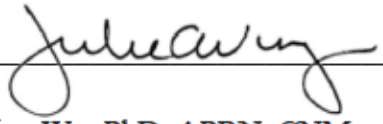
Project Advisor Signature: 

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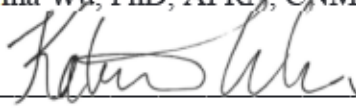
Second Reader Signature: 

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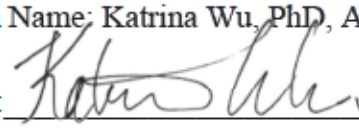
Director of Nurse-Midwifery Program Signature: 

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Meghan Perrodin

Abstract

Introduction: Postpartum depression (PPD) is a challenging yet common experience for new mothers worldwide. PPD is impacted by intrapartum interventions, but their effects are not well-defined in the literature. The purpose of this integrative review was to identify intrapartum interventions that increase or mitigate a woman's risk for postpartum depression.

Methods: A literature search was conducted using PubMed, CINAHL, and ScienceDirect for articles published between 2014-2024. Inclusion and exclusion criteria were used to select applicable studies. Search results were uploaded to Covidence systematic review software and used to screen included studies. Throughout the process, the Johns Hopkins Evidence Research Appraisal Tool was used to analyze study quality and to limit included studies to original research with quality Levels I-III.

Results: The search identified a total of 22 articles with a total of 202,405 participants which met inclusion criteria and were chosen for this review. Themes identified included interventions that are protective against developing PPD, including nonpharmacologic pain relief methods, adequacy of pain relief, social support, and music therapy. Interventions that increase risk of developing PPD include antibiotics, cesarean sections, episiotomies, induction of labor, pain interventions unmatched with desired interventions, epidurals (inconclusive), and synthetic oxytocin (inconclusive).

Discussion: Intrapartum interventions can help to mitigate PPD risk when carefully selected for the individual woman. Application of this review's findings must be nuanced rather than broadly applied. Further research is needed to explore the impact of individual interventions on PPD development, as well as in the context of other risk factors for PPD.

Keywords: Depression; Postpartum; Risk Factors; Mothers/psychology; Pregnancy; Midwifery; Obstetric; Epidural Analgesia; Labor Coach; Oxytocin

Introduction

The data is clear: postpartum depression (PPD) has a multigenerational impact. It negatively affects women, their partners, and their children. PPD can strain the emotional connection between mothers and children long-term, affecting even grandmother-grandchild relationships decades after the initial impact of PPD (Myers & Johns, 2018). Postpartum depression is defined as moderate to severe depression that occurs within the first year after a woman gives birth (NIH, 2022). Untreated, PPD is no different than other forms of depression–it can be deadly. Suicide is a preventable yet leading cause of maternal mortality, accountable for 20% of deaths during pregnancy and the postpartum period (Chin et al., 2022). PPD affects women of all ages, ethnicities, and socioeconomic status (NIH, n.d.), with an estimated prevalence of 17% among postpartum women worldwide (Wang et al., 2021).

Professional Organization Statement

ACNM's (2020) position statement on maternal mental health encompasses postpartum mood disorders. The document reflects the holistic nature of the midwifery profession, recognizing the substantial effect of mental health on well-being. As holistic care providers, midwives are invested in maternal mental health. The ACNM statement recommends screening for depression for all midwifery patients during routine visits. Women should be screened twice for depression during pregnancy, and screening should continue at regular time frames postpartum (ACNM, 2020).

Comprehensive depression screening involves assessing for the presence of risk factors, as well. Furthermore, ACNM urges healthcare providers to be well-trained in providing basic mental health treatment for depression and PTSD, educating patients, and incorporating a standardized follow up to positive screenings in order to treat or refer patients with symptoms of

mental health disorders (2020). Maternal mental health is also at the forefront of obstetricians' minds; ACOG named perinatal depression a policy priority for 2023 (ACOG, 2024). ACOG's clinical practice guidelines (2023a; 2023b) on postpartum mental health screening, diagnosis, treatment, and management of perinatal mental health conditions are similar to ACNM's.

Purpose of the Review

General risk factors for PPD have been identified, and professional organizations have outlined care and screening practices. Even so, information to help midwives and patients mitigate future PPD risk during the intrapartum period is lacking. It bears asking the question, what intrapartum interventions contribute to the development or prevention of postpartum depression? The purpose of this review is to collect evidence on intrapartum interventions that affect PPD.

Significance to Advance Practice Nursing

Midwives hold an important role throughout the perinatal experience. They are responsible for educating patients, creating individualized plans of care, and choosing appropriate intrapartum interventions for laboring women. Equipped with an understanding of the relationship between PPD and intrapartum interventions, providers can help to decrease PPD rates. Therefore, midwives and other providers caring for women during the perinatal period will benefit from the research data compiled by this review.

Theoretical Framework

The Neuman Systems Model is a theoretical framework that explores the composite of variables affecting a patient's well-being (Hannoodee & Dhamoon, 2022). Well-being is not limited to the physical health of a person; rather, many factors contribute to overall health. Each individual is seen as a sum of numerous variables including their environment, community,

family, sociocultural environment, and spiritual beliefs (Hannoodee & Dhamoon, 2022). This model is an effective framework for the investigation of the influence of intrapartum interventions on PPD because it demonstrates how individual stressors can break 'defense lines' in a person's system resulting in impaired emotional or physical health. The impact of environmental factors (such as intrapartum interventions) on mental and emotional well-being is explored through the Neuman Systems Model (Hannoodee & Dhamoon, 2022). With this evidence, midwives can more easily identify common intrapartum practices that can be modified to help decrease PPD rates as a primary prevention strategy.

Methods

Design

The methodology of this review was guided by the process described by Whittemore and Knafl (2005), which lends a systematic and rigorous approach to data analysis. This review was conducted in accordance with Whitmore and Knafl's recommended steps, including identifying an area of interest, performing a detailed literature search, extracting relevant data, comprehensively analyzing the collated information, and synthesizing the findings. The rationale for this methodology lies in reducing bias, increasing rigor, and improving the capacity for synthesizing various methodologies and designs into the body of literature.

Search Strategies

The search process began with a university librarian consultation in January 2024, affirming the search strategy proposal. A singular search was conducted in January of 2024 across three databases in order to identify relevant articles for inclusion: CINAHL, PubMed, and ScienceDirect. The following search terms were used along with Boolean operators: "postpartum depression," "pitocin," "essential oils," "assisted vaginal delivery," "nitrous oxide," "labor

analgesia," "epidural," "cesarean," "operative vaginal delivery," "induction of labor," "labor augmentation," "artificial rupture of membranes," "cervical ripening," "episiotomy," "labor," "intrapartum," and "obstetric"; not "telehealth," "child," or "nursing/nurse."

Criteria for Inclusion and Exclusion of Research Studies

Articles were included if they were original, data-based research studies examining the relationship between PPD and obstetric interventions used in midwifery care during the timeframe of early labor until delivery, published between 2014 and 2024, and written in or translated into English. Studies with the following characteristics were included: randomized controlled trials, large sample sizes, and data from first-world countries. Additionally, some sub-themes yielded a limited number of studies. In these cases, some articles were included that screened for postpartum depressive symptoms in the early postpartum period (e.g., at hospital discharge or less than two weeks postpartum) rather than true PPD, which is not diagnosed until two or more weeks postpartum. Articles examining mode of delivery were included. Although midwives do not perform cesarean sections, midwifery care is well-known for helping to decrease the cesarean rate, therefore this sub-topic was deemed relevant for inclusion. Articles were excluded if they focused predominantly on general risk factors for PPD because they included limited data on the relationship between specific obstetrical interventions and PPD.

Search Process

In order to promote collaboration in reviewing the studies, the search results were uploaded to Covidence systematic review software (2024) for the screening process. After article screening, a Preferred Reporting Items for Systematic Reviews and Meta-Analyses [PRISMA] was conducted using Covidence software (see Figure 1, PRISMA flow diagram). The initial electronic database search produced a total of 1396 publications. Of these, 1297 potentially

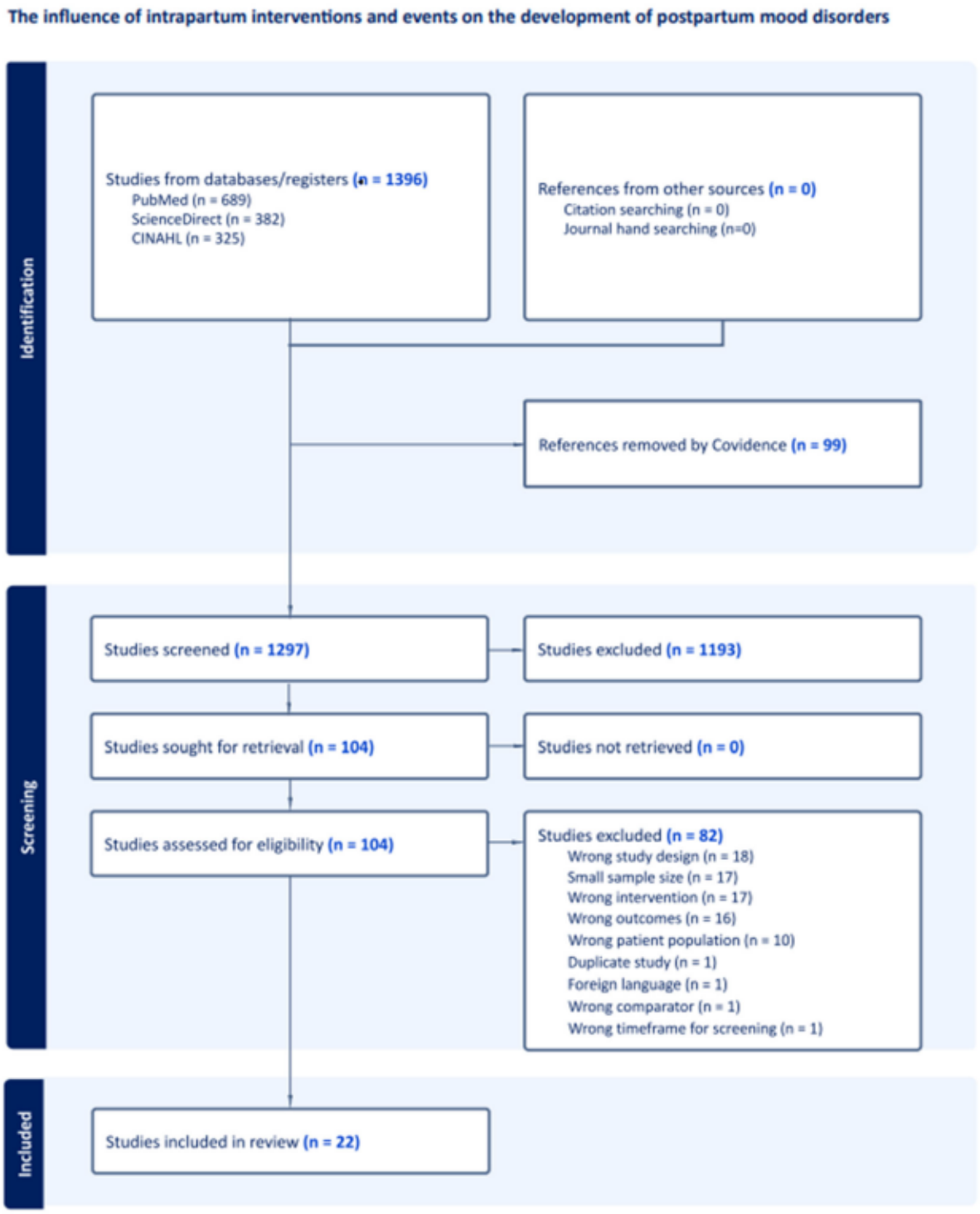
relevant abstracts were reviewed after 99 duplicates were removed. Of the remainder, 1193 abstracts were excluded, 104 full-text articles were retrieved, and 22 articles met inclusion criteria. After independent initial screening by each author, conflicts were resolved by discussion and decisions reached by mutual agreement.

Citation searching of systematic reviews found in the search results yielded no additional relevant articles. In addition, a bibliographic hand search of *American Journal of Obstetrics and Gynecology*, *Journal of Midwifery and Women's Health*, and *Maternal Child Health Journal* was performed to search for any relevant articles published in the past five years. No additional articles were identified by citation searching or journal hand searching for a final sample size of 22.

These 22 studies were critically examined to identify intrapartum interventions' influence on the development of PPD. The authors used the Johns Hopkins Nursing Evidence-Based Practice appraisal tool to assess individual studies and grade them based on rigor, attributes, and transparency (Dang & Dearholt, 2018). A matrix was created to document each study's purpose, level and quality of evidence, design, sample, setting, results, strengths, limitations, author recommendations, and relevance to this review (see Appendix A). The included studies were organized by interventions that increase risk versus decrease risk for developing PPD.

Figure 1

PRISMA Flow Diagram



Results

Summary of Selected Studies

The 22 included studies were published between 2014 and 2023. Using the Johns Hopkins review methodology (Dang et al., 2018), four of the studies were Level I evidence, including three high-quality and one good-quality study. Level II evidence studies included one of good quality and one of fair quality. An additional 16 studies were Level III evidence, of which four were high quality, nine were good quality, and three were low quality.

The study types included four RCTs, three quasi-experimental, one longitudinal prospective, one longitudinal, two prospective observational, one case-control, two cross-sectional, one longitudinal cohort, three prospective cohort, one historical cohort, one retrospective cohort, one cohort, and one correlational. The sum of the sample sizes was 202,405, which included postpartum women of childbearing age. In most cases, women with a history of psychological conditions were excluded from samples. Studies examined the presence of depressive symptoms or PPD which were identified via a study instrument (most commonly the EPDS, which was used in 17 of the studies) or historical diagnosis. The timeframe for screening or diagnosis ranged from 1 day to 12 months postpartum.

The included studies were conducted in a large number of different nations, reflecting the universal experience of PPD among women. Nations where studies were conducted include the United States, Canada, China, Czech Republic, Denmark, Egypt, Germany, India, Israel, Italy, Japan, Netherlands, Oman, Singapore, Turkey, and Ukraine.

The research examined the impact of intrapartum interventions on the development of PPD. In alignment with the Neuman model's focus on prevention, research findings were organized and synthesized by interventions that prevent versus contribute to PPD (See Figure 2).

Synthesis of Major Findings

Stressors to the System - Methods that Increase Risk for PPD

Mode of Delivery. The correlation between mode of delivery and PPD has been extensively studied. Six of the studies examined this relationship. (Baba et al., 2023; Eckerdal et al., 2018; Khalaf et al., 2023; Maimburg & Vaeth, 2015; Meky et al., 2020; Skov et al., 2022).

Baba et al. (2023) conducted a cohort study among 89,954 mothers with live singleton births in Japan. They looked at the relationship between mode of delivery and EPDS results at both 1 and 6 months, adjusting for confounding variables. At 1 month the risk for PPD was slightly higher in all groups compared to unassisted vaginal delivery. The multivariable odds ratio of PPD for assisted vaginal delivery was 1.12 (95% confidence interval [CI], 1.02–1.23), instrumental delivery was 1.20 (95% CI, 1.05–1.38), and cesarean section was 1.30 (95% CI, 1.19-1.42). The mode of delivery was not found to have an impact on PPD at 6 months. Similarly, Eckerdal et al. (2018) found that there was a higher prevalence of depressive symptoms associated with emergent cesarean section at 6 weeks postpartum but not at 6 months. This study was a longitudinal cohort study ($N = 3,888$) in Uppsala, Sweden that used a multivariate model. Emergency cesarean section was associated with PPD at 6 weeks postpartum (odds ratio [OR] 1.45, 95% CI, 1.04-2.01). However, when adjusting for confounding variables a connection between mode of delivery and PPD was not found (Eckerdal et al., 2018).

Skov et al. (2022) conducted a Danish prospective cohort study ($N = 54,474$) that assessed the relationship between mode of delivery and self-reported symptomatology at 6 months. Adjusted analysis showed increased odds for reported depressive symptoms in mothers with a planned cesarean section (OR 1.16; 1.03-1.32) and emergency cesarean section (OR 1.22; 1.09-1.37) compared to spontaneous vaginal delivery. Interestingly, when adjusting for pre-

delivery mental health, higher odds for depressive symptoms were only found in those with emergency cesarean sections (Adj. OR 1.25; 1.09-1.43; Skov et al., 2022).

Meky et al. (2020) conducted a cross-sectional study that explored the relationship between delivery mode and PPD in singleton pregnancies in Ismailia, Egypt ($N = 412$). In the vaginal delivery group, the PPD rates at 8 and 16 weeks postpartum were 7% and 1.7%. In the elective cesarean section group, the rates were 21% and 13%. In women with emergency cesarean sections, the rates were 25% and 19% (Meky et al., 2020). A secondary outcome found in the RCT by Maimburg & Vaeth (2015; $N = 1,193$) was a correlation between cesarean section and PPD (OR 1.57, 95% CI, $p = 0.085$).

Induction/Augmentation of Labor. Ponti et al. (2022), an Italian study, utilized a cohort longitudinal study to investigate the link between induction of labor and PPD 3 months postpartum ($N = 161$). Women with spontaneous labor experienced lower mean EPDS scores ($M = 6.73$, $SD = 4.67$, CI 95%) compared to women with induced labor ($M = 11.88$, $SD = 4.81$, CI 95%; Ponti et al., 2022). Additionally, Zanardo et al. (2017) was an Italian quasi-experimental study ($N = 180$) that examined the relationship between vaginal prostaglandin (dinoprostone) on EPDS scores and breastfeeding. One group was assigned to use dinoprostone in their induction of labor and the other group was not. Those in the group with the prostaglandin induction showed higher EPDS scores at discharge (9 [7-13] vs 5 [3-8], $p = .0003$; Zanardo et al., 2017).

Four studies examined the relationship between intrapartum synthetic oxytocin use and PPD (Gu et al., 2016; Kroll-Desrosiers et al., 2017; Takács et al., 2019; Tichelman et al., 2021). Kroll-Desrosiers et al. (2017) utilized a case-control study to determine the relationship between intrapartum synthetic oxytocin exposure and PPD ($N = 46,732$) in a United States study using convenience sampling. In women with no previous mental health history, intrapartum synthetic

oxytocin exposure increased the risk of PPD or anxiety by 32% (relative risk [RR]: 1.32; 95% CI: 1.23-1.42). In those with a previous mental health history, the risk was increased by 36% (RR: 1.36; 95% CI: 1.2-1.55; Kroll-Desrosiers et al., 2017).

Tichelman et al. (2021) used a prospective cohort study design in the Netherlands (N = 1,528) to examine the relationship between intrapartum synthetic oxytocin exposure and childhood behavioral problems; a secondary outcome was measuring EPDS scores. The study identified an association between synthetic oxytocin and PPD, although weakly ($\beta = 0.17$, 95% CI: 0.03-0.30), a 0.6% variance (Tichelman et al., 2021).

Gu et al. (2016) used a longitudinal study design and convenience sampling (n = 386). This study determined that intrapartum synthetic oxytocin was weakly correlated with depressive symptoms at 2 months postpartum (Pearson's $r = 0.15$, $p < 0.01$). The relationship strengthened ($p < 0.05$) when a multiple linear regression analysis was used to account for relationship status and years of education, accounting for a 4.7% variance (Gu et al., 2016).

Conversely, Takács et al. (2019), a study in Oman, found a lower risk of PPD in relation to synthetic oxytocin exposure. This study was a prospective observational study using the Cox proportional hazards regression. After adjusting for confounding variables they determined there was a lower risk of mood disturbances with synthetic oxytocin exposure (hazard ratio = 0.65, 95% CI 0.47-0.92, $p = 0.025$; Takács et al., 2019).

Pain Interventions. Of the 22 included studies, six examined the impact of pain relief interventions on the development of PPD (Jin et al., 2023; Maimburg & Vaeth, 2015; Orbach-Zinger et al., 2018; Romanenko & Bielka, 2022; Tan et al., 2023; Zhang et al., 2018). Several studies compared rates of PPD between different pain intervention groups.

Zhang et al. (2018) conducted a quasi-experimental study ($N = 565$) and found an association between epidural use and PPD at 2-4 weeks postpartum. Sixteen percent (34/213) of the women who received epidural analgesia, 7.3% (22/301) of those who received doula support, and 7.8% (4/51) of those who received transcutaneous electrical nerve stimulation ($p = 0.006$) screened positive for PPD at 2-4 weeks postpartum. Findings were not statistically significant, but rates of PPD among women who received epidurals were notably higher. Similarly, Romanenko and Bielka (2022) used a prospective observational study design ($N = 321$) and reported that epidural analgesia was associated with a higher risk for PPD development compared to nonpharmacologic pain relief methods ($p = 0.044$). A historical cohort study ($N = 35,437$) based on a data set from Nova Scotia, Canada, found an association between epidural use and an increased risk for PPD compared to women who did not receive an epidural (Adj. OR 1.29; 95% CI, 1.12-1.48); the sample included only primiparous women (Jin et al., 2023). Conversely, an RCT ($N = 881$) conducted in Singapore assigned women to epidural or non-epidural groups, and examined risk for PPD in both. The non-epidural groups received pharmacologic pain management options (IM pethidine or IV patient-controlled analgesia), and the study found no difference in PPD risk among the two groups at 6 to 10 weeks postpartum (Tan et al., 2023).

Another important aspect of labor pain interventions to consider is their effectiveness and whether they were administered as requested; two studies focused on these areas. One RCT (Maimburg and Vaeth, 2015, $N = 1193$) found that lack of intrapartum pain relief is a risk factor for PPD when screened at 6 weeks postpartum. However, PPD correlation differed among unique intrapartum pain interventions. Use of pain relief had a much smaller effect on PPD risk (OR 0.63) compared to inadequate pain relief during delivery (OR 2.48-3.00). A second study

had similar findings, reporting that experiencing labor and delivery without the intended pain management option was correlated with PPD in an Israeli prospective longitudinal study (Orbach-Zinger et al., 2018). The sample ($N = 1497$) included women who had a vaginal delivery. Study outcomes included women's intention to receive an epidural versus no epidural, and whether they birthed with their intended method of pain management. The researchers found that "unmatched intention" correlated with an elevated risk for PPD at 6-10 weeks postpartum; this risk was particularly significant when the intervention desired and not received was epidural analgesia. In women who intended to deliver without epidural analgesia but received epidural analgesia, the PPD risk difference was -8.6% ($p = .014$).

Other. One study examined the effects of intrapartum antibiotic use on PPD ($N = 184$). One month postpartum EPDS rates were higher ($\beta = 0.54$; 95% CI [0.10, 0.98]) with intrapartum antibiotic use, a trend which continued until 2 months postpartum (standardized $\beta = 0.58$; 95% CI [0.14, 1.02]). This correlation did not continue at 6 months postpartum (Murphy et al., 2018). Additionally, another isolated study utilized a retrospective cohort study to examine the relationship between EPDS rates and episiotomy/lacerations ($N = 262$) in Oman (Khalaf et al. 2023). They discovered that the episiotomy group had higher total EPDS scores (10.4, $SD = 5.4$) compared to those with lacerations (8.1, $SD = 4.8$) or an intact perineum (9.4, $SD = 4.9$, $p = < 0.05$).

Flexible Lines of Defense - Methods that Prevent PPD

Pain Interventions. Pain interventions were identified as interventions that can help to prevent PPD as reported in four studies (Kaur et al., 2020; Orbach-Zinger et al., 2018; Romanenko and Bielka, 2022; Tan et al., 2023). Kaur et al. (2020) conducted an RCT ($N = 130$) measuring the incidence of PPD in women with a combined spinal-epidural analgesia (CSE)

group compared to a control group; results were not statistically significant (27.7% vs. 16.9%; Fisher's exact $p = 0.103$) when measured at 6 weeks postpartum. Additionally, Romanenko and Bielka's (2022) prospective observational study ($N = 321$) reported a lower risk for PPD development associated with nonpharmacologic pain relief methods compared to epidurals ($p = 0.044$) whereas a second study (an RCT by Tan et al., 2023) comparing similar interventions found no statistically significant difference in PPD rates at 6-10 weeks postpartum ($N = 881$, $p = 0.49$-0.79). Finally, the Orbach-Zinger et al. (2018) study ($N = 1497$) reinforces that providing laboring women with their desired pain relief method may be protective against PPD. The PPD rate among women who desired epidural analgesia but did not receive it was 8.1%, which was higher than the overall participant PPD rate of 6.6% but not statistically significant.

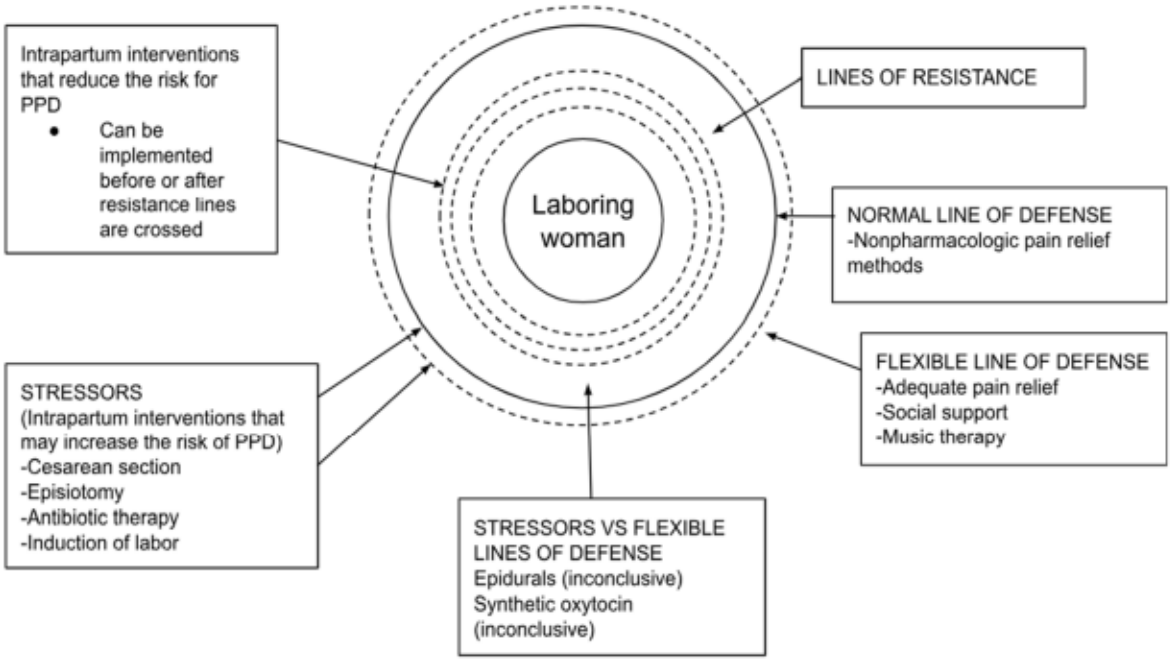
Strong Social Support. Four studies yielded evidence that social support is important in mitigating PPD risk (Falconi et al., 2022; Fukuzawa & Park, 2023; Maimburg & Vaeth, 2015; Zhang et al., 2018). They found that intrapartum social support is valuable when provided via professional and personal relationships, or both. A cross-sectional, multi-center Japanese study found that strong intrapartum social support (primarily given by nurse-midwives and partners) decreased risk for PPD symptoms ($\beta = -2.65$, $p < .001$; Fukuzawa & Park, 2023), and two others noted the same impact when doula support was provided (Falconi et al., 2022; Zhang et al., 2018). A U.S.-based retrospective cohort study matched pairs of patients receiving Medicaid with and without doula support in labor ($N = 298$); results indicated a much higher risk in patients without doula support (Falconi et al., 2022). The women with intrapartum doula support had a 64.7% lower risk of PPD (OR 0.353, 95% CI: 0.16–0.78) than women without a doula. On a similar theme, a Danish RCT (Maimburg & Vaeth, 2015, $N = 1198$) observed that women whose midwives were present less than 20% of the time during a given patient's labor and

delivery had an elevated risk for PPD compared to continuous midwifery presence (OR 2.45, 95% CI: 1.06–5.65).

Music Therapy. Only one of the 22 studies studied the impact of music as an intrapartum intervention. This RCT conducted in Turkey ($N = 141$) found that primiparous women who listened to music during the intrapartum period (through the end of the third stage) showed a reduced rate of depressive symptoms at 8 days postpartum (Simavli et al., 2014). Rates of minor depression were 12.7% in the intervention group versus 35.7% in the control; rates of major depression were 5.6% in the intervention group and 18.6% in the control group–all at 8 days postpartum.

Figure 2

Application of Neuman's Systems Theory: Intrapartum Interventions Impacting PPD



Discussion

This integrative review used the Neuman's Systems Model to investigate the current

published research regarding the effects intrapartum interventions have on subsequent development of PPD. The Neuman's Systems Model examines the effects of stressors on an individual's "defense lines" as well as the impact of other variables on holistic well-being (Hannoodee & Dhamoon, 2022). This framework is useful for understanding the impact of intrapartum interventions as either stressors or helping to strengthen the "defense lines" of a postpartum woman, ultimately increasing or mitigating her risk for PPD.

Methods that Increase Risk for PPD

Mode of Delivery

Multiple studies found an association between increased risk for PPD and cesarean section, especially when unplanned (Baba et al., 2023; Eckerdal et al., 2018; Maimburg & Vaeth, 2015; Meky et al., 2020; Skov et al., 2022). Another theme noted was that the correlation between mode of delivery and PPD was evident at 6 weeks postpartum but not at 4-6 months postpartum (Baba et al., 2023; Eckerdal et al., 2018; Meky et al., 2020). Additionally, instrumental delivery was also found to increase a woman's risk for PPD (Baba et al., 2023).

Induction/Augmentation of Labor

Women who began labor spontaneously had lower EPDS scores compared to those whose labors were induced (Ponti et al., 2022). One study showed a correlation between induction of labor with prostaglandins to have slightly higher EPDS scores than inductions without (Zanardo et al., 2017). Due to the potential impact induction of labor may have on PPD, further research is recommended.

The relationship between synthetic oxytocin and postpartum depression has not been studied extensively. A theme that emerged from the included studies was a positive correlation between intrapartum synthetic oxytocin usage and postpartum depression (Gu et al., 2016; Kroll-

Desrosiers et al., 2017; Tichelman et al., 2021). While three studies reported on this finding, the strength of association varied widely. Conversely, one study found synthetic oxytocin exposure was linked to lower rates of PPD (Takács et al., 2019). These mixed findings are consistent with other systematic reviews (Thul et al., 2020). With the widespread use of synthetic oxytocin in modern practice, more studies should be conducted on the potential effects it can have on PPD.

Pain Interventions

A theme emerged from several of the studies: higher levels of intervention in the physiologic birth process were correlated with increased risk for PPD. Two studies (Romanenko & Bielka, 2022; Zhang et al., 2018) found associations between PPD and epidural analgesia when compared to nonpharmacologic pain interventions including doula support and transcutaneous electrical nerve stimulation. Conversely, a large historical cohort study reported no association between PPD and epidural analgesia in primiparous women compared to a comparable cohort who did not receive epidural analgesia (Jin et al., 2023). Similarly, an RCT comparing women who received epidural analgesia to other types of pharmacological pain relief found no difference in PPD rates between the two groups at 6-10 weeks postpartum (Tan et al., 2023). The larger body of research is also divided in reports of correlation between epidural analgesia and PPD. The conflicting results point to a need for further research on subgroup differences (such as nulliparas versus multiparas) and larger studies comparing, for example, epidural analgesia to nonpharmacologic interventions as well as epidural analgesia to other pharmacological pain interventions. The current implications for obstetric care providers is to discuss the research findings using an individualized approach that considers a patient's preferences, PPD risks, and birth site pain management options.

Two other studies examined the impact of pain relief on the development of PPD (Maimburg & Vaeth, 2015; Orbach-Zinger et al., 2018). One, an RCT, (Maimburg & Vaeth, 2015) found a lack of intrapartum pain relief to be a strong predictor of PPD, and the other (Orbach-Zinger et al., 2018) found an association between "unmatched intention" of desired pain intervention (including desiring no epidural) and pain intervention actually received to be associated with PPD at 6-10 weeks postpartum. The strongest association was noted in the group that desired no epidural but did receive one. The findings of these studies imply the importance of discussing birth plans and desires during the antepartum and early intrapartum periods and then making strong efforts to provide the desired intervention which becomes, as Neuman (Hannoodee & Dhamoon, 2022) described, a "line of defense" against PPD. Women whose labor experiences deviate from their intended plan may require additional emotional support and debriefing to mitigate the risk for PPD caused by their unexpected experiences.

Other

There is very little published research on antibiotic exposure and PPD. A single study included in this review reported a link between intrapartum antibiotic exposure and PPD at 1 and 2 months postpartum that was not statistically significant by 6 months postpartum (Murphy et al., 2018). The gut-brain connection supports the idea that gut flora and depressive symptoms may be linked, but further research is needed to understand the nuances of maternal antibiotic exposure and ensuing psychological changes. Another study found a slight correlation between PPD and episiotomies (Khalaf et al., 2023). Multiple studies showed that PPD may develop secondary to unexpected or unplanned outcomes during the labor and birth process (Baba et al, 2023; Eckerdal et al., 2018; Maimburg & Vaeth, 2015; Meky et al., 2020; Ponti et al., 2022; Orbach-Zinger et al, 2018; Skov et al., 2022).

Methods that Prevent PPD

Pain Interventions

Of the reviewed studies, four explored the mitigating impact of specific pain interventions on PPD. Kaur et al. (2020) did not find a statistically significant difference in PPD rates between women who did versus did not receive spinal-epidural analgesia (CSE) at 6 weeks postpartum. Romanenko and Bielka (2022) conducted a prospective observational study and noted a lower rate of PPD among women who utilized nonpharmacological pain relief methods compared to epidural analgesia during labor. As previously mentioned, Orbach-Zinger et al. (2018) found that women who received their desired pain intervention (including no epidural) had lower rates of PPD. An RCT conducted by Tan et al. (2023) analyzed PPD rates in women receiving epidural analgesia compared to other types of pharmacological pain relief. It is worth noting that study participants could choose the pain intervention that they were initially randomized to, or they could opt for an alternative method. Because of the options given to participants, results were analyzed both by modified intention-to-treat and per-protocol, but no statistically significant difference was identified between groups in either analysis.

Overall, results on pain interventions that are protective against PPD are not strongly conclusive. This may be since pain is a complex phenomenon involving physical, psychological, and emotional factors. Additionally, countless options are available that women can draw from for labor pain relief. Further studies examining the effects of specific interventions (e.g., nitrous oxide, narcotic pain medications, hydrotherapy, or hypnosis) on PPD are needed to help guide clinicians and women in planning satisfactory labor, birth, and postpartum periods that suit individual desires and needs.

Strong Social Support

This body of research supports the theme that intrapartum social support is universally protective against PPD (Bohren et al., 2017; Falconi et al., 2022; Fukuzawa & Park, 2023; Maimburg & Vaeth, 2015; Zhang et al., 2018). This effect persists whether provided by professionals such as doulas, nurses, and midwives or the laboring woman's personal support system. There were no inconsistencies in the research surrounding this theme. Obstetric providers can encourage women to invite supportive persons to their birth to help mitigate PPD risk, especially for women known to have antenatal risk factors. Providers can support policy changes to promote coverage of doula services in an effort to reduce postpartum morbidity related to PPD.

Music Therapy

A single RCT pointed to the protective effect that listening to music during labor and delivery (through the third stage of labor) can have on prevention of PPD symptoms (Simavli et al., 2014). However, this singular study screened for symptoms at 8 days postpartum which is outside of the diagnostic timeframe for PPD (Simavli et al., 2014). Further research is needed to understand the impact of music therapy later in the postpartum period and whether the positive impact continues, increases, or decreases with time.

Review of Strengths and Limitations

Strengths of this integrative review include the rigor of the screening process including the involvement of two researchers. Inclusion of studies from 16 different countries, as well as a broad focus on the general postpartum population increases the comprehensive nature of this review. Most of the studies excluded women with psychiatric disorder history, increasing the

applicability of the findings to the average woman. Finally, a focus on identification of specific interventions that increase risk for PPD yields clinically relevant data that providers can implement in daily practice.

One of the limitations identified was that studies excluded mothers of multiples, adolescent mothers, and those older than 50 years. These groups likely have unique risk profiles for PPD and may benefit from further future studies. Another limitation is that studies examining more than one risk factor for PPD were generally excluded to focus on specific interventions. However those studies contain valuable pearls of information which would help complete our current understanding of intrapartum-associated risk factors for PPD. Finally, the scope of this review limited the ability to include analysis of the complex interactions between antepartum/postpartum risk factors and intrapartum interventions, which are undoubtedly relevant to identifying PPD risk on an individual level.

Conclusion

Numerous studies evaluate risk factors for PPD. Uniquely, this integrative review focused specifically on modifiable intrapartum interventions correlated with PPD. It was found that nonpharmacological pain relief methods, adequate pain relief, social support (such as by doulas, partners, or midwives) and music therapy are protective against PPD. It was also evident that there was an increased correlation between PPD and antibiotic use, cesarean section (especially unplanned), induction of labor, and episiotomy. Both epidural and synthetic oxytocin use in labor had an increased risk for PPD, but the results were not fully conclusive.

Much work has been completed, but there is great need for further investigation on these topics. Until then, providers can glean from the insights gathered here. PPD risk is nuanced, complex, and individual. Per Neuman's theory, each individual possesses unique variables that

keep their lines of defense strong, but these can also become compromised under stress (Hannoodee & Dhamoon, 2022). No single intervention will cause or prevent PPD in isolation. The application of the themes identified in this review can help the clinician and pregnant mother craft a birth plan that aligns with her desires and is protective against future development of PPD.

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Appendix A: Literature Review Matrix

1. Source/author/date:

Baba, S., Ikehara, S., Eshak, E. S., Ueda, K., Kimura, T., & Iso, H. (2023). Association between mode of delivery and postpartum depression: The Japan Environment and Children's Study (JECS). *Journal of epidemiology*, *33*(5), 209–216. https://doi.org/10.2188/jea.JE20210117

Purpose:	**Design (Method/Instruments):**	**Results:**	**Strengths:**
To investigate the relationship between mode of delivery and PPD at 1 and 6 months postpartum. **Level of evidence:** III - cohort study **Quality of evidence:** Good	The association between mode of delivery and PPD was studied. Instrument: Edinburgh Postnatal Depression Scale (cutoff score ≥13) at 1 and 6 months postpartum. **Sample/Setting:** 89,954 mothers with live singleton births in Japan. 51,507 (57.2%) of the women had unassisted vaginal delivery. 16,234 (18%) had an assisted vaginal delivery. 5,381 (6%) need an instrumental delivery. 5,131 (96.2%) of those were vacuum deliveries and the rest were deliveries by forceps. 16,802 (18.7%) had a cesarean section.	At 1 month postpartum 3.7% had PPD and at 6 months postpartum 2.8% had PPD. Cesarean section was associated with PPD at 1 month but not at 6 months; with adjusted ORs 1.10 (95% CI, 1.00-1.21) and 1.01 (95% CI, 0.90-1.13). The association of PPD at 1 month was seen in women with antenatal psychological symptoms (adjusted OR 1.15; 95% CI, 1.03-1.28). This was attenuated when adjusting for the feeding method of the infant. Women who gave birth with assisted vaginal delivery had an increased risk of PPD at 1 month OR 1.12 (95% CI, 1.02–1.23) compared with women who gave vaginal birth unassisted. Women who had instrumental delivery had an increased risk of PPD at 1 month 1.20 (95% CI, 1.05–1.38). Women who had a cesarean section had an increased risk of PPD at 1 month 1.30 (95% CI, 1.19-1.42).	The sample size was large, using a nationwide cohort study. They adjusted for confounding variables. EPDS outcome was at both 1 and 6 months **Limitations:** Did not distinguish between elective and emergency CS. EPDS was self-reported and not diagnosed.

Author Recommendations:
Women who have antepartum psychological symptoms and cesarean sections may be at risk for PPD in the early postpartum period.

Summary for current clinical practice question:
There was a mild association of PPD with those who had antenatal hx of depression and a cesarean section.

2. Source/author/date:

Eckerdal, P., Georgakis, M. K., Kollia, N., Wikström, A. K., Högberg, U., & Skalkidou, A. (2018). Delineating the association between mode of delivery and postpartum depression symptoms: a longitudinal study. *Acta Obstetricia et Gynecologica Scandinavica*, *97*(3), 301–311. https://doi.org/10.1111/aogs.13275

Purpose:	**Design (Method/Instruments):**	**Results:**	**Strengths:**
Understand the link between mode of delivery and PPD accounting for several covariates. **Level of evidence:** III - longitudinal-cohort study **Quality of evidence:** Good	Self-administered questionnaire at 32nd week of pregnancy, 6 weeks postpartum, and 6 months after delivery. The questionnaire included socioeconomic, demographic, and lifestyle questions. History of depression was self-reported. Fear of delivery was assessed. Postpartum delivery experience was assessed. A multivariate model was used to account for cofounding variables that are associated with PPD. **Sample/Setting:** Uppsala, Sweden. 3888 pregnancies.	When women delivered by emergency cesarean section (CS) there were higher rates of depressive symptoms at 6 weeks postpartum but not at 6 months. There was no association when adjusted for multivariables. A reported antepartum fear of delivery increased the mode of delivery's association with PPD 3x4 times. When adjusted for multivariables there was no association for PPD and mode of delivery.	Accounted for multivariables. Large sample size. Longitudinal design. **Limitations:** Self-reporting questionnaire. Self-reporting depression history. Pregnancy complications were assessed at 32 weeks which limits gestation.

Author Recommendations:

PPD and mode of delivery should be studied in other settings. The role of other covariates on PPD and the risk of PPD developing in subsequent pregnancies should be explored more.

Summary for current clinical practice question:

When adjusting for cofounding variables a link was not found with mode of delivery and PPD.

3. Source/author/date:

Falconi, A. M., Bromfield, S. G., Tang, T., Malloy, D., Blanco, D., Disciglio, S., and Chi, W. (2022). Doula care across the maternity care continuum and impact on maternal health: Evaluation of doula programs across three states using propensity score matching. *eClinical Medicine, 50*:101531. https://doi.org/10.1016/j.eclinm.2022.101531

Purpose: To understand who benefits the most from doula services and to evaluate whether women of different race/ethnic groups and health status benefit differently from doulas' care. **Level of evidence:** III - retrospective cohort study **Quality of evidence:** High	**Design (Method/Instruments):** Medicaid medical claims were used in comparing maternal health outcomes in women who did and did not receive doula support (2014 - 2020). **Sample/Setting:** Sample: $N = 298$ matched pairs of women in CA, FL, and a northeastern US state.	**Results:** Women who received doula care had a 52.9% lower cesarean rate (OR, 0.471; 95% CI, 0.29−0.79) and 57.5% lower rate of postpartum depression/postpartum anxiety (PPD/PPA) (OR, 0.425; 95% CI, 0.22 −0.82). Doulas working in the context of midwifery most often showed a reduction in cesarean rates. Intrapartum doula care was associated with 64.7% reduction in rates of PPA/PPD (OR, 0.353; 95% CI, 0.16−0.78).	**Strengths:** Analysis methods and Medicaid records as the data source strengthened the methodology of this study. Use of medical claims data to analyze the impact of doula care. This allowed for consideration of provider factors as well as identifying the timing of events. **Limitations:** There was no evaluation of whether postnatal doula care impacted PPD rates. Sample was largely limited to women living in Florida; furthermore, the sample may not reflect the greater population due to the unique risk factors and demographics of women who were referred to doula services. Also, the study did not assess whether concordance of race between women and their doulas affected outcomes.

Author Recommendations: Doula care appears to have a positive effect on maternal health, with notable benefits for disadvantaged and vulnerable women. Research gaps include a need for studies focusing on the impact of postpartum doula care on health outcomes during that time period.

Summary for current clinical practice question:

Doula care is strongly protective against PPD, even when doulas are utilized only during the intrapartum period.

4. Source/author/date:
Fukuzawa, R. K., & Park, C. G. (2023). Role of intrapartum social support in preventing postpartum depression. *Journal of Perinatal Education, 32*(2):104-115.

Purpose: To understand the impact of intrapartum social support on risk for PPD. **Level of evidence:** III - cross-sectional, multicenter study **Quality of evidence:** High	**Design (Method/Instruments):** A survey questionnaire (U.S. Listening to Mothers-II/Postpartum survey questionnaire) was given to mothers in pen and paper format. The mothers mailed it back to the researchers after completing the survey at home. **Sample/Setting:** Sample: Convenience sample of 204 postpartum women who gave birth after a singleton pregnancy, were aged 20-45, reported no psychiatric history within the past 5 years, and were a mean of 1.26 months postpartum. Setting: Three different facilities (private hospital, public hospital, and private clinic) in Japanese metropolitan/ suburban locations.	**Results:** Major predictors of PPD included antenatal depression, medical complications, intrapartum social support (given by medical personnel and partners), and postpartum social support. Social support provided during the intrapartum/postpartum periods were intercorrelated. Women who registered "perfect" scores indicating high levels of perceived intrapartum social support had lower rates of PPD symptomatology ($\beta = -2.65$, $p < .001$).	**Strengths:** Focus on Japanese women. This study provided information that could be compared across cultures with United States data. **Limitations:** Some predictors of PPD were not included as variables in this study. These study findings (based on a sample of metropolitan/suburban women) may not be comparable to urban or rural hospitals.

Author Recommendations:
Policy change and obstetrical provider awareness can both help to mitigate PPD by encouraging intrapartum social support and community postpartum support. Intrapartum and postpartum social support were found to be equally impactful in PPD prevention.

Summary for current clinical practice question: Providing social support is an intervention correlated with a reduction in PPD risk.

5. Source:

Gu, V., Feeley, N., Gold, I., Hayton, B., Robins, S., Mackinnon, A., Samuel, S., Carter, C. S., & Zelkowitz, P. (2016). Intrapartum synthetic oxytocin and its effects on maternal well-being at 2 months postpartum. *Birth (Berkeley, Calif.)*, *43*(1), 28–35. https://doi.org/10.1111/birt.12198

Purpose:	**Design (Method/Instruments):**	**Results:**	**Strengths:**
Review the correlation between synthetic oxytocin and postpartum mood disorders at 2 months postpartum along with maternal oxytocin levels and breastfeeding. **Level of evidence:** III **Quality of evidence:** Good	Longitudinal study design examining two independent studies. Instrument: questionnaires assessing anxiety, depression, post traumatic stress, and breastfeeding. The doses of synthetic oxytocin used were gathered from the patients' charts. **Sample/Setting:** Convenience sampling of women giving birth at a hospital/birthing center in Montreal Canada. $N = 386$.	Higher doses of synthetic oxytocin were associated with higher levels of depression, anxiety, and somatization symptoms but not perinatal posttraumatic stress. Women who were still exclusively breastfeeding at 2 months postpartum had received less synthetic oxytocin. **Conclusion:** There was a correlation with synthetic oxytocin use in labor and decreased maternal mental health at 2 months postpartum.	The sample was from both a hospital and a birthing center which helps with generalizability. It examined the long-term effects of the intrapartum use of synthetic oxytocin on maternal well being. **Limitations:** The study was a correlation design. Prenatal mental health was not taken into consideration, along with other variables in labor such as duration. No distinction between higher and lower synthetic oxytocin doses.

Author Recommendations:

Intrapartum oxytocin's potential effect on maternal well-being at 2 months postpartum should warrant caution when using synthetic oxytocin in labor.

Summary for current clinical practice question:

This article is extremely relevant to our PICO question. It identifies a correlation between depressive symptoms in mothers, increased oxytocin levels, and intrapartum synthetic oxytocin administration. However, the study limitations do not allow for widespread generalizability of results.

6. Source/author/date:

Jin, S., Munro, A., & George, R. B. (2023). The association between labour epidural analgesia and postpartum depression in primiparous patients: a historical cohort study. *Canadian Journal of Anaesthesia, 70*(12), 1909–1916. https://doi.org/10.1007/s12630-023-02568-2

Purpose:	**Design (Method/Instruments):**	**Results:**	**Strengths:**
To look for an association between labor epidural analgesia (LEA) and PPD in primiparous women. **Level of evidence:** III - historical cohort study **Quality of evidence:** Good	Searched a provincial perinatal database for medical records. Included only primiparous patients who gave birth to viable singleton infants in 2004 - 2018. Patients with PPD after the birth of their first child were identified per their PPD historical diagnosis on their second pregnancy's records. **Sample/Setting:** Sample: Patients who fit the inclusion criteria whose records were found in the Nova Scotia Atlee Perinatal Database; $N = 35,437$.	3.7% ($n = 1,296$) of all included patients experienced PPD. Patients with LEA had an increased risk for PPD compared to patients without LEA (adjusted OR, 1.29; 95% CI, 1.12 to 1.48). A multivariable regression model, found that LEA remained a significant PPD predictor, along with pre-existing anxiety, BMI, and maternal antidepressant use.	Large sample size using a population-based data set; included patients from both community and academic facilities. Heterogeneous protocols for LEA. Self-reported PPD diagnosis in lieu of survey use as primary outcome. Extended time period for PPD recognition; study therefore not restricted to immediate postpartum time frame. **Limitations:** Only historical and observational data were included. Possible confounders such as birth plans/expectations, pain catastrophizing, antenatal preparation for birth, and social support were not considered. Information on epidural placement and efficacy of analgesia was not available/noted.

Author Recommendations:

Study findings agreed with the current body of research recognizing that PPD is complex and impacted by multiple variables. Overall, LEA has not been found to be a singular predictor of PPD, but may increase a woman's risk if she is already high-risk based on preexisting variables. The authors recommend that future research investigate LEA effects on high-risk groups; a national prospective study would provide the preferred design for study accuracy and provision of relevant results.

Summary for current clinical practice question:

This study showed that there was a slightly increased risk for postpartum depression with epidural use. The study looked at second time moms and took into account other variables that increase the risk of postpartum depression.

7. Source/author/date:

Kaur, A., Mitra, S., Singh, J., Sarna, R., Pandher, D. K., Saroa, R., & Das, S. (2020). Pain, stress, analgesia and postpartum depression: Revisiting the controversy with a randomized controlled trial. *Saudi Journal of Anaesthesia 14*(4): p 473-479. https://doi.org/10.4103/sja.SJA_814_19

Purpose: To assess whether combined spinal-epidural (CSE) labor analgesia helps to mitigate PPD risk. **Level of evidence:** I - RCT **Quality of evidence:** High	**Design (Method/Instruments):** Method: Random assignment to either CSE or "normal" vaginal delivery. Sample size was 65 in each group. Instruments: EPDS administered on day 3 and at 6 weeks postpartum. The primary outcome definition was EPDS score of ≥10 at 6 weeks postpartum. **Sample/Setting:** Sample: Women aged 18+ years in spontaneous labor anticipating SVD, in early spontaneous labor (SVE ≤ 5 cm), with baseline pain score > 30 according to the American Society of Anesthesiologists (ASA) physical status I-II, and ability to use a PCEA pump. Group I received CSE while group II did not. The women did not have multiple psychological problems. Setting: Saudi Arabian tertiary teaching hospital.	**Results:** Incidence of PPD 22.3%. PPD rates between the two groups were insignificant (27.7% vs. 16.9%; Fisher's exact $p = 0.103$). Three variables were noted to be different between patients with PPD and those without PPD. The variables included antenatal depressive symptoms ($p = 0.035$); perceived social support ($p = 0.001$); and perceived antenatal stress ($p < 0.0001$).	**Strengths:** Randomized, prospective study design and use of a translated (validated) version of the EPDS. **Limitations:** Limited sample size, and lack of universally accepted timing for PPD screening.

Author Recommendations: CSE analgesia in labor does not impact PPD rates at 6 weeks postpartum. The most important factor identified is elevated levels of antepartum stress.

Summary for current clinical practice question: Combined spinal epidural is not a statistically significant risk factor for PPD.

8. Source/author/date:
Khalaf, A., Al Amri, N., & Al Qadire, M. (2023). Childbirth-related episiotomy and tear in relation to risk of postpartum depression: a retrospective cohort study on Omani mothers. *Journal of Reproductive and Infant Psychology*. https://doi.org/10.1080/02646838.2023.2300082

Purpose:	**Design (Method/Instruments):**	**Results:**	**Strengths:**
To determine if there is an association between episiotomies and tears and postpartum depression. **Level of evidence:** III - retrospective cohort study **Quality of evidence:** Good	The EPDS tool was used at 2 and 6 weeks postpartum. The EPDS score of 13 or higher was considered high risk for depression. Medical records were used to collect data on birth outcomes retrospectively. **Sample/Setting:** $N = 262$. The women in the study gave birth at Wilayat Ibri in Oman, Jordan between the months of June-August 2021. The women had to be 18 years or older and speak English or Arabic, and could not have a diagnosis of psychiatric disorder prior to pregnancy.	19% of the women had episiotomies, 29% had tears and 52% were intact. EPDS score was higher with women who had an episiotomy (10.4, SD = 5.4), compared to women with intact perineums (9.4, SD = 4.9), and those with tears (8.1, SD = 4.8; $p < 0.05$). Women with tears/episiotomies had an average of 1.24 points higher scores on the EPDS screening compared to those with intact perineum ($p > 0.05$).	Several different modes of delivery and perineal outcomes were compared. **Limitations**: In the Middle East the episiotomy rate can be up to 67% of vaginal deliveries. The normalization of episiotomies may prevent the generalizability of studies results. Variables were measured concurrently.

Author Recommendations:
It is recommended to follow up with mothers who had adverse outcomes in their birth due to the potential increased risk for postpartum depression.

Summary for current clinical practice question: Performing an episiotomy may increase a patient's risk for PPD.

9. Source/author/date:
Kroll-Desrosiers, A. R., Nephew, B. C., Babb, J. A., Guilarte-Walker, Y., Moore Simas, T. A., & Deligiannidis, K.M. (2017). Association of peripartum synthetic oxytocin administration and depressive and anxiety disorders within the first postpartum year. *Depression and anxiety*, *34*(2), 137–146. https://doi.org/10.1002/da.22599

Purpose:	**Design (Method/Instruments)**	**Results:**	**Strengths:**
To determine the relationship between peripartum synthetic oxytocin exposure and the development of depression or anxiety in the first year of postpartum. The initial hypothesis was that there would be a reduced risk of PPD when exposed to peripartum synthetic oxytocin. **Level of evidence:** III case-control study **Quality of evidence:** Good	Instrument: EPDS **Sample/Setting:** Convenience sampling was used. There were 9,684 deliveries that were exposed to synthetic oxytocin and 37,048 deliveries that were unexposed. The setting was delivery data collected from MiCARD.	Women with a history of depression or anxiety prepregnancy that were exposed to peripartum oxytocin had an increased risk for PPD or PPA by 36% (RR: 1.36; 95% confidence interval: 1.2-1.55). When women had no prepregnancy mental health history, peripartum oxytocin exposure increased the risk of PPD or PDA by 32% compared to those without (RR: 1.32; 95% CI: 1.23-1.42). **Conclusion:** There is a higher risk for postpartum depression or anxiety when women are exposed to peripartum synthetic oxytocin, especially with a prior mental health diagnosis.	The hypothesis was disproved. There was a good sample size and the population was diverse. **Limitations:** Not an RCT. The population was limited to Massachusetts. The effects of Pitocin on oxytocin levels was not assessed. The study did not account for other factors that can cause PPD/PDA that may be associated with oxytocin use such as birth trauma from the increased risk of cesarean section. The data collection was retroactive so not all variables could be assessed such as the dose of pitocin or complications during the birth.

Author Recommendations:
The author suggested further studies on the relationship between pitocin and maternal mood. Studies that account for mothers who receive Medicaid or factor in the amount of Pitocin exposure that the patient had can help provide more accurate results.

Summary for current clinical practice question:
The current clinical practice involves giving synthetic oxytocin to a large number of patients in the peripartum period. Further research should be done to explore the association between synthetic oxytocin use and postpartum depression and anxiety. The results of this article showed a preliminary strong association. If RCT showed a risk of postpartum depression and anxiety, then clinical practice guidelines should be updated to decrease the use of Pitocin for those who are at risk for depression and anxiety and to consent all women on the use of Pitocin and the risks thus associated with it.

10. Source/author/date:

Maimburg, R. D., & Vaeth, M. (2015). Postpartum depression among first-time mothers - results from a parallel randomised trial. *Sexual & Reproductive Healthcare: Official Journal of the Swedish Association of Midwives, 6*(2), 95–100. https://doi.org/10.1016/j.srhc.2015.01.003

Purpose: Comparison of risk of PPD between nulliparous women taking a structured prenatal program with a control group allocated to standard prenatal care. Also, the study aimed to note obstetric characteristics in women at risk for PPD. **Level of evidence: I** **Quality of evidence:** High	**Design (Method/Instruments):** RCT Data was collected ongoing from local women giving birth and from questionnaires sent to participants via mail. Instrument: EPDS **Sample/Setting:** Sample: 1193 nulliparous Danish women. 603 women were in the antenatal program group and 590 in the standard care group. Setting: Denmark; birth site: university hospital.	**Results:** Risk for PPD was found associated with preterm birth, unscheduled cesarean section, low Apgars, inadequate labor pain relief, limited physical midwifery presence, inadequate discharge preparation, no/limited breastfeeding early postpartum, knowledge deficit regarding breastfeeding, low self-rating for mental health, and poor or ambivalent maternal/infant attachment.	**Strengths:** Large sample size. Ability to separate cesarean category into scheduled versus unscheduled, which helped to identify unscheduled cesarean as a risk factor for PPD. Excellent follow-up rates strengthened the study's internal validity. **Limitations:** The number of participants with EPDS scores >/ = 12 was lower than anticipated. Lack of follow-up interview to confirm diagnosis of PPD. Possible underrepresentation of some socioeconomic groups.

Author Recommendations: This study identified several early predictors related to increased PPD risk during the early postpartum period. This data can help clinicians to anticipate groups at risk of developing PPD, enabling them to provide timely prevention, treatment, and support. Ultimately, specific and timely care for these women at risk can help to optimize their transition to parenthood and overall health.

Summary for current clinical practice question: Identification of multiple intrapartum and postpartum risk factors can help obstetrical providers identify women at risk for PPD.

11. Source/author/date:

Meky, H. K., Shaaban, M. M., Ahmed, M. R., & Mohammed, T. Y. (2020). Prevalence of postpartum depression regarding mode of delivery: A cross-sectional study. *The Journal of Maternal-Fetal & Neonatal Medicine : the Official Journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians*, *33*(19), 3300–3307. https://doi.org/10.1080/14767058.2019.1571572

Purpose:	**Design (Method/Instruments):**	**Results:**	**Strengths:**
To investigate the relationship between mode of delivery and postpartum depression. **Level of evidence:** III - Cross-sectional study **Quality of evidence:** Good	412 women who had a singleton gestation and no pre-delivery medical or psychological problems. An EPDS screen was given to women while pregnant and those with a score of < 13 were able to continue in the study. **Instruments**: Arabic-validated EPDS **Sample/Setting:** The study was done at the Suez Canal University Hospital in Ismailia, Egypt. Out of 412 women with no previous risk factors and a singleton pregnancy, 370 qualified after an initial EPDS screen during the antepartum period.	The PPD rate in the emergency CS group at 8 weeks postpartum was 25% the PPD rate in that group at 16 weeks postpartum was 19%. Women with elective CS had a PPD rate of 21% at 8 weeks and 13% at 16 weeks. Women with a vaginal delivery had a PPD rate of 7% at 8 weeks and 7% at 16 weeks. **Conclusion:** There was a relationship between mode of delivery and PPD, especially with emergency CS.	To avoid bias those with a history of antenatal depression were excluded. Questionnaires were done with in-person interviews, not on the phone. It was differentiated between emergency and elective CS. **Limitations:** The study was limited to one hospital in Egypt. The CS rate of Egypt is 51% which is higher than the USA. Sample size was smaller.

Author Recommendations:
A larger longitudinal study should be performed.

Summary for current clinical practice question:
With current cesarean section rates rising, this study shows an important correlation between cesarean sections and PPD. These findings give additional motivation to avoid unnecessary cesarean sections and helps highlight CS as a risk factor to PPD.

12. Source/author/date:

Murphy, J. R., Paul, S., Dunlop, A. L., & Corwin, E. J. (2018). Maternal peripartum antibiotic exposure and the risk of postpartum depression. *Research in Nursing & Health*. Advance online publication. https://doi.org/10.1002/nur.21881

Purpose:	**Design (Method/Instruments):**	**Results:**	**Strengths:**
To investigate whether a correlation exists between intrapartum antibiotic exposure throughout the first 2 postpartum weeks, and depressive symptoms during the first 6 months postpartum. **Level of evidence:** III - prospective cohort study **Quality of evidence:** Good	Primary data collection was followed by 7 additional home visits. Data included questionnaire, clinical, and biological information. Visits were conducted at 32–36 weeks gestation and after delivery at 1 and 2 weeks, 1/2/3/6 months postpartum. Women were excluded postpartum if they gave birth surgically or experienced complications including hemorrhage or blood transfusion. **Sample/Setting:** $N = 184$; women age 18–40 years of age, absence of chronic illness, pregnant with a singleton infant, expecting a vaginal delivery. Setting: United States.	Perceived stress scores: no difference in scores prenatally through the first month postpartum between groups. EPDS scores: no difference during the prenatally through week 2 postpartum between groups. At 1 month postpartum, EPDS scores were notably higher in the antibiotic group ($\beta = 0.54$; 95% CI [0.10, 0.98]) ; the difference persistent at 2 months postpartum (standardized $\beta = 0.58$; 95% CI [0.14, 1.02]). When baseline predictors of PPD were considered, there was a notable correlation between antibiotic exposure and increased PPD symptoms during the first two postpartum months (standardized $\beta = 0.43$; 95% CI [0.01, 0.86]; standardized $\beta = 0.51$; 95% CI [0.08, 0.94]), respectively but this correlation disappeared by 3 and 6 months postpartum.	Minimized confounding variables. EPDS screen in different time intervals throughout the postpartum period. **Limitations:** No information on individual or collective gut microbiome composition.

Author Recommendations:
There is a need for additional research on the effects of antibiotic exposure both in the antepartum and intrapartum periods on the maternal gut and risk for PPD symptomatology. Current evidence points to a correlation between antibiotic administration and mental health in other populations.

Summary for current clinical practice question:
There was a link found between intrapartum antibiotic usage and PPD at 1 and 2 months postpartum.

13. Source/author/date:

Orbach-Zinger, S., Landau, R., Harousch, A. B., Ovad, O., Caspi, L., Kornilov, E., Ioscovich, A., Bracco, D., Davis, A., Fireman, S., Hoshen, M., & Eidelman, L. (2018). The relationship between women's intention to request a labor epidural analgesia, actually delivering with labor epidural analgesia, and postpartum depression at 6 weeks: a prospective observational study. *Anesthesia & Analgesia 126*(5): p 1590-1597. https://doi.org/10.1213/ANE.0000000000002501

Purpose: To evaluate the interaction between birth plans including receiving labor epidural analgesia (LEA), pain satisfaction in patients receiving LEA, and PPD rates/association at 6 weeks postpartum. **Level of evidence:** III - prospective longitudinal study **Quality of evidence:** High	**Design (Method/Instruments):** The study gathered information on women's initial intent to deliver with or without LEA, whether they received LEA or not, and their satisfaction with pain relief. These outcomes were noted on the first postpartum day. Primary outcome: PPD at 6 weeks. Instrument: EPDS. PPD was defined as a score of ≥10. Correlation between desire to receive and actual receiving LEA, along with impact on PPD development was tested. **Sample/Setting:** Sample: 1497 women who delivered vaginally. Setting: Israel	**Results:** Overall, 6.6% of the population studied experienced PPD at 6 weeks postpartum. Primary outcome: 439 (29.3%) delivered without LEA, of these 193 (12.9%) had intended to receive LEA. The PPD rate in this sub-group was 8.1%–not statistically different from the remainder of the women studied (6.3%; OR: 1.30; 95% CI: 0.72–2.38; $p = .41$). Unmatched expectation: 1058 women (70.7%) received LEA and 439 (29.3%) did not. Thus, 1169 (78.1%) delivered according to their pre-labor intention and 328 (21.9%) did not. A strong negative additive interaction was found in those planning to deliver without LEA but ended up receiving LEA (risk difference, −8.6%; 95% CI, 16.2%–1.6%; $p = .014$).	**Strengths:** Identification of the PPD risk association with LEA administration when women had previously not received LEA; this had not previously been studied. **Limitations:** 11.4% of participants lost by the 6 week follow-up. Exclusion of nitrous oxide administration as a possible analgesic intervention. Exclusion of women taking antidepressants. Possibility of underpowered analysis for outcomes aside from women intending to deliver with but actually delivering without LEA.

Author Recommendations:

Prenatal education, particularly for first-time parents, including adequate preparation for experiencing labor pain may be protective against future feelings of failure and disappointment if they ensue to receive LEA despite initially planning not to receive LEA. Postpartum conversations discussing the birth process, choices, and experiences may be helpful in preventing PPD especially in women whose birth did not go according to their plan.

Summary for current clinical practice question: Supporting women's birth plans–especially their desires to receive labor analgesia–may be protective against PPD.

14. Source/author/date:

Ponti, L., Ghinassi, S., & Tani, F. (2022). Spontaneous and induced labor: association with maternal well-being three months after childbirth, *Psychology, Health & Medicine, 27*(4), 896-901. https://doi.org/10.1080/13548506.2021.1956554

Purpose:	**Design (Method/Instruments):**	**Results:**	**Strengths:**
To determine if there is a relationship between spontaneous or elective induction and postpartum depression/anxiety 3 months after birth. **Level of evidence:** III - cohort longitudinal study **Quality of evidence:** Good	Initial psychological interviews were done during pregnancy and then three months after birth using the EPDS and State Anxiety Inventory tools. **Sample/Setting:** Sample: convenience sample of 161 adult, Italian, nulliparous, primigravida, healthy women with singleton pregnancies. Setting: public hospital in metropolitan Florence, Italy.	Women who had spontaneous labor had lower levels of depression and anxiety (M = 6.73) than women with induced labor (M = 11.88).	Identified an intrapartum factor that might impact PPD. **Limitations:** Small sample size, especially in the induction group. Other variables were not analyzed.

Author Recommendations: None given.

Summary for current clinical practice question: There appears to be correlation between induction of labor and increased stress (whether physiologically or psychologically induced) that impacts the development of PPD.

15. Source/author/date:

Romanenko, A., & Bielka, K. (2022). Labour analgesia and the risk of postpartum depression. *Wiadomosci Lekarskie, 75*(12), 2948–2952. https://doi.org/10.36740/WLek202212109

Purpose: To find an association between postpartum depression incidence and labor analgesia. **Level of evidence:** III - prospective observational study **Quality of evidence:** Good	**Design (Method/Instruments):** PPD correlation was analyzed among 3 groups: epidural analgesia, use of nitrous oxide, and non-pharmacologic pain relief methods (dim, quiet, warm environment; music therapy; massage/acupressure; intrapartum social support given by doula/family/friends; aromatherapy; hydrotherapy; fitball with a Swedish wall; relaxation/breathing techniques; maternal positioning; being within 3-4 minutes to stationary conditions), and hospital birth without pharmacologic intervention. Instruments: Google form and face-to-face interviews, Childbirth Experience Questionnaire, and EPDS. **Sample/Setting:** Sample: 321 women Setting: Ukraine Kyiv City Maternity Hospital №5.	**Results:** Nitrous oxide and non-pharmacological pain relief methods were associated with a lower risk of PPD (p = 0,044; OR: 2.83; 95% CI: 1,03-7,79) than experienced by women who received patient-controlled epidural analgesia (PCEA). Age (p = 0,266); parity (p = 0,713); mode of delivery (p = 0,959); and pain intensity (p = 0,931) were not found to be correlated with depressive symptoms.	**Strengths:** Examination of different methods of labor pain relief. Use of the EPDS, a validated screening tool. **Limitations:** There was no differentiation made between nitrous oxide and other methods of non-pharmacologic pain relief. No explanation of whether the nonpharmacologic methods were used in the home versus hospital setting. The study appears to have been translated into English but with poor-quality interpretation, making it difficult to decipher some aspects of the study.
Author Recommendations: None given.			
Summary for current clinical practice question: Nitrous oxide and various other alternative methods of providing pain relief for labor appear to be associated with decreased risk for developing PPD.			

16. Source/author/date:

Simavli, S., Kaygusuz, I., Gumus, I., Usluogulları, B., Yildirim, M., & Kafali, H. (2014). Effect of music therapy during vaginal delivery on postpartum pain relief and mental health. *Journal of Affective Disorders*, *156*, 194–199. https://doi.org/10.1016/j.jad.2013.12.027

Purpose:.	**Design (Method/Instruments):**	**Results:**	**Strengths:**
To determine if intrapartum music therapy would affect postpartum mood. **Level of evidence:** I - RCT **Quality of evidence:** Good	Inclusion criteria 18-35 year old primiparous women between 37–41 weeks of gestation, carrying vertex singleton pregnancies, pregnant with infants of normal birth weight, anticipating NSVD. Participants were electronically randomized to either a music group or a control group. Music previously chosen by study participants was played continuously during labor, except for 20-minute breaks after every 2 hours of music played, until the end of the third stage of labor. Instrument: EPDS administered on postpartum days 1 and 8. Anxiety, satisfaction with childbirth, and pain were recorded at intervals throughout the first postpartum day. **Sample/Setting:** 141 participants with 71 women in the music therapy group, and 70 controls. Setting: Turkey.	Rates of minor depression during prenatal, postpartum day 1, and postpartum day 8 were 25.4%, 15.5%, 12.7% respectively. Rates of major depression were 11.3%, 5.6%, 5.6%, respectively. Control group: the minor depression rate was 30.0%, 31.4%, 35.7%, and the major depression rate was 12.9%, 17.1%, 18.6% during pregnancy, postpartum day 1, and postpartum day 8 respectively.	Staff were blinded if participating in data collection. RCT. **Limitations:** Measurement of intervention effect on the early PPD time period only. Limitation of study to the intervention's effect of music on only early PPD incidence. 20 women dropped out. Subjects could not be blinded.

Author Recommendations:

Future studies with larger sample sizes are recommended to better understand the impact of music therapy on PPD, including its impact on the later PPD period.

Summary for current clinical practice question:

Music therapy can be a safe and effective method for reducing postpartum depressive symptoms.

17. Source/author/date:

Skov, S.K., Hjorth, S., Kirkegaard, H., Olsen, J., & Nohr, E. A. (2022). Mode of delivery and short-term maternal mental health: A follow-up study in the Danish National Birth Cohort. *International Journal of Gynaecology and Obstetrics, 159*: 457-465. https://obgyn.onlinelibrary.wiley.com/doi/10.1002/ijgo.14155

Purpose:	**Design (Method/Instruments):**	**Results:**	**Strengths:**
To investigate the association between mode of delivery and maternal mental health postpartum. **Level of evidence:** III - prospective cohort study **Quality of evidence:** High	At 30 weeks gestation and 6 months postpartum symptoms of depression and anxiety were self-reported. It was determined if birth was spontaneous vaginal, instrumental vaginal, or cesarean section either planned or emergency. **Sample/Setting:** Data was analyzed from 54,474 mothers in the Danish National Birth Cohort (an ongoing national data collection project that reflects about 30% of births in the studied time period). Nearly all births occurred in hospitals.	In all modes of delivery mental health improved at 6 months. The smallest improvement was with emergency cesarean sections. At 6 months postpartum women with emergency CS reported symptoms of anxiety (OR 1.11; 0.98–1.24), depression (OR 1.25; 1.09–1.43) and stress (OR 1.14; 1.01–1.29) more often compared to women with spontaneous vaginal birth.	This study had a large sample size. Cofounding factors such as mental health and chronic disease were considered. **Limitations:** There was a low participation rate. All births were in the hospital setting, so it might not be generalizable to other settings.

Author Recommendations: None were given.

Summary for current clinical practice question: Mothers who had emergency CS experienced more symptoms of maternal mood disorders at 6 months than other modes of delivery.

18. Source:

Takács, L., Seidlerová, J. M., Štěrbová, Z., Čepický, P., & Havlíček, J. (2019). The effects of intrapartum synthetic oxytocin on maternal postpartum mood: findings from a prospective observational study. *Archives of Women's Mental Health, 22*(4), 485–491. https://doi-org.ezproxy.bethel.edu/10.1007/s00737-018-0913-3

Purpose:	**Design (Method/Instruments):**	**Results:**	**Strengths:**
To investigate if women exposed to intrapartum synthetic oxytocin would be at risk for early postpartum mood symptoms and eventually PPD. **Level of evidence:** III - Prospective Observational Study **Quality of evidence:** Fair	Prospective observational study **Instruments**: EPDS, Maternity Blues Questionnaire **Sample/Setting:** Part of a larger longitudinal study. Convenience sampling; $N = 260$ women delivering at 5 Czech Republic maternity hospitals.	No strong association was found between synthetic oxytocin and baby blues after adjusting for variables through logistic regression. Variables adjusted for were a history of depression, the mode of delivery, and childbirth experience. After the Cox proportional hazards regression adjusted for the variables the study found a protective effect of synthetic oxytocin use against PPD (HR = 0.65, 95% CI: 0.45-0.95, $p = 0.025$). **Conclusion:** Intrapartum synthetic oxytocin use may decrease the risk of PPD, but not postpartum blues.	Depression was screened in pregnancy. Longitudinal prospective design. **Limitations:** Timing and the exact dosage of synthetic oxytocin was not recorded, and oxytocin levels were not measured.

Author Recommendations:
Further research should be done prior to any clinical recommendations.

Summary for current clinical practice question:
Again, we are reminded that further, high-quality research is needed. While this study has some major limitations, it is worth noting the synthetic oxytocin may have a protective effect against PPD development.

19. Source/author/date:

Tan, H. S., Tan, C. W., Sultana, R., Chen, H. Y., Chua, T., Rahman, N., Gandhi, M., Sia, A. T. H., & Sng, B. L. (2023). The association between epidural labour analgesia and postpartum depression: a randomised controlled trial. *Anaesthesia*, Advance online publication. https://doi.org/10.1111/anae.16178

Purpose:	**Design (Method/Instruments):**	**Results:**	**Strengths:**
To identify whether epidural analgesia has a significant impact in the incidence of PPD. **Level of evidence:** I - RCT **Quality of evidence:** High	English-speaking parturients aged 21–50 years old, ASA physical status 2, nulliparous or multiparous, pregnant with a singleton fetus, at a gestational age of 36 weeks or greater in labor. Excluded were parturients with non-cephalic fetal presentation; poorly controlled obstetric or medical conditions (e.g. gestational diabetes on insulin, cardiac disease); and those who underwent elective cesarean delivery. On admission to hospital eligibility and consent was reviewed. Participants could not be in severe pain or distress. Patients were allocated in a 1:1 randomization ratio to epidural or non-epidural groups. At first request for pain relief, patients allocated to the epidural group were offered epidural analgesia. Those allocated to the non-epidural group were offered nitrous oxide 50%, IM pethidine 75 mg or IV PCA. Postpartum depression was assessed at 6-10 weeks using the EPDS. Greater or equal to 13 was considered positive. A secondary analysis using a lower threshold of greater or equal to 10 was also performed. **Sample/Setting:** The study took place in 2017- 2021 at the Singapore Women's and Children's Hospital. 881 women were enrolled in the study (441 in the epidural group, 440 in the non-epidural group) with 773 completing follow-up at 6-10 weeks.	Our modified intention-to-treat analysis did not detect significant differences in the incidence of PPD between groups.	Study design including randomization of participants to groups, and use of secondary analysis to verify consistent results across EPDS thresholds similar to those analyzed in similar studies. **Limitations:** Though randomized to specific groups, laboring women were able to select any available form of labor analgesia. The combination of modalities during labor could have influenced the patients' risk of developing PPD. Researchers were unable to ascertain whether PPD was influenced by the quality of pain relief or by a woman's intention to choose a specific modality of pain relief. High proportion of crossover may have affected results.

Author Recommendations: This RCT did not find a significant difference in PPD risk between patients receiving epidural analgesia and patients receiving other types of analgesia. Research is needed to determine if other modifiable aspects of labor analgesia contribute to the risk of postpartum depression.

Summary for current clinical practice question:

This result may suggest that the quality of labor pain relief has a greater influence on the risk of postpartum depression compared with the type of analgesic modality administered. For instance, parturients who experienced greater pain relief from epidural analgesia were reported to have lower EPDS scores.

20. Source/author/date:

Tichelman, E., Warmink-Perdijk, W., Henrichs, J., Peters, L., Schellevis, F. G., Berger, M. Y., & Burger, H. (2021). Intrapartum synthetic oxytocin, behavioral and emotional problems in children, and the role of postnatal depressive symptoms, postnatal anxiety and mother-to-infant bonding: A Dutch prospective cohort study. *Midwifery*, *100*. https://doi.org/10.1016/j.midw.2021.103045

Purpose:.	**Design (Method/Instruments):**	**Results:**	**Strengths:**
To investigate the association between intrapartum synthetic oxytocin exposure and maternal mood disorders. They also investigated the relationship between exposure and child behavioral problems and mother infant bonding. **Level of evidence:** III - prospective cohort study **Quality of evidence:** Fair	Synthetic oxytocin exposure was determined by medical records and was a yes or no question. The child behavior checklist was used up to 60 months postpartum. EPDS and State Trait Anxiety Inventory was used to determine PPD and anxiety from 6 months postpartum. A multivariable linear regression model helped account for unique variances. **Sample/Setting:** 1,528 women responded, and 607 received intrapartum oxytocin. In the Netherlands from the PADS trial. Population-based Pregnancy Anxiety and Depression Study.	Secondary findings showed that synthetic oxytocin was weakly associated with higher maternal postpartum depression symptoms, explaining a small amount of the variance (i.e., 0.6%).	Large sample size. **Limitations:** Response rate of 34%. The dose of synthetic oxytocin was not known. It was not able to be distinguished between induction or augmentation of labor.

Author Recommendations:

It was recommended that further investigation is done for women who are at a high risk for postpartum depression.

Summary for current clinical practice question:

The secondary findings showed a slight correlation between intrapartum oxytocin usage and postpartum depression, but only 0.6%.

21. Source/author/date:

Zanardo, V., Bertin, M., Sansone, L., & Felice, L. (2017). The adaptive psychological changes of elective induction of labor in breastfeeding women. *Early human development*, *104*, 13–16. https://doi.org/10.1016/j.earlhumdev.2016.10.007

Purpose:.	**Design (Method/Instruments):**	**Results:**	**Strengths:**
To investigate the relationship between elective labor induction with vaginal prostaglandin on maternal mood and breastfeeding. **Level of evidence:** Level II - quasi-experimental **Quality of evidence:** Fair	The women in the vaginal prostaglandin group received dinoprostone gel (Prepidil) until a favorable Bishop score (6) was achieved with a max dose of 4 applications. The morning of discharge all women were given the EPDS. **Sample/Setting:** Italy, $N = 180$. The criteria used was Italian-speaking, singleton pregnancy, term, and a normal vaginal delivery with an elective labor induction. The mother and baby could not have been separated after birth and the babies were breastfed. 204 women were recruited, 180 fit the study criteria, and 90 were in the prostaglandin group.	Mothers in the prostaglandin group showed higher scores on the EPDS [9 (7–13) vs 5 (3–8), $p = 0.003$].	Address prostaglandin's effects on mood and breastfeeding **Limitations:** EPDS at discharge Infant data was not collected. Epidural analgesia use was not noted. Oxytocin use was not noted.

Author Recommendations:
This information may be used to guide clinical care and avoid non-medically indicated inductions.

Summary for current clinical practice question:
Depression symptoms may be influenced by prostaglandin use.

22. Source/author/date:

Zhang, Y., Johnston, L., Ma, D., Wang, F., Zheng, X., & Xu, X. (2018). An exploratory study of the effect of labor pain management on postpartum depression among Chinese women. *Ginekologia Polska, 89*(11), 627–636. https://doi.org/10.5603/GP.a2018.0107

Purpose:	**Design (Method/Instruments):**	**Results:**	**Strengths:**
Investigation of the impact of selected intrapartum pain relief methods on early onset PPD incidence in Chinese women. **Level of evidence:** II - quasi-experimental **Quality of evidence:** Good	Method: A quasi-experimental study type comparing three pain relief methods given based on patient preference. Doula group, $n = 301$; transcutaneous electrical nerve stimulation [TENS] group,u= 51; epidural analgesia group, $n = 213$. Instruments: Labor pain was assessed with a 10-point visual analog scale. PPD was assessed using the EPDS in person and via phone 3 days and 2-4 weeks postpartum, respectively. **Sample/Setting:** Sample: convenience sample; $N = 565$ women. Setting: Women's Hospital, School of Medicine, China.	PPD occurrence was 6.6% at 3 days postpartum (epidural analgesia group), 1.3% (doula group), and 2% (TENS group; $p = 0.04$). At 2-4 weeks postpartum, PPD incidence was 16% (34/213; epidural analgesia group), 7.3% (22/301; doula group), and 7.8% (4/51; TENS group; $p = 0.006$).	**Strengths:** Representative sample, large sample size, repeated PPD assessments, and use of a validated tool. **Limitations:** Recognition that pain may not be the only risk factor for PPD, study design, convenience sampling, selection bias, poor standardization of the administration timing for the latter EPDS (ranged from 2-4 weeks postpartum), lack of pre-study EPDS administration with exclusion of participants with psychiatric disorders.

Author Recommendations:

Notably, though no statistically significant relationship was found between EPDS scores and pain relief methods, women receiving epidural analgesia experienced higher early postpartum EPDS scores. An adequately powered RCT would be needed to explain the results of this study. Further research is important to better understand the relationship between PPD development and modifiable risk factors such as anxiety and fear of labor.

Summary for current clinical practice question:

Various interventions for pain relief in labor may have different impacts on the development of PPD. Use of doulas and TENS units may be protective against the development of PPD.