Breastfeeding Experiences in Women from Ten States Reporting Opioid Use Before or During Pregnancy: PRAMS, Phase 8

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Abstract

Introduction: Evidence of opioid use at hospital delivery has increased over the past two decades, increasing risk of neonatal withdrawal. Breastfeeding may improve infant outcomes, but little is known about breastfeeding experiences of women who have a history of opioid use prior to or during pregnancy. This study aimed to determine if self-reported opioid use prior to or during pregnancy impacted breastfeeding, specifically attempt to breastfeed, duration of breastfeeding, assessment of prenatal breastfeeding intention, source of breastfeeding information, and early hospital experiences.

Methods: Data from ten states (n = 10,550) that evaluated opioid use in the 2016 Pregnancy Risk Assessment Monitoring System survey were included. Weighted univariate and multivariate linear and logistic regression were calculated. The multivariate regression also included adjustment for covariates.

Results: Among the overall sample, 939 participants reported opioid exposure before or during pregnancy. We found no significant difference in breastfeeding attempt. Breastfeeding for at least 6, 10, or 20 weeks was significantly less likely in participants reporting opioid exposure. Exposure correlated with lower odds of skin-to-skin contact, infant being fed in the first hour, exclusive breastfeeding in the hospital, and feeding on demand. Hospital pacifier use was associated with opioid exposure.

Conclusion: While we found no difference in breastfeeding attempt, we did observe significant differences in breastfeeding duration and early hospital experiences which may represent modifiable gaps in clinical practice. Future work should focus on optimizing early hospital experiences and support when breastfeeding is clinically indicated.

Keywords Opioids · Breastfeeding · PRAMS · Neonatal abstinence syndrome · Neonatal opioid withdrawal syndrome

Significance.

What is already known on this subject? Neonatal abstinence syndrome or NAS has increased exponentially as a result of the opioid epidemic. Breastfeeding may not be contraindicated and may confer benefits to the infant exposed to opioids in utero.

What this study adds? This study contributes to an understanding of breastfeeding among women with a history of opioid use prior to or during pregnancy. Opioid exposure correlated with a shorter duration of breastfeeding and differences in early hospital experiences were identified. While not clear, these gaps may have contributed to breastfeeding outcomes. Future work should optimize early experiences and support.

Introduction

The opioid public health crisis has had an impact on all population groups across all stages of life, including pregnancy. One consequence of prenatal opioid use is neonatal abstinence syndrome (NAS) which occurs after a fetus is exposed to maternal substances or drugs in utero (Kocherlakota, 2014). Withdrawal in the first 28 days of life because

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of opioid exposure is referred to as neonatal opioid withdrawal syndrome or NOWS (Patrick, Barfield, Poindexter, American Academy of Pediatrics [AAP] Committee on Fetus and Newborn, and Committee on Substance Use and Prevention, 2020). The American College of Obstetricians and Gynecologists (ACOG) recommends controlled amounts of medications for opioid use disorder (MOUD) during pregnancy, such as methadone and buprenorphine (ACOG, 2017). Although neonatal withdrawal is a potential outcome of MOUD, the benefits outweigh the risks of complete maternal withdrawal (ACOG, 2017).

Treatment goals for NAS are focused on managing withdrawal symptoms and optimizing sleep, nutritional intake, comfort, and maternal bonding (Siu & Robinson, 2014; Mangat et al., 2019). Nonpharmacological treatments including breastfeeding are recommended as a first line therapy for NAS (Hudak, Tan, AAP Committee on Drugs, & Committee on Fetus and Newborn, 2012). Breastfeeding is associated with reduced infant hospital stay, decreased need for NAS-related pharmacotherapy, increased maternal self-esteem, decreased maternal relapse, and maternal-infant bonding (Pritham et al., 2012; Saia et al., 2016; Wu & Carre, 2018). Breastfeeding has also been linked to higher rates of postpartum MOUD retention (Ray et al., 2021).

The AAP recommends breastfeeding guidance regardless of maternal dose of methadone or buprenorphine given the low level of transfer into breastmilk (Sachs and Committee on Drugs, 2013). In 2021, ACOG reaffirmed its 2017 committee opinion recommendation to encourage breastfeeding in stable patients without relapse being treated with opioid agonists, who have no contraindications and are not using illicit drugs. Despite numerous evidence-based policy statements, breastfeeding rates are lower with MOUD which represents an important policy to practice gap (Clark, 2019).

There are many reasons one may not choose to breastfeed in the context of opioid exposure, including receiving conflicting information from health professionals (Holmes et al., 2017). Literature highlights the struggle between maternal desire and misinformation, which is complicated by lack of support, and stigma in the context of OUD (Demirci et al., 2015; MacVicar et al., 2017; McGlothen et al., 2018; Howard et al., 2018).

Generally breastfeeding support in the hospital is linked to breastfeeding outcomes (Gianni et al., 2019). Yet, hospital experiences have left women with opioid use disorder (OUD) feeling undermined, uncomfortable, and frustrated (Howard et al., 2018). Rooming-in is one example of a cost-effective, supportive care strategy for NAS which may promote breastfeeding and maternal-infant bonding in the hospital (Avram et al., 2020; Patrick et al., 2020). While qualitative work has described facilitators and barriers of breastfeeding and opioid use, there are limited quantitative studies (Clark, 2019).

This study aimed to fill a gap in the understanding of breastfeeding experiences in a diverse sample with a history of opioid exposure, including MOUD. We examined the relationship between self-reported opioid exposure and breastfeeding initiation and duration. We also examined differences in the assessment of prenatal breastfeeding intention, sources of breastfeeding information, and early hospital experiences relevant to breastfeeding.

Methods

We performed an analysis of data collected from a cross sectional study of women in the United States who gave birth and participated in the 2016 Pregnancy Risk Assessment Monitoring System (PRAMS) project. PRAMS is a joint project conducted by the Center for Disease Control and Prevention's (CDC) Division of Reproductive Health and state health departments. PRAMS utilizes random sampling, with oversampling of small, high-risk populations (Shulman et al., 2018). PRAMS has evaluated illicit drug use in the past; however, 2016 was the first survey where opioid exposure including MOUD was specified in the optional, standard survey. PRAMS data from 2016 included responses from 34,918 participants who gave birth 2–6 months prior to participating. The final sample for this analysis (N = 10,550) included participant data collected from 10 states (AK, LA, ME, MO, NM, OK, VT, WI, WY, and WV) that included the optional standard survey questions to evaluate whether opioid use was reported before or during pregnancy. The weighted response rates for these 10 states in 2016 ranged from 55.9 to 70.5%; all of which met the acceptable criteria of 55% (CDC, 2022).

PRAMS is conducted in accordance with the ethical standards of the Declaration of Helsinki and all participants are provided with an informed consent information sheet. A de-identified dataset containing the requested research variables was obtained from the CDC. This analysis was determined exempt from the Institutional Review Board at Bowling Green State University.

Measures

Opioid exposure was ascertained from two standard items related to drug use the month before and during pregnancy. Respondents were asked "During the month before you got pregnant, did you take or use any of the following drugs for any reason?". This was followed by a series of options. Relative to opioids, there were three options including (1)

prescription pain relievers such as hydrocodone, oxycodone, or codeine (2) methadone, naloxone, subutex, Suboxone® and (3) heroin. Likewise, respondents were asked "During your most recent pregnancy, did you take or use any of the following drugs for any reason?" The same response options were available for this item as the prior. A new variable was created, collapsing all forms of opioids to represent cases of opioid exposure in the month before becoming pregnant or during pregnancy.

Two primary outcome variables were breastfeeding attempt and duration, which were ascertained from three core items. The first item asked, "Did you ever breastfeed or pump breastmilk to feed your new baby, even for a short period of time?" with options of "no" and "yes". Participants were asked "Are you currently breastfeeding or feeding pumped milk to your new baby?" Participants who reported breastfeeding were then prompted to indicate duration of breastfeeding. Duration was recorded as less than a week, number of weeks, or number of months, and if a woman was still breastfeeding at the time of the survey "86" was categorically assigned. If "86" was recorded, breastfeeding duration was recoded to account for the infant's age at the time of the survey. For this analysis, duration was only converted to weeks for those who breastfed at least 1-week. Dichotomous, categorical variables were determined to indicate if a woman breastfed for at least 6 weeks, 10 weeks, and 20 weeks.

Assessment of prenatal breastfeeding intention was obtained from the core item that asked, "During any of your prenatal care visits, did a doctor, nurse, or other health care worker ask you…if I planned to breastfeed my new baby?" with a "no" or "yes" response option. Relative to sources of breastfeeding information participants were also asked in the core survey, "Before or after your new baby was born did you receive information about breastfeeding from any of the following sources?" with sources including, doctor, nurse/midwife/doula, lactation specialist, baby's doctor or healthcare provider, breastfeeding support group, breastfeeding hotline or toll-free number, and family or friends. Participants were prompted to select "no" or "yes" for each source.

Information related to early hospital experiences was ascertained from the standard item, "This question asks about things that may have happened at the hospital where your new baby was born, for each item, check 'no' if it did not happen or 'yes' if it did." The prompt was followed by 12 items related to hospital experiences which correspond with the evidence-based framework known as the Baby-Friendly Hospital Initiative ® (BFHI). BFHI has been endorsed by leading authorities and includes practices that focus on helping mothers breastfeed (World Health Organization, (WHO), 1998). Sample items included "Hospital staff gave me information about breastfeeding," "My baby stayed in the same room with me at the hospital," "Staff helped me learn how to breastfeed," "I breastfed in the first hour after my baby was born," and "My baby was placed in skin-to-skin contact within the first hour of life". Additional statements were related to baby being fed breastmilk exclusively in the hospital, feeding on demand, hospital provided a breast pump or a giftpack with formula, as well as being given a telephone help number for breastfeeding support, and hospital staff providing the infant with a pacifier.

Covariates were considered based on their potential to influence breastfeeding outcomes. Demographic characteristics included maternal age, education, race-ethnicity, and household income. Race-ethnicity was reported in this study as 'non-Hispanic white' or 'Other race or ethnicity'; this was due to limited data release on race and ethnicity from Vermont. As a result, race-ethnicity data for the other states included in this analysis was recoded to match this coding scheme. We also included 'state' to account for possible state-specific differences. Additional covariates included number of prior live births, plurality, participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) during pregnancy, gestational age at delivery, delivery type, and infant transfer after birth.

Statistical Analysis

Statistical analysis was performed with SPSS Version 27 using the complex samples add-on. Unweighted sample characteristics and weighted estimates were determined. Following the PRAMS analytical guidelines, weighted analyses were conducted to account for the complex sampling design. Weighted univariate linear regression was used to evaluate differences in the continuous breastfeeding duration variable. Weighted univariate, binary logistic regression was used to evaluate differences in the dichotomous breastfeeding duration variables. Weighted univariate, binary logistic regression was used to assess the relationships between opioid exposure and assessment of prenatal breastfeeding intention, sources of breastfeeding information, and early hospital experiences. Significant relationships were then evaluated using multivariate regression methods adjusting for covariates. An alpha of $P < .05$ was considered statistically significant.

Results

Demographic information is summarized in Table 1. The mean age of women who reported opioid use was 29 years (SD = 5.66). The proportion of women who reported opioid use were more likely to identify as white, non-Hispanic,

reside in an urban setting, and more likely to participate in WIC and Medicaid (Table 1).

Breastfeeding Attempt

The weighted estimate indicated that 83% of women who reported opioid use attempted breastfeeding (Table 2). There was no statistically significant difference in breastfeeding attempt.

Breastfeeding Duration

Women who reported opioid use (M = 10.87 weeks, SE = 0.41, 95% CI = 10.06, 11.68) had significantly shorter duration of breastfeeding (t = 5.18, p < .001, adjusted (adj) t = 3.89, p < .001) than women who did not report opioid use (M = 13.05 weeks, SE = 0.11, 95% CI = 12.83, 13.27). Opioid exposure correlated with lower odds of having breastfed for 6 weeks or more (adj OR = 0.61, 95% CI = 0.44, 0.84, p = .003), 10 weeks or more (adj OR = 0.62, 95% CI = 0.47, 0.84, p < .001), or 20 weeks or more (adj OR = 0.60, 95% CI = 0.38, 0.95, p = .03) (Table 2).

Assessment of Prenatal Intention and Sources of Breastfeeding Information

No significant difference was observed in whether a healthcare provider asked about intention to breastfeed in the prenatal period (Table 3). Opioid exposure correlated with increased odds that their doctor had provided them with breastfeeding information either before or after the infant was born (adj OR = 1.37, 95% CI = 1.02, 1.83, p = .03) (Table 3).

Early Hospital Experiences

Opioid exposure correlated with significantly lower odds of the infant being breastfed in the first hour after birth (adj OR = 0.71, 95% CI = 0.52, 0.97, p = .03), having skin-to-skin contact (adj OR = 0.64, 95% CI = 0.43, 0.95, p = .03), feeding on demand (adj OR = 0.67, 95% CI = 0.48, 0.93, p = .02), and receiving only breastmilk in the hospital (adj OR = 0.61, 95% CI = 0.46, 0.81, p < .001) (Table 4). Opioid exposure was associated with higher odds of hospital staff providing the infant with a pacifier (adj OR = 1.74, 95% CI = 1.27, 2.38, p < .001).

Discussion

Among the 10 states that measured opioid use, 939 of the 10,550 respondents (8.9%, unweighted or 8.8% weighted,

95% CI = 8.0, 9.7%) reported opioid use either during pregnancy or in the month prior to pregnancy. Comparatively, a report estimated maternal opioid related diagnosis at hospital discharge was 8.2% in 2017 (Hirai et al., 2021). The weighted, estimated percentage of opioid use reported before or during pregnancy ranged from 4 to 12.2% with West Virginia having the highest estimate. This parallels a 2016 report that found West Virginia had the highest rates of NOWS (Ko, Patrick, Tong, Patel, Lind, & Barfield, 2016).

Opioid exposure was more commonly reported among urban dwelling participants which contrasts literature showing higher rates of maternal opioid use and NOWS in rural areas (Brown et al., 2018; Villapiano et al., 2017). It is important to reinforce that opioid exposure in our study represented multiple forms of opioid exposure including MOUD. We found the weighted estimated proportion of those reporting MOUD before pregnancy (urban 1.1% vs. 0.5% rural) and during pregnancy (0.8% urban vs. 0.1% rural) was higher in urban women. It is possible that MOUD access for women was limited in rural areas. Rural communities are challenged by lack of clinics for OUD, trained providers, and transportation (Pew Charitable Trusts, 2019). Lack of MOUD access would inherently influence appropriateness of breastfeeding. These issues should be further explored.

Breastfeeding initiation rates were similar regardless of opioid exposure. The analysis estimated that 83% of women with opioid exposure did initiate breastfeeding which is consistent with the 2017 national initiation rate (84.1%) and the average initiation rate from the ten states of this analysis (81.77%, determined from the CDC Breastfeeding Report Card, 2021). However, other research shows lower rates of initiation in women with OUD (Stephen et al., 2020). Despite similar rates of initiation, opioid exposure correlated with shorter duration of breastfeeding. Others have also found persistent differences in breastfeeding duration (Stephen et al., 2020). Considering the potential for delayed withdrawal symptoms and/or persistent complications there is a need for support that goes beyond breastfeeding initiation. Women would benefit from ongoing, practical support to troubleshoot breastfeeding challenges (Howard et al., 2018). While our analysis focuses on prenatal and hospital experiences, the transition to outpatient, postpartum care is an area for future work.

Opioid exposure correlated with increased odds of receiving breastfeeding information from a personal doctor. No other differences in source of breastfeeding information were noted which may represent a potential practice gap among other disciplines (i.e., nurse, midwife, doula, lactation specialist, or infant's doctor). It is not clear what breastfeeding information women received from their personal doctor and if that information encouraged or discouraged

Table 1 Unweighted and weighted frequencies of demographic characteristics of opioid (n = 939) and non-opioid using women who participated in PRAMS, Phase 8 (2016) in 10 states where opioid use was evaluated (N = 10,550)

Variable	Non-opioid %[a]	Opioid %[a]	Non-Opioid %[b]	Opioid %[b]
Age				
19 years or less	7.0	4.6	5.9	3.7
20–24 years	23.2	23.3	23.2	21.7
25–29 years	30.3	31.8	31.8	34.1
30–34 years	25.5	25.0	26.9	25.0
35–39 years	11.5	12.6	10.1	12.5
40 + years	2.5	2.7	2.1	3.1
Race-Ethnicity				
NH, white[c]	76.2	81.8	86.2	91.0
Other	23.8	18.2	13.8	9.0
Household Income[d]				
0-16 K	23.0	32.4	23.0	32.7
16001-20 K	8.7	12.6	9.0	13.4
20001-24 K	5.8	7.0	5.5	6.1
24001-28 K	4.0	4.4	4.1	5.6
28001-32 K	4.5	6.6	5.0	6.0
32001-40 K	6.0	5.2	6.3	6.6
40001-48 K	4.6	3.2	4.8	3.8
48001-57 K	4.8	2.6	5.3	2.8
57001-60 K	2.3	2.0	2.6	3.6
60001-73 K	4.9	3.3	5.9	5.6
73001-85 K	4.9	1.9	5.9	2.7
85,001 or more	26.6	18.7	22.6	11.0
Education[e]				
0–8 yrs.	2.4	1.8	2.5	2.1
9–11 yrs.	12.0	14.8	9.8	14.6
HS or GED	27.1	35.0	27.3	32.8
Post HS	29.7	34.7	29.2	33.1
4-year degree+	28.9	13.7	31.2	17.5
Rural	42.5	38.9	39.1	37.1
Urban	57.5	61.1	60.9	62.9
Medicaid the month before becoming pregnant, yes	28.9	44.0	23.7	41.7
No insurance the month before becoming pregnant, yes	14.8	16.9	15.8	16.4
Medicaid PNC[f], yes	52.5	72.7	48.6	69.2
No Insurance for PNC, yes	1.7	1.2	1.7	0.7
No PNC, yes	3.3	3.3	2.9	2.1
WIC, yes	43.8	56.4	39.9	54.4
Previous Live Births				
0	39.2	28.3	37.7	24.8
1	30.8	32.4	32.6	37.7
2	17.2	21.5	17.8	23.8
3+	12.9	17.8	12.0	13.6
Plurality				
1	96.6	97.0	98.1	98.3
2+	3.4	3.0	1.9	1.7
Gestational Age, Weeks				
≤ 27	1.6	2.5	0.5	0.7
28–33	4.8	6.5	1.8	3.1
34–36	10.8	13.8	6.8	11.1

breastfeeding. Furthermore, the analysis was not able to evaluate whether patients were stable and if anticipatory

Table 1 (continued)

Variable	Non-opioid %[a]	Opioid %[a]	Non-Opioid %[b]	Opioid %[b]
37+	82.8	77.3	90.8	85.1
Infant Transferred	1.9	2.7	1.3	1.8

[a] % is unweighted and based on valid percentage

[b] % is weighted estimate

[c] NH = non-Hispanic

[d] HH = household

[e] Education, 0–8 years; 9–11 years but no degree or GED; HS = high school degree or GED; post HS = post high school, 13–15 years; 4-year degree + = 4-year degree or higher

[f] PNC = prenatal care

guidance was indicated within evidence-based guidelines. It is possible that physician guidance encouraged breastfeeding, but that is not clear. Prenatal NAS and breastfeeding education programs have shown promise to increase breastfeeding initiation, exclusive breastfeeding, and reduce infant length of stay (Brocato, at al., 2022) ; Crook & Brandon 2017). More work is needed to identify best practices for education and the role of the multidisciplinary team.

The differences in hospital experiences that we identified contradict the evidence-based Ten Steps to Successful Breastfeeding of the BFHI which links early experiences, including on-demand feeding, skin-to-skin contact, breastfeeding within the first hour, and exclusive breastfeeding in the hospital with breastfeeding duration (Brown & Arnott, 2014; Mikiel-Kostyra et al., 2002; Murray et al., 2007). Furthermore, rooming in, skin-to-skin contact, and use of mother's milk can reduce NAS symptoms (Ryan et al., 2019). Despite this evidence, early hospital experiences were less than optimal. One would anticipate women with opioid

exposure may require additional breastfeeding support in the hospital, yet there was no significant difference in hospital staff providing breastfeeding information or helping with breastfeeding. Furthermore, opioid exposure correlated with lower odds of the infant being fed in the first hour, skin-to-skin contact, exclusivity of breastmilk in the hospital, and feeding on demand. Although exclusive breastfeeding is a goal of the BFHI, we recognize that formula supplementation may be warranted with NAS. Anticipatory guidance on formula supplementation and the benefits of breastmilk regardless of exclusivity should be incorporated into prenatal breastfeeding education.

Staff pacifier use in the hospital was associated with opioid exposure. It is conceivable that pacifier use may have been used to comfort the infant. Pacifier use is a non-pharmacological strategy of the evidence-based, "Eat, Sleep, Console" (ESC) approach to managing NAS (Grisham et al., 2019). While literature is mixed, early introduction of a pacifier has been associated with decreased duration and

Table 2 Breastfeeding attempt and duration among opioid and non-opioid reporting women from 10 states who participated in PRAMS, Phase 8 (2016)

Variable	Non-opioid %[a]	Opioid %[a]	OR[b]	95% CI[c]	P Value	Adj[d] OR	95%CI	P Value
BF[e] attempt	83.8	83.0	0.95	0.71, 1.3	0.71			
BF duration								
≥6 weeks	**82.7**	**71.6**	**0.53**	**0.39, 0.71**	**<0.001**	**0.61**	**0.44, 0.84**	**0.003**

Table 3 Assessment of prenatal breastfeeding intention and sources of breastfeeding information before or after baby was born among opioid and non-opioid using women from 10 states who participated in PRAMS, Phase 8 (2016)

Variable	Non-opioid %[a]	Opioid %[a]	OR[b]	95% CI[c]	P value	Adj[d] OR	95% CI	P Value
Assessed prenatal intention[e]	93.1	93.4	1.05	0.70, 1.57	0.81			
Source of Information[f]								
Doctor	**78.9**	**83.5**	**1.36**	**1.03, 1.78**	**0.03**	**1.37**	**1.02, 1.83**	**0.04**
Nurse, midwife, or doula	74.6	71.9	0.87	0.68, 1.11	0.26			
Lactation specialist	73.5	74.0	1.03	0.80, 1.32	0.84			
Baby's doctor or HCP[g]	69.2	72.5	1.17	0.92, 1.50	0.20			
Support group	24.2	25.3	1.06	0.82, 1.37	0.66			
BF hotline or toll-free number[h]	11.2	13.6	1.25	0.89, 1.75	0.19			
Family or friends	64.3	61.9	0.90	0.72, 1.13	0.38			

[a] weighted estimate

[b] OR = odds ratio

[c] CI = confidence interval

[d] adjusted for state, maternal race-ethnicity, income, education, WIC participation during pregnancy, gestational age, delivery, plurality, prior live births, and infant transfer

[e] From the core survey, "During any of your prenatal care visits, did a doctor, nurse, or other health care worker ask you…if I planned to breastfeed my new baby"

[f] From the core survey, "Before or after your new baby was born did you receive information about breastfeeding from any of the following sources…"

[g] HCP = healthcare provider

[h] BF = breastfeeding

exclusivity of breastfeeding (Howard et al., 2003; Scott et al., 2006). More recent literature on healthy infants found no differences in breastfeeding duration with pacifier use (Jaafar et al., 2016). BFHI guidance on pacifier use was updated in 2018, no longer prohibiting pacifier use for therapeutic purposes (WHO, UNICEF, 2018). Practitioners will need to find a balance in addressing NAS treatment goals and the woman's breastfeeding goals within the family centered model of care. Mothers should be counseled on the benefits and risks of pacifier use, how to recognize feeding cues, and the importance of not replacing suckling in the background of pacifier use (WHO, 2018).

Collectively the findings point to potential modifiable gaps in evidence-based, clinical practices known to support breastfeeding. It is possible that these early hospital experiences may have contributed to the differences in breastfeeding duration. Reducing hospital restrictions, prenatal education programs, and quality improvement initiatives focused on rooming-in, skin-to-skin, and lactation support have shown promise to improve the odds of infants receiving breastmilk after opioid exposure (Schiff et al., 2018).

While BFHI offers a foundation for optimizing breastfeeding outcomes, this framework may not be sufficient for this population (Yonke et al., 2019). BFHI and ESC offer complimentary strategies for NAS and breastfeeding, including empowerment of the mother, skin-to-skin contact, and feeding on demand.

While we did not evaluate the impact of trauma, this is an area that should be explored in the future. For numerous reasons, the AAP recommends supportive care and a trauma informed approach to breastfeeding counseling and support among women with OUD (Patrick et al., 2020). Within this lens, clinical and organizational changes should empower patients, while fostering a collaborative network that promotes safety, mutuality, and trust (Menschner & Maul, 2016; Substance Abuse and Mental Health Services Administration, 2014). Trauma informed workforce training programs should reduce the potential for misinformation, stigma, while fostering counseling skills to support breastfeeding when clinically indicated and desired by the mother.

Table 4 Early hospital experiences[a] relevant to breastfeeding among opioid and non-opioid using women from 10 states who participated in PRAMS, Phase 8 (2016)

Variable	Non-opioid %[b]	Opioid %[b]	OR[c]	95% CI[d]	P value	Adj[e] OR	95% CI	P Value
Staff gave information	95.4	92.6	0.60	0.36, 1.00	0.05			
Baby in hospital room	89.7	83.8	0.59	0.43, 0.82	0.002	0.67	0.44, 1.02	0.06
Staff helped with BF	82.0	76.0	0.70	0.52, 0.93	0.01	0.86	0.62, 1.17	0.33
Baby fed in room	92.0	84.2	0.47	0.31, 0.70	< 0.001	0.68	0.42, 1.11	0.122
Baby fed in first hour	**77.4**	**65.8**	**0.56**	**0.43, 0.73**	**< 0.001**	**0.71**	**0.52, 0.97**	**0.03**
Skin-to-skin first hour	**86.7**	**77.3**	**0.52**	**0.38, 0.72**	**< 0.001**	**0.64**	**0.43, 0.95**	**0.03**
Fed only breastmilk	**66.0**	**48.8**	**0.49**	**0.39, 0.62**	**< 0.001**	**0.61**	**0.46, 0.81**	**< 0.001**
Feed on demand	**85.6**	**76.6**	**0.55**	**0.41, 0.74**	**< 0.001**	**0.67**	**0.48, 0.93**	**0.02**
Gave breast pump	38.5	47.5	1.45	1.10, 1.91	0.009	1.37	0.99, 1.90	0.06
Gift pack with formula	40.3	45.6	1.24	0.98, 1.59	0.08			
Help phone number	80.1	76.2	0.79	0.61, 1.05	0.11			
Staff gave pacifier	**51.0**	**67.5**	**1.99**	**1.50, 2.65**	**< 0.001**	**1.7**	**1.27, 2.38**	**< 0.001**

[a] From the standard survey, "This question asks about things that may have happened at the hospital where your new baby was born, for each item, check 'no' if it did not happen or 'yes' if it did."

[b] weighted estimate

[c] OR = odds ratio

[d] CI = confidence interval

[e] adjusted for state, maternal race-ethnicity, income, education, WIC participation during pregnancy, gestational age, delivery, plurality, prior live births, and infant transfer

Limitations

This study is limited by potential self-reporting error and the potential for misinterpretation of survey items. Participants may have underreported opioid use. It is possible that other factors not examined (i.e., stigma, trauma) may have influenced outcomes. Only 10 states opted to ask questions regarding opioid use in 2016 which may influence the generalizability. States that already recognized an opioid problem in their state may have been more likely to ask questions regarding opioid use, which may have influenced the results. A strength is that the response rate for each of the 10 states exceeded the 55% threshold of PRAMS (CDC, 2022).

While this analysis describes associations between opioid exposure and breastfeeding, it is possible that breastfeeding may have been contraindicated in some cases. Although PRAMS collects data on illicit drug use, we could not account for timing relevant to the third trimester or at delivery which would contraindicate breastfeeding. The 2019 PRAMS opioid supplement addresses timing of use which may be beneficial for future analyses. Further, there are medical circumstances (i.e., HIV positive) where breastfeeding would not be appropriate; however, complete medical history was not available. The questions available in PRAMS cannot be used to evaluate opioid use disorder based on the DSM-5 criteria (American Psychiatric Association, 2013). We also could not determine if those reporting medications commonly used for opioid use disorder were stable. The two standard items that assessed drug use the month before or during pregnancy allowed participants to select multiple responses. For these reasons we decided to combine any form of opioid exposure in the month prior to pregnancy or during pregnancy to form one collapsed variable representing opioid exposure. Despite these limitations the rate of opioid exposure was comparable to a 2017 report (Hirai et al., 2021). To the best of our knowledge this was the first study that used PRAMS data to compare breastfeeding duration and experiences based on maternal opioid exposure. The adjustment for covariates is a strength of this analysis. The findings contribute to a better understanding of breastfeeding experiences in the setting of opioid exposure before or during pregnancy.

Conclusions

This study highlighted several differences in hospital experiences which are known to support breastfeeding. Hospitals may want to tailor breastfeeding initiatives for women with a history of opioid use. Healthcare professionals should observe evidence-based guidelines and encourage breastfeeding when clinically appropriate. Hospitals should evaluate policies and supports to optimize other non-pharmacological therapies for NAS such as rooming-in, skin-to-skin contact, and feeding on demand which also increase the potential for successful breastfeeding.

Declarations

Conflicts of interest/competing interests – None to disclose.

Ethics approval – This secondary analysis received Exempt approval by the institution's Institutional Review Board (IRB).

Consent to participate – Not applicable.

Consent for publication Not applicable.

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