

REVIEW OF THERAPEUTICS

Breastfeeding Considerations for Mothers of Infants with Neonatal Abstinence Syndrome

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Breastfeeding offers many benefits to both mother and baby. Breastfeeding is generally recommended for mothers of infants with neonatal abstinence syndrome (NAS) unless some associated risk outweighs the benefits. Evidence indicates that infants with NAS who receive human milk require less pharmacologic treatment and have shorter hospital lengths of stay. Perhaps the greatest barrier to breastfeeding for women with opioid dependence is the inaccurate and inconsistent information they receive from different sources, including health care professionals. The American Congress of Obstetricians and Gynecologists, American Academy of Pediatrics, and Academy of Breastfeeding Medicine (ABM) have published statements that support breastfeeding infants with NAS. The ABM has a dedicated protocol to guide clinicians in deciding which mothers should and which mothers should not breastfeed their infants. In this review, studies evaluating the effects of breastfeeding, professional organizations' protocols and recommendations regarding breastfeeding, and barriers to breastfeeding infants with NAS are discussed, as well as the dangers of illicit drug exposure and avoiding rebound NAS in a breastfed infant. Clinicians can play an important role in identifying, supporting, counseling, and advocating for mothers who wish to breastfeed their infant with NAS.

KEY WORDS neonatal abstinence syndrome, breastfeeding, lactation, NAS.

(Pharmacotherapy 2017;37(7):861–869) doi: 10.1002/phar.1944

Neonatal abstinence syndrome (NAS) is a term used to describe the withdrawal experienced by infants who have been exposed to opiates in utero.¹ The incidence of NAS almost quadrupled from 7:1000 to 27:1000 neonatal intensive care unit (NICU) admissions ($p < 0.001$) from 2004 to 2013.¹ The percentage of infants with NAS who received breast milk has increased from only 20% during 2004–2005 to 35% during 2012–2013.¹ This increase in the breastfeeding rate may be related to updates in the guidelines from the American Congress of Obstetricians and Gynecologists (ACOG), American Academy of Pediatrics (AAP), and Academy of Breastfeeding Medicine (ABM).

The benefits of breastfeeding, including both the act of breastfeeding and the provision of expressed human milk, are numerous and well documented.² Both morbidity and mortality are reduced in infants who are breastfed.² Infants who are breastfed will have lower rates of infections such as bacterial sepsis, bacterial meningitis, and otitis media.² They have also been shown to have a lower risk for sudden infant death syndrome.² In the long term, infants who are breastfed are at lower risk for obesity, asthma, diabetes mellitus, and some childhood cancers.² More immediately, the act of breastfeeding soothes agitated infants.³ Breast milk is easier to digest, which may provide an added advantage in infants with significant gastrointestinal distress related to their NAS.

Maternal benefits to breastfeeding include quicker return to prepregnancy weight and less postpartum bleeding.⁴ More long-term benefits include lower risk of type 2 diabetes and

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breast or ovarian cancers in women who breast-feed their infants.⁴ Mother–breastfeeding infant pairs have increased bonding and attachment. A specific advantage to mothers dealing with substance abuse issues relates to the increased bonding, as the oxytocin released during this time may aid in the mother’s recovery by relieving stress and protecting against relapse.⁵

Breastfeeding is generally recommended unless some associated risk outweighs the benefits. True contraindications to breastfeeding are rare. Generally accepted contraindications to breastfeeding in the United States include human immunodeficiency virus (HIV) infection, herpes lesion on the breast, active tuberculosis, human T-cell lymphocytic virus infection, exposure to radioactive isotopes or antimetabolites, illicit drug use, and galactosemia (of the infant).⁶ Mothers in recovery for addiction who are not actively using illicit substances not only can, but should, breastfeed, as will be discussed in detail in this article.⁴

Methods

To prepare for this review, the ClinicalKey and Ovid databases were searched using combinations of the following terms: *neonatal abstinence syndrome, withdrawal, lactation, and breastfeeding*. Abstracts were reviewed for relevance. All comparative studies were included as were multiple reviews. Not all review articles were cited in this article because they did not contribute any further new information. Additional articles were also included for background information outside of this search.

Review of Evidence

In one of the earliest studies (published in 2006) evaluating breastfeeding and outcomes in infants with NAS, the authors performed a retrospective review of 190 infants stratified by type of feeding on the fifth day of life.⁷ Infants who received more than two feedings per day as formula were placed in the formula-fed group; otherwise, they were placed in the breastfed group. In addition to being retrospective in nature, this study has other considerable limitations. Still, it is important, as it was the first study of its kind to evaluate such a large population. The investigators found that infants with NAS who were fed primarily breast milk compared with those fed formula had a later onset of NAS (10 vs 3 days, $p<0.001$), required

pharmacologic treatment less often (52.9% vs 79%, $p<0.001$), and had a shorter length of stay (LOS) (15 vs 19 days, $p=0.049$).

Another retrospective cohort study published in 2009 found that mothers who breastfed their infants for at least 72 hours reduced the odds that their infant would require pharmacologic treatment for NAS by half (odds ratio [OR] 0.55, 95% confidence interval [CI] 0.34–0.88; $p=0.013$).³ Several studies of varying size have followed that continued to substantiate the evidence that breastfeeding mitigates the need for pharmacologic treatment of NAS.^{8–12}

In a cohort of 124 women, the effect of breastfeeding on NAS management in infants exposed to either methadone or buprenorphine was examined.¹¹ Similar to the other studies, they found that breastfed infants required a shorter duration of pharmacologic treatment for NAS: 28.6 days for those who were breastfed compared to 46.7 days for those who were not ($p<0.05$). When stratified by method of opioid maintenance, the methadone-exposed group demonstrated a shorter duration of treatment for breastfed infants compared to formula-fed infants; however, the buprenorphine-exposed infants did not demonstrate a difference based on feeding type.

A retrospective review of 295 mother–infant pairs examined the effects of a rooming-in program on the need for pharmacologic treatment of NAS.¹³ Rooming-in can occur in various degrees, but ultimately, the benefit comes from maternal involvement in the bedside care of her infant. This enables the mother to participate in settling the infant, minimizing withdrawal symptoms, but also allows for more opportunity for skin-to-skin holding, cuddling, and breastfeeding. In this retrospective review, only 12% of infants who were breastfed required pharmacologic treatment with opiates compared to 37% of infants who were not breastfed. This is equivalent to a 79% decrease in the odds of an infant requiring pharmacologic treatment if the mother is breastfeeding (OR 0.21 \pm 1.43, 95% CI 0.1–0.42, $p<0.001$). This facilitation of breastfeeding is thought to be one of the primary reasons why rooming-in was demonstrated to decrease the need for pharmacologic treatment.

A retrospective review of 194 infants compared breastfed infants ($n=32$), formula-fed infants ($n=150$), and infants receiving expressed breast milk ($n=12$) to determine if feeding modality had an impact on NAS.¹⁴ The investigators found no statistically significant difference among groups for average NAS score ($p=0.47$), peak morphine

dose for those who required treatment ($p=0.2$), or the proportion of those who required treatment ($p=0.11$). Several confounders could account for the difference in outcomes in this study including categorizing feeding modality based on method of feeding during the first 2 days of life; statistically significant differences between groups for both maternal characteristics (methadone dose) and infant characteristics (prematurity); and the small sample size of the expressed breast milk group.

Table 1 summarizes the findings of studies evaluating the effects of breastfeeding in infants with NAS.

Pharmacology and Breast Milk

It is important for clinicians making decisions concerning medication use in lactating mothers to understand properties that affect medication disposition and breast milk. Medications pass into and out of breast milk via passive diffusion.⁴ Properties consistent with increased passage into breast milk include lower molecular weight, higher lipophilicity, and minimal protein binding.¹⁵ Medications with a high pK_a (> 7.2) may become ionized and therefore trapped in breast milk.⁴ Medications with poor oral bioavailability may be of little concern despite passage into milk since systemic exposure in the infant would be minimal. Investigators often use infant dose, an estimate of the maximum possible dose that an infant might receive, to express the drug concentration in maternal milk.¹⁵ Methadone is a low-molecular-weight, highly lipophilic medication that would be expected to pass into breast milk. Researchers examined the milk of 12 women taking methadone 20–80 mg/day along with blood from eight of their infants¹⁶; they calculated a mean infant dose at approximately 2.8% of the maternal dose.

Another group¹⁷ studied the relationship between maternal methadone plasma and milk concentrations in conjunction with infant serum plasma methadone concentrations. This study established that methadone concentration in breast milk is independent of the maternal dose. Further, they determined that infant methadone serum concentrations were not related to the need for pharmacologic treatment for NAS. These investigators established that methadone concentrations in milk are low (2.2–8.1 ng/ml), leading to the conclusion that any risk of adverse effects from this exposure is outweighed by the benefits of breastfeeding.

Since the publication of the Maternal Opioid Treatment: Human Experimental Research (MOTHER) study, which demonstrated decreased need for morphine and shorter lengths of stay for infants born to mothers taking buprenorphine compared to methadone, it has become more commonplace to see pregnant women who are being maintained on buprenorphine for opioid dependence.¹⁸ With very little buprenorphine passed into breast milk and its poor oral bioavailability, minimal amounts would be expected to make their way into the breastfeeding infant. Several small studies have verified that serum concentrations of buprenorphine in infants exposed through breastfeeding are minimal.¹⁹ One of the more recent studies on this subject followed infants of breastfeeding mothers receiving buprenorphine for 4 weeks.²⁰ Four infants were exclusively breastfed for the full 4 weeks, and the other three received supplementation with formula. All infant outcomes assessed in this study (weight gain, sleeping patterns, skin color, and elimination and hydration patterns) were found to be normal in each infant, further establishing the safety of buprenorphine in breastfeeding.

Literature surrounding NAS and breastfeeding focuses on maternal methadone or buprenorphine use; however, NAS sometimes results from maternal prescription opiate use. Table 2 summarizes safety information and recommendations for various opiates in breastfeeding.

Organizational Recommendations

The ABM develops clinical protocols for addressing the common medical problems that may affect breastfeeding. In the setting of substance use disorders, the ABM has a dedicated protocol to guide clinicians in deciding which mothers should and which mothers should not breastfeed their infants.²² The recommendations for breastfeeding include making a patient–infant specific care plan for patients that includes the following: a drug and substance abuse history; medical and psychiatric status; medication needs of the mother; infant health status; the infant and mother's support system status; and plan for postnatal care for both infant and mother. Based on these guidelines, mothers fall in one of the three following categories: encourage breastfeeding, use caution in breastfeeding, and discourage breastfeeding.

Table 1. Summary of Studies Evaluating the Effects of Breastfeeding in Infants with Neonatal Abstinence Syndrome

Study Design	Study Objectives	Index vs Reference Groups	Results Related to Breastfeeding
Retrospective ⁷	To determine the association between receipt of breast milk and outcomes in infants with NAS	Breastfed infants with NAS vs formula-fed infants with NAS	LOS: 15 vs 19 days (p=0.049). Onset of NAS: 10 vs 3 days (p<0.001). Required pharmacologic treatment: 52.9% vs 79% (p<0.001)
Prospective ¹⁷	To determine the methadone concentration in breast milk and plasma of lactating women, and to compare outcomes and plasma methadone concentrations in breastfed vs formula-fed infants	Methadone-maintained lactating women and their infants vs matched formula-fed infants	Average amount of methadone ingestible by infant < 0.2 mg/day at day 30. Infant plasma methadone levels ranged from 2.2–8.1 ng/ml; no correlation was found between infant methadone level and maternal methadone level or receipt of breast milk at day 14 of life
Retrospective ³	To investigate factors associated with development of NAS	Univariate analysis of 450 infants born to methadone-prescribed women	Breastfeeding ≥ 72 hrs reduced the odds of receiving pharmacologic treatment for NAS: OR 0.55, 95% CI 0.34–0.88 (p=0.013)
Retrospective ⁸	To determine the effect of high-dose methadone in pregnant women and duration of NAS	Breastfed vs nonbreastfed infants	Trend toward fewer days of treatment for breastfed infants, with an average 7.76 fewer days compared with nonbreastfed infants (p=0.062)
Retrospective ⁹	To determine maternal and neonatal factors that impact response to methadone treatment of NAS	Breastfed vs nonbreastfed infants	Breastfed infants had shorter LOS: 12.5 vs 18.5 days (p=0.01); 4% of infants were readmitted for NAS within 2 weeks of discharge—breastmilk had been stopped or considerably reduced in each
Retrospective descriptive study ¹⁰	To examine opioid replacement therapy in opioid-dependent pregnant women and to determine the effects on neonatal outcomes	152 opioid-dependent pregnant women and their breastfed vs formula-fed (or formula + breast milk-fed) neonates	Breastfeeding was associated with shorter LOS but it was not statistically significant (p=0.05)
Ambidirectional ¹¹	To determine association between breastfeeding and outcomes in infants with NAS	Breastfed vs nonbreastfed infants Results were stratified by methadone vs buprenorphine exposure	Breastfed infants had shorter duration of pharmacologic treatment: 28.6 vs 46.7 days (p<0.05)
Retrospective ¹²	To determine the association between breastfeeding and outcomes in infants with NAS	Predominantly breastfed infants vs combination-fed infants vs predominantly formula-fed infants	Shorter duration of treatment for the methadone-exposed breastfed group vs nonbreastfed group: 31 vs 48.9 days (p<0.05) No significant difference noted for the buprenorphine-exposed breastfed group vs nonbreastfed group: 25.7 vs 38.8 days (p=NS) perhaps due to smaller sample size Fewer NAS scores (proxy for NAS duration of symptoms) recorded: 25 vs 56.3 vs 95.6 (p=0.001) Lower magnitude of scores (proxy for severity): 4.9 vs 6.5 vs 6.9 (p=0.0001)

(continued)

Table 1 (continued)

Study Design	Study Objectives	Index vs Reference Groups	Results Related to Breastfeeding
Retrospective ¹³	To determine the effects of a rooming-in program on need for pharmacologic treatment of NAS	Breastfed vs nonbreastfed infants	A lower proportion of breastfed infants required pharmacologic treatment: 12% vs 37%, which is equivalent to 79% reduction in odds of infant requiring pharmacologic treatment if breastfed (OR 0.21 ± 1.43, 95% CI 0.1–0.42, $p < 0.001$)
Retrospective ¹⁴	To compare the effect of different feeding modalities on onset of NAS	Formula-fed infants vs breastfed infants vs expressed breast milk–fed infants	Similar rate of NAS for all feeding modalities: 81% vs 100% vs 72% ($p = 0.11$) Later onset of NAS for breastfed infants ($p = 0.04$)

NAS = neonatal abstinence syndrome; OR = odds ratio; CI = confidence interval; LOS = length of stay.

Encourage Breastfeeding

Mothers should be encouraged to breastfeed if she is engaged in a substance abuse program, consent is given to discuss progress in the program, and plans for postpartum treatment with a substance abuse counselor are established.²² The patient should be planning to continue treatment for substance abuse postpartum, and abstinence from the substance should be established for 90 days before delivery. Toxicology screening should be negative at time of delivery. The mother should also be engaged and compliant in prenatal care. Patients who are stable on methadone or buprenorphine maintenance therapy should be encouraged to breastfeed regardless of dose. Mothers who partake in drinking alcohol may do so; however, they should wait 90–120 minutes after ingestion before breastfeeding or expressing milk (unless it is to be discarded). Patients who smoke cigarettes may breastfeed; however, they should be encouraged to stop smoking. Cannabis has long-term neurobehavioral effects when infants are exposed to its smoke. Mothers should be discouraged from using marijuana while breastfeeding. Current evidence is insufficient to make this a contraindication in breastfeeding, but ABM urges that caution should be used.

Use Caution in Breastfeeding

The ABM encourages that risk versus benefit be weighed in certain situations such as substance abuse relapse, concomitant use of other prescription medications deemed incompatible with lactation, the mother is engaged in prenatal care after the second trimester, the mother does not maintain sobriety in the outpatient setting, lack of support systems, or the mother reports only wanting to breastfeed her infant to retain custody or maintain her sobriety in the postpartum period.²²

Discourage Breastfeeding

There are only a few reasons that mothers should be discouraged from breastfeeding.²² The first is that the patient is not engaged in a substance abuse treatment program or plans not to engage in a postpartum program. The second is that the mother is not engaged in prenatal care or has a positive toxicology screen, with the exception of marijuana. If the patient relapses within 30 days of delivery, the patient should be discouraged from breastfeeding. Last, if the

Table 2. Safety of Various Opiates in Lactating Mothers²¹

Opiate	Lactation Risk Category ^a	Comments
Methadone	L2	Most thoroughly studied opioid related to breastfeeding and neonatal abstinence syndrome; 1 infant death reported, but breast milk may not have been the sole source of methadone
Buprenorphine	L2	Subclinical amounts found in breast milk; poor oral bioavailability
Buprenorphine + naloxone	L3	Subclinical amounts found in breast milk; poor oral bioavailability
Hydrocodone	L3	
Oxycodone	L3	
Oxymorphone	L3	
Fentanyl	L2	
Codeine	L4	Concern for potential overdose if mother or baby is an ultrarapid metabolizer; at least one infant death has been reported
Morphine	L3	

^aRisk categories are defined as follows: L2 = limited data, probably compatible; L3 = no data, probably compatible; L4 = possibly hazardous.

mother chronically consumes alcohol, she should not breastfeed.

Although the ABM offers the most comprehensive recommendations for breastfeeding infants with NAS, other organizations, such as AAP and ACOG, offer guidance as well. Some practitioners may recall that the AAP previously endorsed breastfeeding if a woman was taking methadone doses of 20 mg or lower²³; however, this is no longer a current recommendation. The AAP guidelines now state that breastfeeding infants with NAS is recommended in most situations due to its association with less severe NAS that is less likely to require pharmacologic treatment.⁶ The AAP further supports the ABM recommendation of encouraging breastfeeding unless otherwise contraindicated and expresses that methadone and buprenorphine maintenance therapies are not contraindications.²⁴ The AAP specifically recommends avoiding street drugs such as phencyclidine (PCP), cocaine, and cannabis, which have been detected in human milk, while breastfeeding.²⁴ The result of using these drugs may be associated with poor neurobehavioral effects.²⁴ ACOG's Committee Opinion on Opioid Abuse, Dependence, and Addiction in Pregnancy states that women maintained on methadone or buprenorphine should be encouraged to breastfeed as long as they do not have other contraindications, such as HIV infection/AIDS.²⁵

Dangers of Illicit Drug Exposure

Although it is optimal for patients to receive treatment for their addiction, patients may relapse into active use of illicit drugs while breastfeeding. For this reason, clinicians should be aware of the dangers of polysubstance abuse and include this in the information provided when counseling

mothers.²⁶ The neonatal effects depend on the substance used. Amphetamines, when used in clinical doses, are considered compatible with breastfeeding.²¹ On the contrary, methamphetamine remains in the breast milk for 48 hours and has proven fatal in some reported cases.²⁷ Benzodiazepines, such as lorazepam, diazepam, and alprazolam, can accumulate in a pre-term infant or neonate, causing increased sedation.²⁷ In breastfed infants, apnea, withdrawal, and sedation have all been reported.^{19, 21}

The proportion of pregnant women in the United States who use cocaine is estimated at 10%.²⁸ Several published case reports describe seizures, tachycardia, and irritability in infants who have been exposed to cocaine through breast milk.²⁸⁻³⁰ In addition to the multitude of risks to the health of the infant due to exposure to the illicit substance, there is also potential risk due to associated lifestyle choices. Intravenous drug use and risky lifestyles (e.g., prostitution, theft) put the infant at risk for HIV and other sexually transmitted infections. The mother may also be cognitively impaired while attempting to care for the child, which may also put the child in life-threatening situations. It is the clinician's role to screen the infant and educate the mother on other possible healthy lifestyle choices.

Barriers to Breastfeeding an Infant with NAS

Perhaps the greatest barrier to breastfeeding for women with opioid dependence is the inaccurate and inconsistent information they receive from different sources, including health care professionals.^{11, 31, 32} Despite all of the evidence to the contrary, some clinicians continue to advise opioid-dependent mothers not to breastfeed.

One potential barrier to breastfeeding in this population is social prejudice. Mothers may be told by well-meaning but uninformed caregivers that they should not breastfeed their infant.^{3, 17} Likewise, mothers may be advised by their own mothers, sisters, and partners that they should not breastfeed.³³ Mothers may be reluctant to express interest in breastfeeding for fear of being shunned by those who do not understand or support breastfeeding in this population. Mothers and/or their partners may also be concerned that their infant may receive an overdose of methadone through breast milk.³²

A retrospective review of 276 NAS-diagnosed infants found both breastfeeding initiation and continuation rates to be low.³¹ Seventy-five percent of the infants in this study were born at Baby-Friendly-designated institutions, thereby indicating they would have adequate support from knowledgeable health care professionals including lactation consultants. Despite this support, breastfeeding rates continued to be low. Potential barriers identified by these authors included the time commitment required for recovery itself, limited financial resources, medical and psychiatric comorbidities, and NAS symptoms.

Recovery does require a significant time commitment.^{31, 32} Women who are maintained on methadone will be required to travel to a methadone clinic daily to receive their dose. Regardless of whether they are receiving methadone or buprenorphine, they will need to report regularly for urine drug screening. Depending on where mothers are in their sobriety, they may have to attend regular meetings. This time constraint may make breastfeeding seem impossible for some women.

Women in recovery for addiction often have limited financial resources.^{31, 32} Traveling to the hospital to breastfeed or bring expressed milk may be a barrier in itself. Add in the cost of travel, parking, and any child care for older siblings, and this may become cost prohibitive.

Women with a history of substance abuse are at risk for viral infections such as hepatitis B and hepatitis C virus.³² Although infection with either virus is not considered a contraindication to breastfeeding, there is potential for misunderstanding, and some women may be steered away from breastfeeding erroneously. Likewise, this population is known to frequently have multiple psychiatric comorbidities.²² Although the condition itself would not be a contraindication to breastfeeding, the psychoactive medications used to treat them may be.

Finally, infants who are experiencing symptoms of NAS may be hypertonic and irritable.³¹ They may have nasal stuffiness and general feeding problems. These symptoms can work against the mother as she attempts to breastfeed.

Another potential barrier to breastfeeding is the common misconception that the poor weight gain experienced by infants with NAS is misinterpreted as poorly established lactation.³⁴ There are several reasons for postnatal weight decline in infants with NAS. The weight loss can be attributed to poor, uncoordinated feeding, rapid gut transit, and increased caloric expenditure secondary to jitteriness, tachypnea, and poor sleep patterns.⁶ These reasons combined can lead to a net loss of weight early in the life of an infant with NAS. For this reason, early excessive weight loss or failure to regain birth weight in the first week or two of life cannot be taken as a sign of failure to establish lactation as described.³⁴ In considering the effects of NAS on weight gain in early life, a greater tolerance of weight loss may be appropriate in these infants before supplementing breastfeeding with formula.

Avoiding Rebound NAS in a Breastfed Infant

Anecdotally, clinicians who care for infants with NAS have observed increasing NAS scores (e.g., Lipsitz or Finnegan scoring systems)⁶ as a sign of withdrawal occurring when breast milk is withheld. Although no objective evidence, to our knowledge, has been published specifically describing increased NAS scores associated with missed maternal milk feeding, case reports have been published describing withdrawal after complete cessation of breastfeeding.^{9, 35} Researchers reported two cases of infants who experienced withdrawal after abrupt cessation of breastfeeding.³⁵ In both cases, the infants had been discharged home from the hospital without requiring treatment for NAS. Maternal illness led to withdrawal of breastfeeding in at least one case. Cessation of breastfeeding precipitated withdrawal in the infants. One infant experienced this withdrawal at 6 weeks of life and the other at 17 days of life. There is another report of readmission of 4% of infants in a study of NAS within 2 weeks of discharge.⁹ Each infant had experienced either complete discontinuation of breast milk or a considerable reduction. Women who are breastfeeding infants at risk for NAS should be advised to avoid abrupt discontinuation of breastfeeding, if possible.

Clinician's Role in Identifying, Promoting, and Counseling Mothers of Breastfeeding Infants with NAS

In many institutions, a multidisciplinary team cares for patients with NAS, and all members on this team need to be aware of, and in agreement with, the breastfeeding plan. Further, team members should act as advocates for breastfeeding when appropriate. Pharmacists are often key members of this team in the context of assessing the safety of medication exposure through breast milk.

There is a role for the clinician to identify special circumstances related to breastfeeding an infant with or at risk for NAS. An increased tolerance for weight loss or delayed weight gain may aid in establishing successful breastfeeding down the road.³⁴ Counseling mothers on the danger of potential withdrawal precipitated by abrupt cessation of breastfeeding is another specific role for clinicians.³⁵ In addition, mothers should be counseled on the adverse effects of breastfeeding following use of illicit substances.²⁶ They should have a clear understanding that breastfeeding would no longer be advised if they return to active use of illicit substances. Pharmacists specifically may be consulted to interpret toxicology results or to assess the safety of concomitant medications (e.g., psychotropic medications) in breastfeeding mothers.

In all interactions, an important role of the clinician is to be understanding of a patient's desire to breastfeed her infant. As more hospitals push for a "breast is best" environment, a mother who is attempting to or has stopped illicit drug use should be afforded the same opportunities. As many studies have shown, there is a need for more breastfeeding education, support, and promotion, especially in mothers enrolled in maintenance programs.^{9, 12} A clinician should know the signs and symptoms of withdrawal of an infant and know the correct responses and resources for these instances.

Clinicians working with infants with NAS and their families should be familiar with addiction as a disease and not a moral shortcoming.³⁶ This can make for a better, more trusting relationship between clinician and mother. Clinicians should also be well versed in the organizational recommendations outlined in this article to identify which mothers are and which are not candidates for breastfeeding. Mothers who are eligible to breastfeed their infants should be educated and supported by those involved in her care and the care of her infant.³⁷

Infants with NAS may have a more difficult time with breastfeeding due to poorly coordinated sucking, swallowing, and breathing mechanisms.^{37, 38} Likewise, their hypertonicity may make it difficult to position them to breastfeed.³⁹ A lactation consultant should be involved in the interprofessional approach to the care of these mother–infant pairs.

Conclusion

The benefits of breastfeeding for both mother and infant are numerous and well documented. Breastfeeding in infants with NAS, although controversial in the past, is now known to convey additional benefits specific to these infants. Several organizations have published recommendations that support and assist in identifying which mothers are candidates for breastfeeding. Clinicians can play an important role in identifying, promoting, and counseling mothers of infants with NAS regarding breastfeeding.

Acknowledgment

The authors would like to express their appreciation to J. Brock Harris for his review of and valuable input to this manuscript.

References

1. Tolia VN, Patrick SW, Bennett MM, et al. Increasing incidence of the neonatal abstinence syndrome in U.S. neonatal ICUs. *N Engl J Med* 2015;372(22):2118–26.
2. Goldman AS, Hopkinson JM, Rassin DK. Benefits and risks of breastfeeding. *Adv Pediatr* 2007;54:275–304.
3. Dryden C, Young D, Hepburn M, Mactier H. Maternal methadone use in pregnancy: factors associated with the development of neonatal abstinence syndrome and implications for healthcare resources. *BJOG* 2009;116(5):665–71.
4. Burkey BW, Holmes AP. Evaluating medication use in pregnancy and lactation: what every pharmacist should know. *J Pediatr Pharmacol Ther* 2013;18(3):247–58.
5. Tsai LC, Doan TJ. Breastfeeding among mothers on opioid maintenance treatment: A literature review. *J Hum Lact* 2016;32(3):521–9.
6. Hudak ML, Tan RC. Neonatal drug withdrawal. *Pediatrics* 2012;129(2):e540–60.
7. Abdel-Latif ME, Pinner J, Clews S, Cooke F, Lui K, Oei J. Effects of breast milk on the severity and outcome of neonatal abstinence syndrome among infants of drug-dependent mothers. *Pediatrics* 2006;117(6):e1163–9.
8. Lim S, Prasad MR, Samuels P, Gardner DK, Cordero L. High-dose methadone in pregnant women and its effect on duration of neonatal abstinence syndrome. *Am J Obstet Gynecol* 2009;200(1):70.e1–5.
9. Isemann B, Meinen-derr J, Akinbi H. Maternal and neonatal factors impacting response to methadone therapy in infants treated for neonatal abstinence syndrome. *J Perinatol* 2011;31(1):25–9.
10. Pritham UA, Paul JA, Hayes MJ. Opioid dependency in pregnancy and length of stay for neonatal abstinence syndrome. *J Obstet Gynecol Neonatal Nurs* 2012;41(2):180–90.

11. Welle-Strand GK, Skurtveit S, Jansson LM, Bakstad B, Bjarko L, Ravndal E. Breastfeeding reduces the need for withdrawal treatment in opioid-exposed infants. *Acta Paediatr* 2013;102(11):1060–6.
12. McQueen KA, Murphy-Oikonen J, Gerlach K, Montelpare W. The impact of infant feeding method on neonatal abstinence scores of methadone-exposed infants. *Adv Neonatal Care* 2011;11(4):282–90.
13. Hodgson ZG, Abrahams RR. A rooming-in program to mitigate the need to treat for opiate withdrawal in the newborn. *J Obstet Gynaecol Can* 2012;34(5):475–81.
14. Liu A, Juarez J, Nair A, Nanan R. Feeding modalities and the onset of the neonatal abstinence syndrome. *Front Pediatr* 2015;3(14):1–4.
15. Friguls B, Joya X, Garcia-Algar O, et al. A comprehensive review of assay methods to determine drugs in breast milk and the safety of breastfeeding when taking drugs. *Anal Bioanal Chem* 2010;397:1157–79.
16. Wojnar-Horton RE, Kristensen JH, Yapp P, et al. Methadone distribution and excretion into breast milk of clients in a methadone maintenance programme. *Br J Clin Pharmacol* 1997;44(6):543–7.
17. Jansson LM, Choo R, Velez ML, et al. Methadone maintenance and breastfeeding in the neonatal period. *Pediatrics* 2008;121(1):106–14.
18. Jones HE, Kaltenbach K, Heil SH, et al. Neonatal abstinence syndrome after methadone or buprenorphine exposure. *N Engl J Med* 2010;363:2320–31.
19. Lactmed. Buprenorphine; LactMed record no.: 338. Bethesda, MD: National Library of Medicine. Available from <https://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm>. Revised September 2016. Accessed November 2016.
20. Gower S, Bartu A, Ilett KF, et al. The wellbeing of infants exposed to buprenorphine via breast milk at 4 weeks of age. *J Hum Lact* 2014;30(2):217–23.
21. Hale TW. Medication and Mother's Milk, 16th ed. Amarillo, TX: Hale Publishing, 2014.
22. Reece-Stretman S, Marinelli KA. ABM clinical protocol #21: Guidelines for breastfeeding and substance use or substance use disorder. *Breastfeed Med* 2015;10(3):135–41.
23. Mactier H. Neonatal and longer term management following substance misuse in pregnancy. *Early Hum Dev* 2013;89(11):887–92.
24. Eidelman AI. Breastfeeding and the use of human milk: an analysis of the American Academy of Pediatrics 2012 Breastfeeding Policy Statement. *Breastfeed Med* 2012;7(5):323–4.
25. Committee on Health Care for Underserved Women and the American Society of Addiction Medicine. Opioid abuse, dependence, and addiction in pregnancy. Committee Opinion No. 524. American College of Obstetricians and Gynecologists. *Obstet Gynecol* 2012;119(5):1070–6.
26. Cleveland LM. Breastfeeding recommendations for women who receive medication-assisted treatment for opioid use disorders: AWHONN Practice Brief Number 4. *JOGGNN* 2016;45(4):574–6.
27. Sachs HC. The transfer of drugs and therapeutics into human breast milk: an update on selected topics. *Pediatrics* 2013;132(3):e796–809.
28. Sarkar M, Djulus J, Koren G. When a cocaine-using mother wishes to breastfeed: proposed guidelines. *Ther Drug Monit* 2005;27(1):1–2.
29. Chaney NE, Franke J, Wadlington WB. Cocaine convulsions in a breast-feeding baby. *J Pediatr* 1988;112(1):134–5.
30. Shannon M, Lacouture PG, Roa J, Woolf A. Cocaine exposure among children seen at a pediatric hospital. *Pediatrics* 1989;83(3):337–42.
31. Wachman EM, Byun J, Philipp BL. Breastfeeding rates among mothers of infants with neonatal abstinence syndrome. *Breastfeed Med* 2010;5(4):159–64.
32. Graves LE, Turner S, Nader M, Sinha S. Breastfeeding and opiate substitution therapy: starting to understand infant feeding choices. *Subst Abuse* 2016;10(Suppl 1):43–7.
33. Gopman S. Prenatal and postpartum care of women with substance use disorders. *Obstet Gynecol Clin North Am* 2014;41(2):213–28.
34. Dryden C, Young D, Campbell N, Mactier H. Postnatal weight loss in substitute methadone-exposed infants: implications for the management of breast feeding. *Arch Dis Child Fetal Neonatal Ed* 2012;97(3):F214–6.
35. Malpas TJ, Darlow BA. Neonatal abstinence syndrome following abrupt cessation of breastfeeding. *N Z Med J* 1080;1999(112):12–3.
36. McKeever AE, Apaeth-Brayton S, Sheerin S. The role of nurses in comprehensive care management of pregnant women with drug addiction. *Nurs Womens Health* 2014;18(4):284–93.
37. Maguire D. Drug addiction in pregnancy: disease not moral failure. *Neonatal Netw* 2014;33(1):11–8.
38. Velez M, Jansson LM. The opioid dependent mother and newborn dyad: nonpharmacologic care. *J Addict Med* 2008;2(3):113–20.
39. Pritham UA. Breastfeeding promotion for management of neonatal abstinence syndrome. *JOGNN* 2013;42:517–26.