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Academy of Breastfeeding Medicine Clinical Protocol #21: Breastfeeding in the Setting of Substance Use and Substance Use Disorder (Revised 2023)

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Abstract

Background: The Academy of Breastfeeding Medicine (ABM) revised the 2015 version of the substance use disorder (SUD) clinical protocol to review the evidence and provide updated literature-based recommendations related to breastfeeding in the setting of substance use and SUD treatments.

Key Information: Decisions around breastfeeding are an important aspect of care during the peripartum period, and there are specific benefits and risks for substance-exposed mother–infant dyads.

Recommendations: This protocol provides breastfeeding recommendations in the setting of nonprescribed opioid, stimulant, sedative-hypnotic, alcohol, nicotine, and cannabis use, and SUD treatments. Additionally, we offer guidance on the utility of toxicology testing in breastfeeding recommendations. Individual programs and institutions should establish consistent breastfeeding approaches that mitigate bias, facilitate consistency, and empower mothers with SUD. For specific breastfeeding recommendations, given the complexity of breastfeeding in mothers with SUD, individualized care plans should be created in partnership with the patient and multidisciplinary team with appropriate clinical support and follow-up. In general, breastfeeding is recommended among mothers who stop nonprescribed substance use by the time of delivery, and they should continue to receive ongoing postpartum care, such as lactation support and SUD treatment. Overall, enhancing breastfeeding education regarding substance use in pregnancy and lactation is essential to allow for patient-centered guidance.

Keywords: breastfeeding, substance use disorder, opioids, alcohol, Cannabis

About ABM Protocols: *A central goal of the Academy of Breastfeeding Medicine (ABM) is the development of clinical protocols for managing common medical problems that may impact breastfeeding success. These protocols serve only as guidelines for the care of breastfeeding mothers and infants and do not delineate an exclusive course of treatment or serve as standards of medical care. Variations in treatment may be appropriate according to the needs of an individual patient. The ABM empowers health professionals to provide safe, inclusive, patient-centered, and evidence-based care. Women and others who are pregnant and lactating identify with a broad spectrum of genders, pronouns, and terms for feeding and parenting. There are two reasons ABM's use of gender-inclusive language may be transitional or inconsistent across protocols. First, gender-inclusive language is nuanced and evolving across languages, cultures, and countries. Second, foun-*

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dational research has not adequately described the experiences of gender-diverse individuals. Therefore, ABM advocates for and will strive to use language that is as inclusive and accurate as possible within this framework. For more explanation, please read ABM Position Statements on Infant Feeding and Lactation-Related Language and Gender (<https://doi.org/10.1089/bfm.2021.29188.abm>) and Breastfeeding as a Basic Human Right (<https://doi.org/10.1089/bfm.2022.29216.abm>).

Introduction

THIS GUIDELINE UPDATE aims to support clinicians working in partnership with pregnant and breastfeeding mothers who use nonprescribed substances and those with substance use disorders (SUDs) around breastfeeding decision-making. Guided by principles of patient-centered care, defined as care that is consistent with the needs, values, and desires of patients, the purpose of this guideline is to provide literature-based recommendations to aid clinicians in discussing the risks and benefits to breastfeeding for women and infants in the setting of maternal substance use and/or SUD treatment.

This update to the 2015 Academy of Breastfeeding Medicine (ABM) protocol includes multiple major revisions including the addition of substance-specific and SUD treatment-specific recommendations, guidance regarding perinatal toxicology testing, and changes to guidance on breastfeeding initiation timing in the setting of perinatal nonprescribed substance use.

ABM Protocols #7 (Model Maternity Policy to Support Breastfeeding),¹ #15 (Analgesia and Anesthesia for the Breastfeeding Mother),² and #18 (Use of Antidepressants in Breastfeeding Mothers)³ may serve as useful adjuncts to this protocol.

Methods

We established independent working groups to develop an individualized search strategy for each topic area. Searches were restricted to published literature after 2015, the year of the previous guideline publication.⁴ All articles identified were reviewed for relevance and quality, and those relevant articles were included in the annotated bibliography. Included articles were briefly summarized, and the level of evidence (LOE) was determined according to strength of recommendation taxonomy (SORT) criteria, with Level 1 evidence being the highest and Level 3 being the lowest quality of evidence.^{5,6}

Using the SORT strength-of-recommendation (SOR) grading system, the authors rated recommendations as level A (based on consistent good-quality patient-oriented evidence), B (based on inconsistent or limited quality evidence), or C (based on consensus, usual practice, case series evidence, or opinion). Each recommendation was reviewed and required consensus from the authorship committee. Though the formal literature search was restricted to 2015 and beyond, articles published before this date are included in the guideline references where no new evidence has emerged since the previous ABM protocol.

Next, the relative infant dose (RID), a commonly used evidence-based tool to estimate infant drug exposure was reviewed. The RID is dependent on drug pharmacology, maternal exposure and metabolism into breast milk, infant gastric absorption, metabolism, and gestational age.^{7,8} Substances with RID values <10% are generally considered safe for a breastfed infant and substances with RID values of >25% should be avoided in breastfeeding mothers.⁷⁻⁹ Given that this guideline

focuses on nonprescribed substances, and there is limited data available regarding breast milk exposure for most illicit substances, wherever pharmacokinetic and RID data are available for prescribed substances of similar pharmacokinetic and pharmacologic properties, we include this information to help inform decision-making. RID and other key pharmacokinetic measures of included substances are described in Tables 1 and 2. Half-life is included to help determine time for substance clearance from the breastmilk. In addition, medications enter breastmilk relative to maternal plasma concentration, thus peak effect is also included to guide timing of breastfeeding.⁹

Key Information

Background

Clinicians caring for pregnant patients and their newborns will commonly be tasked with making recommendations regarding breastfeeding in the context of nonprescribed substance use and SUD.^{7,10-13} Globally, prevalence of SUD has increased between 2009 and 2016, with alcohol, opioid, and cannabis use disorders having the highest rates among women.¹⁴ The United States (US) 2021 National Survey on Drug Use and Health (NSDUH) data found that 7.7%, 10.8%, and 9.8% of pregnant women reported past-month nonprescribed substance use, tobacco product use, and alcohol use, respectively.¹⁵ Decisions around breastfeeding are an important aspect of the peripartum period for all mothers, but there are specific risks and benefits to consider among substance-exposed mother–infant dyads.

Beyond the well-established benefits in the general population,¹⁶ breastfeeding is known to reduce the severity of neonatal opioid withdrawal syndrome (NOWS), such as decreasing the need for pharmacologic treatment and length of infant hospitalization.^{17,18} In addition to the benefits for the infant, breastfeeding may also help mothers bond with their infant and thereby reduce stress and support their recovery.¹⁹ However, risks associated with breastfeeding in individuals actively using nonprescribed substances include reduced parental ability to respond to infant feeding cues and infant substance exposure through breast milk, risking acute toxicity, reduced breastfeeding ability, and potential alterations in neonatal brain development.^{20,21}

Facilitators and barriers to breastfeeding in individuals with SUD

Given the high rates of co-occurring mental illness, trauma, and social and structural inequities among pregnant people with SUD, comprehensive prenatal and addiction care are important to support substance use stabilization by delivery.²²⁻²⁵ Interdisciplinary care models that include mental health care, addiction treatment, case management, and social support services combined with prenatal care have been shown to yield better obstetrical and neonatal outcomes.²⁶⁻²⁹ Engagement with such services can support a shared

decision-making process that facilitates informed, individualized discussions regarding specific benefits and potential risks of breastfeeding.

However, many women with SUD avoid seeking prenatal care due to persistent stigma, fear of child removal, and punitive laws that criminalize substance use during pregnancy or mandate reporting to child services, even for those only receiving the recommended medications to treat their SUD.^{30–33} Such policies deter pregnant women from seeking care, and among those that do, discourage them from starting medication treatments for SUD.^{34–36} Some women may face additional barriers to substance use treatment due to cultural, social, and economic factors.³⁷ For example, structural racism in North America exacerbates barriers to care for Black, Indigenous, Latinx, and pregnant individuals of color who are more likely to undergo urine drug testing and child removal.^{34,38–43} Individuals with SUD not engaged in prenatal care are more likely to be actively using nonprescribed substances at the time of delivery complicating breastfeeding guidance.⁴⁴

Women with SUD are less likely to initiate and maintain breastfeeding compared to those without SUD.^{45–47} Factors impacting breastfeeding include a high co-occurrence of medical and psychiatric conditions impacting lactation, pharmacotherapy impacting breast milk production, polysubstance use, pain with breastfeeding in the context of a SUD, and/or physical and sexual trauma histories that complicate breastfeeding experiences.^{48–51} Related to structural health inequities, racism, and stigma individuals with SUD may be also be distrustful of the breastfeeding recommendations they receive from providers.^{50,52} Additionally, infant factors can also complicate breastfeeding in substance-exposed parent–infant dyads. Infants with NOWS may experience greater difficulty with latch, have significantly more weight loss leading to commercial milk formula supplementation, and have long hospitalizations resulting in greater parent–infant separation.^{53–56}

Use of toxicology testing to guide breastfeeding decision-making

Universal screening for SUDs during pregnancy using a standardized validated screening tool is widely recommended including by the World Health Organization⁵⁷ and the American College of Obstetricians and Gynecologists.⁵⁸ The decision of whether or not to send toxicology testing on the mother and/or infant, and what type of toxicology testing is beyond the scope of these guidelines and should be informed by individual clinical contexts. Urine toxicology testing at the time of delivery will generally detect substances used within the previous 48–72 hours. However, nonprescribed fentanyl and its metabolites can persist in the urine for days to weeks after last use.⁵⁹ In addition, delta-9-tetrahydrocannabinol (THC) and metabolites can persist in the urine for 4–5 days after single-use, and up to 4 weeks in the setting of chronic use, complicating interpretation and testing utility to guide breastfeeding decision-making.⁶⁰

In summary, urine drug testing can be a tool to inform breastfeeding guidance but has limitations. All urine drug testing must be interpreted within the clinical context including patient history and collateral information, and this should inform the need for further confirmatory testing (e.g., with gas chromatography).⁶¹ In clinical contexts where

testing is consistent with new or ongoing nonprescribed substance use, breastfeeding should be avoided until clearance of the substance.

Timing of nonprescribed use during pregnancy and breastfeeding initiation

Previous ABM guidelines recommended that women who had nonprescribed substance use in the 30–90 days before delivery be discouraged from breastfeeding. A single-site 2020 retrospective cohort study of 503 women receiving opioid use disorder (OUD) treatment found that the predictive value of postpartum substance use based on urine drug testing from the third trimester was only 36% and that urine drug testing at delivery had the strongest association with ongoing nonprescribed use postpartum.⁶² In light of these findings, evidence showing that most substances are eliminated in hours to days rather than days to weeks,²¹ and in line with more current breastfeeding decision-making practices,^{63–65} women who discontinue nonprescribed substance use by or during the delivery hospitalization can be supported in breastfeeding initiation.

Mothers motivated to breastfeed who report recent nonprescribed substance use and/or have positive toxicology testing at delivery should be supported in expressing milk to establish milk production. The decision of whether to give expressed milk to the infant and when to start breastfeeding should be made using a multidisciplinary approach involving the patient and clinicians of both the parent–infant dyad. Ideally, before breastfeeding, sufficient time should pass to allow for substance clearance from breast milk. If a breastfeeding mother returns to nonprescribed substance use in the postpartum period, a similar approach of expressing milk and discarding milk and consultation with a multidisciplinary team should take place to inform breastfeeding decisions.

Breastfeeding counseling and supports for dyads with maternal SUD

There is limited evidence around specific interventions to best support breastfeeding among dyads with maternal SUD. Most published research on interventions to support breastfeeding in the setting of maternal SUD have reported on general treatment models for perinatal SUD and NOWS, with few studies evaluating specific breastfeeding support measures.^{66,67} Clinician expertise suggests that supports and counseling should take a trauma-informed approach and span prenatal, intrapartum, and postpartum care.

Prenatal breastfeeding education specific to the context of SUD may help encourage more mothers with SUD to breastfeed.⁶⁸ Anticipatory guidance should include counseling on the impact of infant withdrawal, co-occurring conditions and treatments, smoking, and other factors that may affect lactation and infant feeding. Provider education and consistent institutional policies around breastfeeding among dyads with maternal SUD should be implemented.^{69,70}

Specialized lactation support is required in the hospital for infants that experience NOWS due to the significant effect these symptoms have on infant feeding.⁵⁶ Both rooming-in and skin-to-skin positioning throughout the perinatal hospital stay are encouraged as they are associated with decreased NOWS symptoms and improved breastfeeding outcomes.^{71,72} Ideally, dyads should continue to receive outpatient breastfeeding care that is responsive to existing social

supports, social isolation, mental health needs, and unique challenges such as expressing milk after hospital discharge. Multidisciplinary perinatal SUD programs are well positioned to integrate skilled lactation professionals, peer recovery/lactation counselors, and social support programs for breastfeeding dyads.

Opioids

There has been more than a fourfold increase in the number of deliveries impacted by OUD and a sevenfold increase in the rates of NOWS between 2000 and 2016 in the United States with similar increases in other high-income countries.^{73–76} However, according to recent NSDUH data, the prevalence of opioid use during pregnancy appears to be declining in the United States from 1.2% to 0.4% in 2017 and 2019, respectively.⁷⁷ It is not clear how nascent shifts in drug supply from prescription opioids to synthetic fentanyl analogues and patterns of use where polysubstance use is more common will impact maternal opioid epidemiology and NOWS treatment.^{78–81} Data on nonprescribed opioid use among breastfeeding individuals is lacking; therefore, epi-

demologic inferences are made from data among pregnant individuals with OUD and opioid-exposed infants.

While there is a moderate amount of data on lactation pharmacokinetics of prescribed opioids (morphine, codeine, oxycodone, and tramadol), little is known regarding nonprescribed use, particularly of synthetic opioids, like fentanyl, adulterating up to 90% of the illicit opioid supply in parts of North America.^{81–84} With this limitation in mind, understanding the pharmacokinetics of prescribed opioids can still inform risk–benefit assessments for clinicians working with individuals using nonprescribed opioids (Table 1).^{13,85} In individuals taking short-term prescribed opioids (3–5 days), the RIDs are usually low, in the range of 1–5%, and breastfeeding is typically safe, though this is dependent on the total daily dose of the opioid in terms of risk for infant sedation and other adverse events.^{2,13,85,86} Less is known regarding longer-term use (>5 days), but drug accumulation has been cited as a concern.¹³ Tramadol has a US Food and Drug Administration (FDA) warning due to variable metabolism which may result in higher RID in some individuals, although there are no reports of effects in infants with parental tramadol use.

TABLE 1. PRESCRIBED OPIOIDS, BENZODIAZEPINES, STIMULANTS, NON-PRESCRIBED STIMULANTS, ALCOHOL, NICOTINE, AND CANNABIS PHARMACOKINETIC CONSIDERATIONS TO INFORM BREASTFEEDING

Opioids	Peak effect ^a	Half-life ^a	RID (%)
Morphine	0.5–1 hour ²³⁷	2–4 hours ²³⁷	9.09–35 ⁹
Codeine	1–1.5 hours ²³⁷	3 hours ²³⁷	0.6–8.1 ⁹
Oxycodone	0.5–2 hours ²³⁷	3–4 hours ²³⁷	1.0–4.6 ⁹
Tramadol	2–3 hours ²³⁷	6–7.5 hours ²³⁷	2.9 ⁹
Benzodiazepines	Peak effect	Half-life	RID (%)
Diazepam	0.3–2.5 hours ²³⁷	44–48 hours ²³⁷	0.9–7.1 ⁹
Alprazolam	IR: 1–2 hours ER: 9 hours ²³⁷	IR: 11 hours ER: 10–16 hours ²³⁷	8.5 ⁹
Lorazepam	IR: 2 hours ER: 14 hours ²³⁷	IR: 12 hours ER: 20 hours ²³⁷	2.6–2.9 ⁹
Clonazepam	1–4 hours ²³⁷	17–60 hours ²³⁷	2.8 ⁹
Chlordiazepoxide	0.5–2 hours ²³⁷	24–48 hours ²³⁷	N/A
Stimulants	Peak effect	Half-life	RID (%)
Cocaine	0.5 hour ²³⁷	1.5 hours ²³⁸	N/A
Methamphetamine	2.5 hours ²³⁹	4–5 hours ²³⁷	N/A
MDMA	2–4 hours ²³⁷	4–6 hours ²³⁷	N/A
Cathinone	2.3 hours ²⁴⁰	1.5 hours ²⁴⁰	N/A
Amphetamine	IR: 3–4 hours ER: 5–7 hours ²³⁷	IR: 10–12 hours ER: 11–12 hours ²³⁷	1.9–2.1 ¹³²
Dexamphetamine	IR: 3 hours ER: 8 hours ²³⁷	IR: 3–4 hours ER: 5–7 hours ²³⁷	4.0–10.6 ¹³³
Substance	Peak effect	Half-life	RID (%)
Alcohol	0.5–1.5 hours ²³⁷	4–5 hours ²³⁷	16 ⁹
Nicotine	0.25 hours ²³⁷	1–2 hours ²³⁷	N/A
Cannabis (THC)	0.25–0.5 hours ²³⁷	25–36 hours ²³⁷	0.4–8.7 ⁹

^aPeak and half-life values reference adult pharmacokinetic data for a potential breastfeeding individual. The above prescribed opioid, benzodiazepine, and stimulant data are derived from oral route of administration. IV route of administration for equivalent IV medications have shorter peak effects, in the order of minutes. In intravenous route of administration, the half-lives for opioids may be shorter. For nicotine and cannabis, peak effect and half-lives are for inhalation route of administration.

ER, extended release; IR, immediate release; IV, intravenous; MDMA, 3,4-methyl enedioxy methamphetamine; N/A, data not available; RID, relative infant dose; THC, delta-9-tetrahydrocannabinol.

The harms of nonprescribed opioid use and addiction are well described elsewhere,^{87,88} but specific harms while breastfeeding include risk for parental sedation, reduced ability to respond to infant cues, and risk for bed-sharing infant injuries.^{13,89} Though opioids theoretically increase prolactin, limited research that compared varying opioids, doses, and routes of administration found mixed results with either no effect on lactation versus delayed lactation.^{90–95} Infant harms from active nonprescribed opioid use while breastfeeding includes risk for sedation, withdrawal, and respiratory depression.^{13,89} Long-term impacts on infant cognitive development from opioid exposure during lactation are not known.

Sedative hypnotics

Data on the prevalence of nonprescribed sedative-hypnotic (benzodiazepines, z-drugs, gabapentin, and phenobarbital) use and use disorders in breastfeeding are lacking, but in the general population prescribed sedative-hypnotic use is more common among women than men.^{96,97} Use of sedative hypnotics (prescribed and nonprescribed) affects 1.9% of pregnancies globally,⁹⁸ and rates of nonprescribed use and use disorders affect about 1.2% of US women.^{15,99}

Moderate pharmacokinetic lactation data are available for prescribed benzodiazepines while other sedative-hypnotic drug data are limited. There is increasing toxicity of illicit benzodiazepine supply, where novel long-acting synthetic sedative-hypnotics are being more commonly reported.^{100–103} Given that the treatment for sedative-hypnotic disorders typically includes a period of prescribed sedative-hypnotic use, it is useful to review the pharmacokinetics.

A recent study among 11 women taking prescribed benzodiazepines assessed maternal blood and breast milk samples at 3–6 days and 1 month postpartum.¹⁰⁴ RID values were found to be <10%, and no clinical abnormalities were noted in the infants, but older observational data found benzodiazepine use during breastfeeding may cause infant sedation and/or infant withdrawal (Table 1).^{99,104–106} In light of conflicting data, a recent study developed a new safety scoring system of psychotropic medications during lactation based on a comprehensive review of the literature and found that benzodiazepines had a moderate safety profile, but a lack of data precluded safety assessments of other sedative-hypnotics.¹⁰⁷ Reviews of small observational and case report studies on prescribed z-drugs (e.g., zolpidem, zopiclone) find low RID levels of <10%, suggesting they may be safe during lactation, but data are limited.^{108–110} Studies on nonprescribed phenobarbital and gabapentin use during breastfeeding are lacking, and breastfeeding recommendations for their prescription use in the setting of seizure or mood disorders can be found elsewhere.^{111–115}

Breastfeeding-specific parental harms related to sedative-hypnotic use are similar to those of other sedating substances and include risk for sedation and reduced ability to respond to infant cues.¹¹⁶ Infant harms from active nonprescribed sedative-hypnotic use while breastfeeding include risk for sedation, respiratory depression, tremors, and poor weight gain.^{104,117} Data on the long-term impacts on infant development from sedative-hypnotic exposure during lactation are limited, but observational data have not found evidence of cognitive delay.^{117,118}

Stimulants

Internationally, rates of stimulant use disorder in pregnancy vary from 0.1% to 1% of deliveries.^{119,120} In the United States, according to the 2019 NSDUH, 1.79 million women aged between 15 and 44 years used nonprescribed stimulants (cocaine, methamphetamine, amphetamines, 3,4-methyl enedioxy methamphetamine (MDMA)) and/or made nonmedical use of stimulant medications in the past month.⁷⁷ While rates of cocaine use in pregnancy have declined over the past two decades, deliveries affected by amphetamine use have doubled.¹²¹ Little data exist on the prevalence of nonprescribed stimulant use among breastfeeding mothers.

There is also limited data on the pharmacokinetics of cocaine and methamphetamine in breast milk. Animal and lab data suggest that the low molecular weight, solubility in nonpolar solvents, lipid solubility, and high bioavailability of these substances may contribute to a high RID.^{21,122,123} Clinical data are limited to the case report level with minimal maternal dose information to inform the RID of cocaine^{123–126} and methamphetamine (Table 1).^{127,128} In case reports, cocaine and its metabolites were cleared from infant urine toxicology testing by 60 hours and methamphetamine by 100 hours.^{127,129} Additionally, there is limited research examining the effects of the nonprescribed use of stimulants such as amphetamine and dexamphetamine during breastfeeding.

Though research on prescribed stimulant use during lactation may not be a comparable standard,¹³⁰ understanding prescribed stimulant pharmacokinetics can inform risk discussions. Studies have found that prescribed amphetamines accumulate in breast milk at rates higher than maternal plasma levels during lactation.^{131–133} Yet no adverse events were observed in infants exposed to dexamphetamine through breast milk.¹³³ Very limited data exist on cathinone or MDMA lactation pharmacokinetics, but due to structural similarities to other amphetamines and a single case report, evidence suggests that they both likely accumulate in breast milk.^{134–136} Further pharmacokinetic details of stimulants are summarized in Table 1.

Parental harms related to stimulant use specific to breastfeeding include risk for reduced breast milk production in the setting of chronic use secondary to hypoprolactinemia.^{137–140} Case report level data describe the following potential harms in infants exposed to nonprescribed stimulants: diarrhea, vomiting, abdominal pain, weight loss, tachycardia, tachypnea, hypertension, hypothermia, irritability, tremors, sleep disturbance, and seizures.^{129,141,142} There are three documented cases of infant death related to methamphetamine breast milk exposure.^{143–145} Data on the long-term effects of infant cocaine and methamphetamine exposure during breastfeeding are lacking.

Alcohol

Globally, alcohol is the most commonly misused substance among women.¹⁴ Binge drinking in the United States is highest among individuals aged 25–34 years, which includes individuals of childbearing age.¹⁴⁶ Between 24% and 28% of pregnant individuals report at least one binge drinking episode in early pregnancy.¹⁴⁷ The prevalence of alcohol use during pregnancy is stable according to U.S. national surveillance data from the NSDUH, with 197,000 pregnant

individuals reporting past month alcohol use in 2019.¹⁴⁸ A recent European study of over 7,000 individuals from 11 countries found that 16% of pregnant women drank alcohol during pregnancy.¹⁴⁹ Occasional alcohol use during lactation remains common, reported in up to 50–82% of breastfeeding people.^{150–152} The reported incidence of binge drinking among breastfeeding mothers is significantly lower at 6–7%.¹⁵³

Pharmacokinetic studies demonstrate that alcohol transfers into breast milk readily, with a high RID of 16% (Table 1).⁹ Yet there is no accumulation of alcohol in breast milk due to alcohol's zero-order pharmacokinetic profile; the amount of alcohol in breast milk is reduced by the passage of time from alcohol consumption.^{154,155} There are nomograms available for counseling that calculates, as a function of body weight and amount of alcohol consumed, the time to "zero" plasma levels in the lactating individual.¹⁵⁶

In breastfeeding mothers, alcohol is known to decrease the production of the hormones oxytocin and prolactin, subsequently reducing the amount of breast milk available for the infant.^{9,157,158} Known acute adverse infant effects include drowsiness, altered infant sleep and feeding behaviors around the time of alcohol consumption, typically with maternal blood levels of >300 mg/dL.^{9,158,159} Impaired infant motor development or postnatal growth has been reported.¹⁶⁰ In terms of long-term effects, there are conflicting reports on child cognitive function with prospective cohort studies showing either no effect on infant development or a dose-dependent reduction in cognitive abilities at 6–7 years of age that was not sustained at 10–11 years.^{150,151,161} Drinking alcohol while breastfeeding may also result in dose-dependent reductions in children's academic abilities, becoming clinically significant with riskier amounts of consumption such as frequent binge drinking.¹⁵²

Tobacco smoking and nicotine vaping

The 2021 NSDUH found 10.1% of pregnant women reported past-month cigarette use, while some women quit during pregnancy, postpartum relapse is common where 10% of women report smoking in the postpartum period.^{15,162} US data from recent reports do not include nicotine exposure from vaping products, the use of which is increasingly common, particularly among teenagers and young adults.¹⁶² A recent study from 78 low- to middle-income countries found an overall prevalence of 3.6% for use of any tobacco product during lactation, and 2.6% for smokeless tobacco products.¹⁶³ Studies show that women who use tobacco are less likely to breastfeed,¹⁶⁴ but breastfeeding can be a motivation for quitting, highlighting an opportunity to engage women in smoking cessation.^{165,166}

Tobacco products, including nicotine, can readily transfer into breast milk (Table 1). Nicotine has a long half-life and may remain in the breast milk for upward of 5–10 hours after cigarette use^{167–169} and potentially longer after vaping.^{162,170} One case report estimated nicotine RID to be 12.8%.¹⁶⁷ Infant nicotine exposure can also occur through second-hand smoke while breastfeeding and/or from general environmental exposures. Nicotine in breast milk diminishes with longer intervals between smoking and breastfeeding.^{169,170}

Breastfeeding mothers who smoke or vape nicotine products may produce breast milk that is less nutritional,¹⁶⁹ produce lower volumes of breast milk, and be less likely to initiate and sustain breastfeeding.^{45,171} Infant nicotine ex-

posure can result in appetite suppression, tachycardia, and impaired sleep.¹⁶⁹ Infants exposed to second-hand tobacco smoke have been found to be at greater risk for ear, nose, throat, and upper respiratory infections, allergies, and sudden unexplained infant death (SUID).^{168,169,171–174} Long-term health outcomes are less well understood, but tobacco exposure may increase the risk of metabolic syndrome.¹⁷⁵ Among infants of mothers who smoke during lactation, breastfeeding mitigates many of the health effects of second-hand smoke exposure such as SUID and respiratory illness^{176–178} and is therefore recommended over commercial milk formula in the setting of maternal smoking.

Cannabis

With cannabis legalization in a growing number of countries,¹⁷⁹ cannabis use has increased among pregnant and breastfeeding people.^{77,180} The 2021 NSDUH found that 7.2% of pregnant women in the United States report past-month cannabis use.¹⁵ These epidemiologic trends may be in part driven by cannabis dispensaries advertising cannabis as a safe and effective treatment for nausea and vomiting during pregnancy in the absence of any safety data.¹⁸¹ Additionally, both the regulated and illicit cannabis supply has become more potent. Synthetic cannabinoid products and other adulterants may be present in illicit cannabis supplies.¹⁸² Such changes in the cannabis supply may also be impacting use patterns.

Cannabis products contain two dominant active ingredients; THC and cannabidiol.¹⁸² The concentration of THC in human milk may exceed maternal plasma concentrations due to the high lipid content in human milk and the lipophilic nature of cannabinoids.^{183–185} Cannabis RID estimates vary from 0.4% to 8.7%.^{183–185} Peak cannabis concentrations in human milk usually occur within 1-hour postingestion and dissipates over time with a half-life of 17 hours and up to 6 weeks for clearance (Table 1).^{184,186,187}

Maternal risks and medical recommendations of cannabis consumption during pregnancy require individualized assessment of past medical history, drug formulation, potency, duration, and route of ingestion.¹⁸⁸ While decreased breastfeeding duration has been observed in those who use cannabis, it is not clear if this is related to cannabis use versus other maternal social-structural factors.^{189–193} Cannabis may also affect breast milk composition, decreasing immunoglobulins and increasing lactose.¹⁹⁴ Limited data exist describing the acute or long-term effects related to infant cannabis exposure through breast milk.^{195,196} A 2020 systematic review found only two observational studies on infant outcomes each reporting conflicting results on infant motor development at 12 months.^{63,197} Both studies were unable to control for prenatal cannabis exposure, thus further limiting data on cannabis exposure by breast milk alone.

ODU treatment

Pregnant and breastfeeding persons with OUD should universally be offered treatment with medications, including methadone and buprenorphine given their well-established benefits and understanding that they outweigh the risks.^{198,199} Despite these recommendations and the known benefits of reducing the severity of NODS, breastfeeding estimates among women with OUD in treatment vary widely from 17% to 81%.^{64,66}

TABLE 2. SUBSTANCE USE DISORDERS TREATMENT PHARMACOKINETICS

<i>SUD treatment</i>	<i>Peak effect^a</i>	<i>Half-life^a</i>	<i>RID (%)</i>
Buprenorphine (SL)	1–3 hours ²³⁷	27–37 hours ²³⁷	0.1–2.5 ⁹
Methadone	1–7.5 hours ²³⁷	8–59 hours ²³⁷	1.9–6.5 ⁹
Naltrexone	PO: 2 hours ²³⁷	PO: 4 hours	1 ⁹
	IM: 2 hours (first peak), 2–3 hours (second peak) ²³⁷	IM: 5–10 days ²³⁷	
Acamprosate	3–8 hours ²³⁷	20–33 hours ²³⁷	N/A
Disulfiram	12 hours ²³⁷	60–120 hours ²³⁷	N/A
NRT	Transdermal: 4 hours	Transdermal: 4 hours ²³⁷	N/A
	Gum: 0.5 hours ²³⁷		
Varenicline	3–4 hours ²³⁷	24 hours ²³⁷	N/A
Bupropion	3–4 hours ²³⁷	21 hours ²³⁷	2.0–11 ^{9,220}

^aPeak and half-life values reference adult pharmacokinetic data for a potential breastfeeding individual.

IM, intramuscular; NRT, nicotine replacement therapy; PO, by mouth; RID, relative infant dose; SL, sublingual; SUD, substance use disorder.

Methadone, a full opioid agonist, is well studied in breastfeeding. Methadone concentrations in human milk are low, with a RID of 3% (Table 2). Breastfeeding should be encouraged, if desired, regardless of the methadone dose.^{13,17,200} During periods of methadone titration, particularly if the dose exceeds 100 mg or is initiated postpartum, infants should be monitored for sedation and respiratory depression.^{13,200–202} Long-term effects of methadone exposure through breastfeeding are poorly understood. One prospective study among 200-breastfed methadone-exposed infants found some motor delay (1.5 standard deviations) among 38% of exposed infants compared to matched controls.²⁰³ However, given the known benefits to the parent and evidence showing breastfeeding reduces NOWS among opioid-exposed infants, we strongly recommend continuation of methadone while breastfeeding.^{85,203,204}

Buprenorphine, a partial opioid agonist, has growing evidence that suggest minimal concentrations in human milk, with a RID of 0.38% (Table 2).²⁰⁵ A 2016 study examining breast milk and infant plasma buprenorphine concentrations at 2, 3, 4, 14, and 30 days postdelivery among 10 buprenorphine-breastfeeding mother–infant dyads found low breast milk and infant plasma buprenorphine levels.²⁰⁶ Observational data suggest there are few acute infant harms associated with buprenorphine breast milk exposure regardless of maternal dose, and breastfeeding in individuals taking buprenorphine has been found to reduce NOWS severity.^{207–211} Long-term infant safety data remains lacking. In general, breastfeeding should be encouraged for women taking buprenorphine.²¹² Newer monthly injectable buprenorphine formulations have not yet been studied with lactation. There are concerns about a preservative contained in the injection called N-methyl-2-pyrrolidone that may be toxic, but concentrations in breast milk are unknown.²¹²

For individuals interested in providing breast milk who are stable in recovery and doing well on these medications, decisions around changing medications should be made in consultation with an addiction expert given the risks associated with changes to treatment. Like other opioids, both methadone and buprenorphine may increase prolactin, but an impact on breastfeeding has not been shown.

Naltrexone, an opioid antagonist, has limited safety data during lactation. Naltrexone is available in several formulations (oral tablet, extended-release monthly injection, and multiyear implantable device). A single case study from an individual on a stable daily oral dose of 50 mg of naltrexone

assessed postpartum maternal serum and breast milk samples and infant serum samples.²¹³ The calculated 24-hour infant dose was low, indicating low infant exposure. Developmental assessments of the infant at 6 weeks were normal.²¹³ Though data are limited, given the minimal transmission of naltrexone and its metabolite into breast milk, breastfeeding is recommended.

Alcohol use disorder treatment

There are three medications commonly used to treat alcohol use disorder (AUD): acamprosate, naltrexone (discussed above under OUD treatments), and disulfiram (Table 2). For non-breastfeeding individuals, the American Psychiatric Association (APA) recommends acamprosate or naltrexone as first-line treatment for moderate-to-severe AUD, with disulfiram considered second-line therapy under close supervision.^{214,215} Given there is no amount of alcohol that is considered safe during pregnancy, use of pharmacotherapy for AUD during the pregnancy can decrease the risk for Fetal Alcohol Spectrum Disorders which have significant implications for child health.²¹⁶

There are no data available on the transfer of acamprosate into breast milk or RID. Due to its low molecular weight and lack of protein binding, it is possible that it could readily enter breast milk; however, it has low oral absorption.⁹ Disulfiram is used less frequently to treat AUD and works by inhibiting aldehyde dehydrogenase (ADH), one of the enzymes responsible for the metabolism of alcohol.⁹ There is no data on the transfer of disulfiram into breast milk or RID; however, it is thought that it may be transferred into milk due to its small molecular weight. It is possible that any quantity in the milk could produce long-lasting inhibition of the infant’s ADH.⁹ Any ingestion of alcohol while taking disulfiram causes alcohol toxicity; thus, if the breastfeeding mother were to use any alcohol at the same time as disulfiram, it could potentially cause toxicity in the infant.

There is insufficient data to make a recommendation for acamprosate or disulfiram; however, given the pharmacokinetics and demonstrated benefits of acamprosate in individuals with AUD, this is likely safer than disulfiram during breastfeeding.

Tobacco smoking cessation treatment

Individuals who continue to smoke tobacco while breastfeeding should be offered pharmacotherapy treatments to assist with cessation given the clear risks of smoking to the

mother–infant dyad. Among nonbreastfeeding individuals, the most effective smoking cessation strategy is a combination of nicotine replacement therapy (NRT, nicotine patches, gum, etc.) and medication (varenicline or bupropion) treatments.^{217,218} However, minimal pharmacotherapy safety data complicate approaches during breastfeeding. In general smoking cessation, products are preferable to continued smoking during breastfeeding and shared decision-making should be pursued to guide treatment.

Nicotine replacement products are the best studied, and the benefits outweigh the risks of ongoing cigarette smoking. However, though parental nicotine serum levels from NRT are lower than levels while smoking or vaping,¹⁶⁹ nicotine can still transfer to breast milk and may be associated with the same acute infant harms described above (Table 2).^{219,220} NRT is available in short- and long-acting formulations including gum, lozenges, nasal spray, oral inhaler, and patches. NRT can be pursued while breastfeeding and the type of NRT used should be determined by the clinical needs of the breastfeeding mother.

Varenicline, a partial nicotine agonist, is the most effective treatment for smoking cessation, but there is no safety data available for its use during breastfeeding. Animal data suggest that varenicline may interfere with normal infant lung development.²¹⁹ According to the manufacturer, varenicline's pharmacokinetics (small molecular weight, low protein-binding, and long half-life) suggest that it may transfer readily into human milk, and breastfed infants should be monitored for seizures and excessive vomiting.²²¹ However, there is no data on how commonly these adverse events occur. The decision to use varenicline should be pursued in partnership with the patient based on the severity of tobacco use disorder and the clinical context.

Bupropion, an aminoketone antidepressant, has some nicotine receptor-blocking activity and the sustained-release formulation is an effective smoking cessation treatment.²²² Two prospective studies among women examined bupropion and its metabolite concentrations in breast milk and found the RID to range from 2% to 11% (Table 2).^{220,223} Data on infant exposure harms are mixed with some studies finding no adverse effects while others found seizure-like events.²²⁰ However, the latter reports were among three infants aged 6–6.5 months who were only partially breastfed, so the link is unclear. A randomized controlled trial assessing bupropion for smoking cessation among postpartum women is underway that will provide more specific insights into its harms and benefits.²²⁴ Bupropion can be used for smoking cessation treatment among breastfeeding women.

Vaping or electronic nicotine delivery systems are used as a harm reduction smoking cessation approach in nonlactating individuals in contexts where first-line treatments have not helped or in settings where patients remain precontemplative.^{225,226} No safety data exist in breastfeeding. Vapors from devices and nicotine compounds contain potentially toxic and carcinogenic substances like tobacco, but at lower levels. Given the lack of data, we would recommend pursuing first-line smoking cessation treatments in breastfeeding mothers.

Recommendations

For each recommendation, the quality of evidence (LOE 1, 2, and 3) and the SOR (A, B, and C) are noted as defined by the SORT criteria.^{5,6}

General breastfeeding recommendations in the setting of maternal substance use

Breastfeeding decisions among substance-exposed mother–infant dyads are complex, but below are some general recommendations that facilitate breastfeeding^{227,228} and minimize inconsistencies and biases⁶⁴ in decision-making (Table 3). Based on the evidence, individuals who discontinue nonprescribed substance use by the delivery hospitalization can be supported in breastfeeding initiation^{62,64} with appropriate follow-up such as postpartum SUD care and lactation support.^{229–231}

1. *Multidisciplinary care: Those who have SUD or use substances during pregnancy or the postpartum period should engage in multidisciplinary prenatal and postpartum substance use care.*
Level of Evidence: 2. Strength of Recommendation: B.
2. *Breastfeeding initiation timing: Individuals who discontinue nonprescribed substance use by the delivery hospitalization can be supported in breastfeeding initiation.*
Level of Evidence: 2. Strength of Recommendation: B.
3. *Perinatal breastfeeding support: Targeted perinatal dyadic breastfeeding care such as prenatal education, inpatient and postpartum lactation support, and ongoing multidisciplinary SUD treatment can facilitate breastfeeding continuation.*
Level of Evidence: 2. Strength of Recommendation: B.

TABLE 3. GENERAL RECOMMENDATIONS FOR BREASTFEEDING AMONG INDIVIDUALS WHO USE SUBSTANCES OR WITH SUBSTANCE USE DISORDERS

<i>Recommendation</i>	<i>Level of evidence</i>	<i>Strength of recommendation</i>
Those who have SUD or use substances during pregnancy or the postpartum period should engage in multidisciplinary prenatal and postpartum substance use care.	2	B
Individuals who discontinue nonprescribed substance use by the delivery hospitalization can be supported in breastfeeding initiation with appropriate follow-up.	2	B
Targeted perinatal dyadic lactation care such as prenatal education, inpatient and postpartum lactation support, and ongoing multidisciplinary SUD treatment can facilitate breastfeeding continuation.	2	B
Individual programs and institutions should establish breastfeeding guidelines to mitigate bias, facilitate consistency across providers, and empower individuals with SUD.	3	C

TABLE 4. SUMMARY OF BREASTFEEDING RECOMMENDATIONS FOR NONPRESCRIBED SUBSTANCE USE

<i>Recommendations</i>	<i>Infant monitoring/potential harms</i>	<i>Maternal monitoring/potential harms</i>	<i>Additional considerations</i>
Opioids Breastfeeding should be avoided during the use of nonprescribed opioids. <i>Level of Evidence: 2</i> <i>Strength of Recommendation: B</i>	Sedation, respiratory depression, withdrawal, and associated feeding difficulties	Sedation, decreased responsiveness to infant, rare reports of delayed lactogenesis	Pumping/expressing milk should be recommended in cases of recent use if future abstinence is supported. Consider a relapse plan and other supportive measures.
Sedative hypnotics Breastfeeding should be avoided during the use of nonprescribed sedative-hypnotics <i>Level of Evidence: 3</i> <i>Strength of Recommendation: C</i>	Sedation, respiratory depression, withdrawal, inadequate weight gain	Sedation, decreased responsiveness to infant	Individuals prescribed benzodiazepines for the treatment of benzodiazepine use disorder or for anxiety disorders may safely breastfeed.
Stimulants Breastfeeding should be avoided during the use of nonprescribed stimulants. <i>Level of Evidence: 3</i> <i>Strength of Recommendation: B</i>	Gastrointestinal and cardiorespiratory symptoms, sleep disturbance, and seizures	Reduced breast milk production	May accumulate in greater quantities in breast milk than maternal serum. Individuals prescribed stimulants for the treatment of ADHD may safely breastfeed.
Alcohol Breastfeeding should be avoided after moderate-to-high alcohol consumption. Occasional intake of more modest amounts of alcohol during lactation and waiting 2 hours per drink consumed to resume breastfeeding is likely safe. <i>Level of Evidence: 1</i> <i>Strength of Recommendation: A</i>	Drowsiness, changes in sleep and eating behaviors, possible impact on long-term neurodevelopment	Decreased breast milk production	There is no accumulation of alcohol in breast milk due to alcohol's zero-order pharmacokinetic profile.
Nicotine Breastfeeding is recommended, but individuals should be counseled and supported to reduce or stop the use of nicotine products while breastfeeding. <i>Level of Evidence: 1</i> <i>Strength of Recommendation: A</i>	Altered feeding and sleep	Breast milk is less nutritional, decreased milk production	Second-hand smoke exposure is associated with an increased risk for upper respiratory infections, allergies, and SUID in the infants. Little data are available for vaping products.
Cannabis We encourage cessation and/or reduction of cannabis use during lactation. <i>Level of Evidence: 2</i> <i>Strength of Recommendation: B</i>	Possible neurodevelopmental effects	Changes in breast milk composition and decrease in duration of breastfeeding	For individuals who continue to use cannabis and wish to breastfeed, we recommend a shared decision-making process to discuss the risks and benefits.

ADHD, attention deficit hyperactivity disorder; SUID, sudden unexpected infant death.

4. *Establish consistent approaches: Individual programs and institutions should establish breastfeeding guidelines to mitigate bias, facilitate consistency across providers, and empower individuals with SUD.*
Level of Evidence: 3. Strength of Recommendation: C.

Breastfeeding recommendations in the setting of nonprescribed substance use

Recommendations by nonprescribed substance are summarized below and in Table 4. For all people using nonprescribed substances interested in breastfeeding, we recommend that clinicians encourage use reduction and/or detoxification and cessation where possible, with connection to appropriate treatments and supports. Among those who stop nonprescribed substance use but have a return to use, breastfeeding can be resumed after clearance of the substance with supportive treatment plans in place.^{232,233}

1. *Opioids: Breastfeeding should be avoided during the use of nonprescribed opioids.*
Level of Evidence: 2. Strength of Recommendation: B.
2. *Sedative hypnotics: Breastfeeding should be avoided during the use of nonprescribed sedative hypnotics.*
Level of Evidence: 3. Strength of Recommendation: C.
3. *Prescribed benzodiazepines: In breastfeeding mothers who stop nonprescribed use but remain on prescribed benzodiazepine tapers for the treatment of benzodiazepine use disorder, or for anxiety disorders, mothers may return to breastfeeding.*
Level of Evidence: 2. Strength of Recommendation: B.
4. *Stimulants: Breastfeeding should be avoided during the use of nonprescribed stimulants.*
Level of Evidence: 3. Strength of Recommendation: B.
5. *Alcohol: Breastfeeding should be avoided immediately after moderate-to-high alcohol consumption. Occasional intake of modest amounts of alcohol (two 150 mL glasses of wine or 1.5 pints of beer) during lactation and waiting for 2 hours per drink consumed to resume breastfeeding is likely safe.*
Level of Evidence: 1. Strength of Recommendation: A.
6. *Combustible tobacco and nicotine vaping: We recommend breastfeeding to be continued in those mothers who smoke or vape, given the documented benefits, but suggest they reduce their use as much as possible and avoid tobacco smoking and nicotine vaping product use around their infants.*
Level of Evidence: 1. Strength of Recommendation: A.

7. *Cannabis: We encourage cessation and/or reduction of cannabis use during breastfeeding.*^{234–236}
Level of Evidence: 2. Strength of Recommendation: B.
8. *For mothers who continue to use cannabis and wish to breastfeed, we recommend a shared decision-making process to discuss the risks and benefits of breastfeeding. Discussions may be guided by examining the route and type of cannabis product use, potency of product use, and frequency of use.*
Level of Evidence: 3. Strength of Recommendation: C.

Breastfeeding recommendations in the setting of substance use treatment

Recommendations for SUD treatment are summarized below and in Table 5. In general, SUD treatments should be supported through informed risk–benefit discussions with patients with the caveat that any fetal and/or neonatal risks must be considered in the context of ongoing nonprescribed use that may occur in the absence of evidence-based treatment.

1. *Methadone: Breastfeeding is compatible with methadone treatment, regardless of dose, and recommended in mothers taking methadone. During periods of titration, breastfeeding mothers should be counselled to monitor for infant sedation.*
Level of Evidence: 2. Strength of Recommendation: A.
2. *Buprenorphine sublingual: Breastfeeding is compatible with sublingual-buprenorphine formulations and is recommended in mothers taking sublingual-buprenorphine.*
Level of Evidence: 2. Strength of Recommendation: A.
3. *Buprenorphine injectable: Safety data for injectable extended-release buprenorphine formulations are lacking. Decisions around and treatment changes to support breastfeeding should be made in consultation with the patient and addiction provider given the risks associated with changes in OUD treatment.*
Level of Evidence: 3. Strength of Recommendation: C.
4. *Naltrexone: Breastfeeding is compatible with naltrexone and is recommended in mothers taking naltrexone.*
Level of Evidence: 3. Strength of Recommendations: B.
5. *Acamprosate: Breastfeeding appears compatible with acamprosate, but there is little evidence; thus, providers should pursue a risk–benefit discussion with patients to guide decision-making.*
Level of Evidence: 3. Strength of Recommendation: C.

TABLE 5. SUMMARY OF BREASTFEEDING RECOMMENDATIONS FOR SUBSTANCE USE DISORDER TREATMENTS

SUD treatment	Recommendations	Level of evidence	Strength of recommendation
Methadone	Compatible with breastfeeding, regardless of dose.	2	A
Buprenorphine (SL)	Compatible with breastfeeding, regardless of dose.	2	A
Naltrexone	Compatible with breastfeeding.	3	B
Acamprosate	Likely compatible with breastfeeding.	3	C
Disulfiram	Not recommended given potential toxicity.	3	C
NRT	Compatible with breastfeeding	2	B
Varenicline	Use cautiously with a shared decision-making approach.	3	C
Bupropion	Compatible with breastfeeding.	2	B

NRT, nicotine replacement therapy; SL, sublingual.

6. *Disulfiram: Breastfeeding does not appear compatible with disulfiram given risk of infant exposure and risk of alcohol toxicity in the breastfeeding mother. Thus, other AUD treatments should be pursued over disulfiram in the setting of breastfeeding.*

Level of Evidence: 3. Strength of Recommendation: C.

7. *NRT: Breastfeeding is compatible with NRT and is recommended in mothers taking NRT. The type of NRT should be determined by the clinical needs of the breastfeeding mother.*

Level of Evidence: 2. Strength of Recommendation: B.

8. *Varenicline: Animal data suggest there may be some harms associated with varenicline exposure through breast milk, though clinical data are lacking. Providers should pursue a risk–benefit discussion with patients to guide decision-making based on the severity of tobacco use disorder and the clinical context.*

Level of Evidence: 3. Strength of Recommendation: C.

9. *Bupropion: Breastfeeding is compatible with bupropion, and bupropion is recommended in the setting of breastfeeding.*

Level of Evidence: 2. Strength of Recommendation: B.

Summary

Breastfeeding guidance among individuals who use substances and those with SUD is complex and should be pursued in partnership with the patient and a multidisciplinary team. The creation of recommendations is complicated by an overall limited body of available evidence. Additionally, many individuals with SUD use multiple substances, such as opioids and stimulants, which have different risks and treatments, complicating breastfeeding decision-making. Further, there are frequently newly emerging nonprescribed substances and novel treatments, as well as regional variations in both, that challenge evidenced-based guidance. In summary, patient-centered approaches that review individualized risks and benefits are key to breastfeeding decision-making among individuals who use substances or with SUD.

Recommendations for Future Research

The following areas of research are suggested to enhance future evidence for breastfeeding guidance in substance-exposed mother–infant dyads:

1. Further studies on the pharmacokinetics and safety of opioids, including long-term lactation data and studies of newer medications used to treat OUD such as extended-release buprenorphine formulations.
2. Investigation of the pharmacokinetics and safety of medications used for the treatment of AUD and nicotine use disorder including naltrexone, acamprosate, and nicotine replacement treatments.
3. Investigation of the pharmacokinetics and safety of breastfeeding in the setting of nonprescribed sedative-hypnotics and stimulant use.
4. Additional studies of infant safety and outcomes after exposure to various amounts of cannabis via the breast milk.

5. In vitro studies using human breast milk samples to better understand the properties of nonprescribed substances such as cocaine and methamphetamines in a breast milk medium.

6. Studies examining breast milk exposure in the setting of polysubstance use to determine any differences in pharmacokinetics and infant adverse effects.

7. Appropriately powered and designed studies that examine the long-term outcomes of infants exposed to nonprescribed substances via breast milk.

8. Investigation of the effect of breastfeeding on SUD outcomes and exploration of the possible biochemical and behavioral mechanisms by which breastfeeding may impact recovery.

9. Developing and testing of interventions to support breastfeeding dyads with maternal SUD.

10. Development of point of care tests to assess exposures in breast milk.

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Authors' Contributions

The authors have all contributed to the conception and drafting of this document.

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ABM protocols expire 5 years from the date of publication. Content of this protocol is up to date at the time of publication. Evidence-based revisions are made within 5 years or sooner if there are significant changes in the evidence

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