



Published: January 31, 2023

Citation: MacMullen NJ and Dulski LA, 2022. Neonatal Abstinence Syndrome: Non-pharmacologic Interventions for the Maternal-Infant Dyad, Medical Research Archives, [online] 11(1).

<https://doi.org/10.18103/mra.v11i1.3506>

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DOI

<https://doi.org/10.18103/mra.v11i1.3506>

ISSN: 2375-1924

RESEARCH ARTICLE

Neonatal Abstinence Syndrome: Non-pharmacologic Interventions for the Maternal-Infant Dyad

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ABSTRACT

Neonatal Abstinence Syndrome (NAS) remains a concern for health care providers. The incidence of NAS has increased globally, and it has emerged as a worldwide health concern. In our previous article, we explored the efficacy of current pharmacologic treatment for NAS symptoms. Our purpose now is to focus on non-pharmacologic interventions for NAS symptoms and the involvement of caregivers, specifically the mother. We will discuss breastfeeding, rooming in, babywearing, the eat, sleep, console approach, and laser acupuncture.

We intend to describe the involvement of the interdisciplinary team and all who care for these infants, including parents.

Introduction

Drug use has escalated globally in the last several years. The United Nations Office on Drugs and Crime (UNDOC) reports that about 275 million people used drugs worldwide and over 36 million people experienced suffering from drug use disorders.¹ Though the problem affects both sexes, drug use tends to escalate into addiction more quickly in women. If drugs are used during pregnancy, it exposes the infant to potential harmful effects in utero and after delivery. Infants can experience withdrawal symptoms (NAS) after being exposed to opioids prenatally.² NAS is a constellation of symptoms including diarrhea, irritability, poor feeding, sleep disturbances, tremors and vomiting. Much is known about the use of medications to treat these symptoms, but little is known about non-pharmacologic methods to help these infants during withdrawal. The purpose of this article is to explore various interventions beside drugs to alleviate symptoms.

The method utilized to achieve the purpose of the article was a literature review of several scholarly articles. The articles reviewed focused on the non-pharmaceutical interventions for the maternal infant dyad. Five themes emerged from the literature search: Breastfeeding, rooming in, baby wearing, the eat, sleep console method and acupuncture. Nursing interventions and the mother's role as a care giver also were significant topics addressed in the literature.

Breastfeeding

A number of articles extolled the importance of breastfeeding for the infant during the treatment of NAS. Aside from the nutritional benefits of breastfeeding and its relationship to maternal infant bonding, studies have shown that breastfeeding decreases the need for pharmacological interventions and decreases the length of stay for infants with NAS.^{2, 3, 4} Breastfeeding is part of non-pharmacological treatment for evidence-based care for symptoms of NAS.⁵

Breastfeeding needs to be promoted by the care giving team for the NAS infant unless the mother is HIV positive or continues her substance use.⁶ Breastfeeding is soothing for infants and contains small amounts of the used substances which can relieve withdrawal signs and symptoms in the infants.⁷ According to the American Academy of Pediatrics Policy Statement 2022, mothers with opioid use should begin breastfeeding and breast feed exclusively to reduce the impact of withdrawal on the infant.⁸

Rooming In

Several studies on rooming in for NAS infants revealed numerous benefits of this practice. Benefits included less likelihood of pharmacotherapy, substantial reductions in length of stay and decreased hospital costs.^{9, 10, 11, 12} Clearly, rooming in has economic and developmental benefits for the infant. Rooming in facilitates maternal infant bonding and the mother learning important skills to care for her infant.

Baby Wearing

Rankin, Williams, et al, discuss the use of the baby wearing strategy as an intervention for the NAS infant in the intensive care setting. They define Baby Wearing as the use of a soft fabric carrier worn on the body of the care giver.¹³ This allows the care giver ability to complete other activities while the infant is soothed by the motion of the care giver. A qualitative study of nurses in the Neonatal Intensive Care Unit (NICU) who practiced baby wearing revealed three benefits: Infant consoling, ability to multi-task, and connectedness between the nurse and the infant. The nurses suggested three barriers to baby wearing in the NICU: Infection control, lack of education, and patient load. Baby Wearing is cost effective and supports parenting and can be done by non-parent caregivers.¹⁴

The Eat, Sleep, Console Management Program

The Eat, Sleep, Console (ESC) approach assesses a newborn's ability to function. Eating, sleeping and consolability are the three critical functions evaluated. ESC determines whether these functions are interrupted by withdrawal symptoms. If the infant's function is significantly affected, pharmacologic treatment may be necessary.¹⁵ If eating, sleeping, and consolability are not disrupted, by withdrawal symptoms the infant does not require pharmacologic interventions, even when traditional NAS tool scores are elevated.¹⁵ The criteria include the following:

1. Eat

The newborn should consume an adequate amount of formula or breast milk according to age. For formula fed infants, this may be less than an ounce for babies one to two days old or one ounce per feed for infants three days old or greater. Breastfeeding quality should be identified as good by the mother and/or the nursing staff.¹⁵

2. Sleep

Sleep is one of the hallmark symptoms of infant withdrawal. Babies should sleep undisturbed for at least one hour with or without holding.

3. Console

The newborn is consoled within ten minutes. If this does not happen, non-pharmacologic measures should be increased to console the baby. Should these increased measures fail to console the infant, the health care team is consulted for the possible initiation of pharmacologic therapy.

The care giver role in implementing the ESC approach, includes assessments of the three functions every three hours after a feeding. The caregiver input is important to evaluate the newborn's well-being. Eat, sleep, console involves, the family and is a wholistic approach. The health care team serves as educators, coaches, support people and hands on assistants with non-pharmacologic treatment. The ESC works best on a mother baby unit where rooming in is implemented from delivery to discharge.¹⁶

Barriers and Benefits

Significant barriers to the ESC approach include bias of the health care team members, lack of acceptance by clinical team members, and continuous presence of the caregiver throughout the hospitalization.¹⁶

Benefits of the ESC approach are a decreased length of stay, and use of medication to treat these infants.^{17, 18} Thus, the ESC approach is cost-effective, and reduces the need for drug therapy.

Laser Acupuncture

Laser acupuncture is a form of adjuvant therapy for NAS withdrawal symptoms.¹⁹ The laser is applied to several acupuncture points starting at the right ear and then the body from head to toe. Acupuncture calms restless infants and improves sleeping and eating. These are the critical functions identified in the ESC approach.

When added to pharmacologic treatment, laser acupuncture was shown to reduce the time of morphine therapy to treat symptoms of NAS.¹⁹ However laser acupuncture needs to be further studied because other studies have demonstrated contradictory results.²⁰

Caring for the mother

A holistic approach to the care of the infant withdrawing from narcotics involves caring for the mother. Several studies have indicated that these mothers are more prone to mental illness.^{21,22} This effect can persist up to one year after giving birth. Careful consideration needs to be given to encouraging the mother's participation in infant care. Mothers have reported that skin to skin contact supports their bond with the baby.²³ Other important factors include paternal support,

community support, and information from the health care team. Lack of support, guilt, feeling judged, and the severity of infant withdrawal symptoms were found to be barriers to mother infant bonding.²⁴ Trauma-informed care (TIC) is an approach that recognizes the trauma of giving birth to an addicted infant and shows the influence of trauma on her behavior and life choices. It creates trust and empowers mothers to partner in the care of their babies.²⁵

The health care challenge

Many obstacles are encountered in caring for NAS infants. Two of the greatest are the withdrawal symptoms themselves and the facilitation of bonding in an intensive care environment. Attachment is tenuous for these fragile infants and the mothers are often less responsive to their infant's behavior during the brief times they might be present.²⁶ The stigma of substance use overshadows these mothers, who frequently feel they must overcome judgment.²⁷ A study of health care workers revealed that prioritization of physical needs, compassion fatigue, poor continuity of care and stigma compromised the care of NAS infants.²⁸ Moral distress has been reported by the health care team working with these babies and mothers.²⁹

Conclusion

Pharmacologic treatment has been a mainstay of caring for the infant with withdrawal symptoms. However, other approaches to NAS symptom relief can reduce the need for medication or be an important adjuvant to drugs. We have discussed breastfeeding, babywearing, rooming-in eat, sleep console, and laser acupuncture as alternatives or additions to current therapy. The use of nonpharmacologic treatment has been shown to decrease the use of drugs and severity of NAS symptoms, shorten the length of hospitalization, decrease agitation, and improve sleep.³⁰

Barriers to the implementation of these care approaches include lack of appropriate education for parents and staff, staff experience, parental participation, and organizational support (unit design, staffing ratios, and use of resources).³¹ Interdisciplinary care coordination and maternal involvement are other factors affecting the success of nonpharmacologic interventions.³²

Neonatal Abstinence Syndrome is a complex phenomenon requiring a variety of different approaches for treatment. The interventions we have discussed can supplement traditional drug therapy or possibly replace it. Assessing symptoms differently such as the ESC approach can reduce the frequency of medication

use and lower the length of stay. In this way, costs can be reduced, and care becomes more efficient, Greater involvement of the mother reinforces the maternal infant bond and reduces the stress on the health care team. Clearly, there are many benefits

to using these approaches, but there are also challenges to be overcome.

Conflicts of Interest Statement

The authors have no conflicts of interest to declare.

Table 1: References by intervention

Intervention	Works cited
Breastfeeding	<ol style="list-style-type: none"> 1. Chu, C, McGrath, JM, Qiao, J, et al. A meta-analysis of breastfeeding effects for infants with neonatal abstinence syndrome. <i>Nursing Research</i>. 2022; 71(1):54-65. 2. Welle-Strand, GK, Skurtveit, S, Jansson, LM et al. Breastfeeding reduces the need for withdrawal treatment in opioid-exposed infants. <i>Acta Paediatr</i>. 2013:1-3. 3. Wu, D, Carre, C. The impact of breastfeeding on health outcomes for infants diagnosed with Neonatal Abstinence Syndrome: A review. <i>Cureus</i>. 2018; 10(7): 1-10. Doi: 10.7759/Cureus.3061 4. Younger Meek, J, Noble, L. American Academy of Pediatrics Policy statement: Breastfeeding and the use of human milk. <i>Pediatrics</i>. 2022: 1-47. Doi.org/10.1542/peds.2022-057988. 5. Karakashian, AL, Schub, T. <i>CINAHL Nursing Guide EBSCO Publishing</i>. 2021: 1-7.
Rooming in	<ol style="list-style-type: none"> 1. MacMillan, DL, Rendon, CP, Kanak, V et al. Association of rooming in with outcomes for Neonatal Abstinence Syndrome A systematic review and meta-analysis. <i>JAMA Pediatr</i>. 2018: 345-351. Doi: 10.1001/jamapediatrics.2017.5195 2. Holmes, AV, Atwood, EC, Whalen, B et al. Rooming-in to treat Neonatal Abstinence Syndrome: improved family-centered care at lower cost. <i>Pediatrics</i>. 2016: 1-3. Doi.org/10.1542/peds.2015-2929.
Babywearing	<ol style="list-style-type: none"> 1. Rankin Williams, L, Grisham, LM, Gebler-Wolfe, M, Kelsch, K, Bedrick, A, Bader,MY.. Nurse perceptions of babywearing for neonates with Neonatal Abstinence Syndrome in the Neonatal Intensive Care Unit. <i>Adv.Neonatal Care</i>. 2020: 23-31. Doi: 10.1097/ANC.0000000000000811 2. Rankin Williams, Gebler-Wolfe, M, Grisham LM, Bader, MY.. “Babywearing” in the NICU. <i>Adv. Neonatal Care</i>. 2020;(440-449). Doi 10.1097/ANC.0000000000000788
Eat Sleep Console approach	<ol style="list-style-type: none"> 1. Grisham, LM, Stephen, MM, Coykendall, MR et al. Eat, Sleep, Console Approach. <i>Adv. Neonatal Care</i> 2019: 138-144. 2. Wortham, SE, Bianchi, AL. Strategies to successfully implement an eat, sleep, console protocol. <i>MCN AmJ Matern Child Nurs</i>. 2022; 47 (4): 182-188. 3. Wachman, EM, Houghton, M, Melvin, P. et al. A quality improvement initiative to implement the eat, sleep, console neonatal opioid withdrawal syndrome care tool in Massachusetts’ PNQIN collaborative. <i>J Perinatol</i>. 2021; 40: 1560-1569. Doi.org/10.1038/s41372-020-0733-y 4. Miller, P, Willier, T. Baby strength eat, sleep, console for infants with Neonatal Abstinence Syndrome. <i>Adv. Neonatal Care</i>. 2021; 21(2): 99-106. Doi:10/1097/ANC.0000000000000840.
Laser acupuncture	<ol style="list-style-type: none"> 1. Raith, W, Schmolzer,GM, Resch,B et al. Laser acupuncture for Neonatal Abstinence Syndrome: A randomized controlled trial. <i>Pediatrics</i>. 2015; 136(5): 1-9 2. Mangat, AK, Schmolzer, GM. A review on acupuncture as a non-pharmacological treatment for Neonatal Abstinence Syndrome (NAS). <i>ICM-OBM</i>. 2019; 4(3): 1-12. Doi: 10.21926/obm.icm.1903051

References

1. United Nations Office on Drugs and Crime (UNODC). UNODC World Drug Report 2021: pandemic effects ramp up drug risks, as youth underestimate cannabis dangers 2021: 1- 2.
2. Chu, C, McGrath, JM, Qiao, J, et al. A meta-analysis of breastfeeding effects for infants with neonatal abstinence syndrome. *Nursing Research*. 2022; 71(1):54-65.
3. Welle-Strand, GK, Skurtveit, S, Jansson, LM et al. Breastfeeding reduces the need for withdrawal treatment in opioid-exposed infants. *Acta Paediatr*. 2013:1-3.
4. Wu, D, Carre, C. The impact of breastfeeding on health outcomes for infants diagnosed with Neonatal Abstinence Syndrome: A review. *Cureus*. 2018; 10(7): 1-10. Doi: 10.7759/Cureus.3061
5. Shuman, CJ, Weber, A, VanAntwerp, K. et al. Engaging mothers to implement nonpharmacological care for infants with Neonatal Abstinence Syndrome. Perceptions of perinatal and pediatric nurses. *Adv. Neonatal Care*. 2020: 464-472. Doi:10.1097/ANC.0000000000000812
6. Shub, T, Ashley, TJ. *CINAHL Nursing Guide EBSCO Publishing*. 2021; 1-6.
7. Karakashian, AL, Schub, T. *CINAHL Nursing Guide EBSCO Publishing*. 2021: 1-7.
8. Younger Meek, J, Noble, L. American Academy of Pediatrics Policy statement: Breastfeeding and the use of human milk. *Pediatrics*. 2022: 1-47. Doi.org/10.1542/peds.2022-057988.
9. MacMillan, DL, Rendon, CP, Kanak, V et al. Association of rooming in with outcomes for Neonatal Abstinence Syndrome A systematic review and meta-analysis. *JAMA Pediatr*. 2018: 345-351. Doi: 10.1001/jamapediatrics.2017.5195
10. Holmes, AV, Atwood, EC, Whalen, B et al. Rooming-in to treat Neonatal Abstinence Syndrome: improved family-centered care at lower cost. *Pediatrics*. 2016: 1-3. Doi:org/10.1542/peds.2015-2929.
11. Schub, T. Neonatal Abstinence Syndrome: Caring for the newborn with. *CINAHL Nursing Guide EBSCO Publishing*. 2018; 1-11.
12. Piteau, S, Vyas, M, Papadakos, P. Reduction of need for treatment and length of hospital stay following institution of a Neonatal Abstinence Syndrome rooming-in program. *Pediatrics*.2021; 1-2. Doi.org/10.1542/peds.147.3MA1.54b
13. Rankin Williams, L, Grisham, LM, Gebler-Wolfe, M, Kelsch, K, Bedrick, A, Bader,MY.. Nurse perceptions of babywearing for neonates with Neonatal Abstinence Syndrome in the Neonatal Intensive Care Unit. *Adv.Neonatal Care*. 2020: 23-31. Doi: 10.1097/ANC.0000000000000811
14. Rankin Williams, Gebler-Wolfe, M, Grisham LM, Bader, MY.. "Babywearing" in the NICU. *Adv. Neonatal Care*. 2020;(440-449). Doi 10.1097/ANC.0000000000000788
15. Grisham, LM, Stephen, MM, Coykendall, MR et al. Eat, Sleep, Console Approach. *Adv. Neonatal Care* 2019: 138-144.
16. Wortham, SE, Bianchi, AL. Strategies to successfully implement an eat, sleep, console protocol. *MCN AmJ Matern Child Nurs*. 2022; 47 (4): 182-188.
17. Wachman, EM, Houghton, M, Melvin, P. et al. A quality improvement initiative to implement the eat, sleep, console neonatal opioid withdrawal syndrome care tool in Massachusetts' PNQIN collaborative. *J Perinatol*. 2021; 40: 1560-1569. Doi.org/10.1038/s41372-020-0733-y
18. Miller, P, Willier, T. Baby strength eat, sleep, console for infants with Neonatal Abstinence Syndrome. *Adv. Neonatal Care*. 2021; 21(2): 99-106. Doi:10/1097/ANC.0000000000000840.
19. Raith, W, Schmolzer,GM, Resch,B et al. Laser acupuncture for Neonatal Abstinence Syndrome: A randomized controlled trial. *Pediatrics*. 2015; 136(5): 1-9.
20. Mangat, AK, Schmolzer, GM. A review on acupuncture as a non-pharmacological treatment for Neonatal Abstinence Syndrome (NAS). *ICM-OBM*. 2019; 4(3): 1-12. Doi: 10.21926/obm.icm.1903051
21. Corr, TE, Schaefer, EW, Hollenbeck, CS, Leslie, DL. One year postpartum mental health outcomes of mothers of infants with Neonatal Abstinence Syndrome. *Maternl Child Health J*. 2020; 24: 283-290. Doi: .org/10.1007/s10995-019-02839-9
22. Faherty, LJ, Matone, M, Passarella, M, Lorch, S. Mental health of mothers of infants with Neonatal Abstinence Syndrome and prenatal opioid exposure. *Matern Child J* . 2018;22: 841-848.
23. McGlothen-Bell, K, Recto, P, McGrath, JM, Brownell, E., Cleveland, LM. Recovering together mothers' experiences providing skin-to-skin care for their infants with NAS. *Adv.Neonatal Care*. 2020;21(1): 16-22.
24. Rockefeller, K, Macken, LC, Craig, A. Trying to do what is best. A qualitative study of maternal-infant bonding and Neonatal Abstinence Syndrome. *Adv.Neonatal Care*. 2019; 19(5): E3-E15. Doi: 10.1097/ANC.0000000000000616.

25. Linn, N, Stephens, K, Swanson-Biearman, B, Lewis, D, Whiteman, K. Implementing trauma-informed strategies for mothers of infants with Neonatal Abstinence Syndrome. *MCN AM.J. Matern.Child Nurs.* 2021; 46(4): 211-216. Doi: 10.1097/NMC.0000000000000728.
26. Shannon, J, Peters, K, Blythe, S. The challenges to promoting attachment for hospitalized infants with NAS. *Children.* 2021; 8:1-13.
27. Recto, P, McGlothen-Bell, K , McGrath, J, Brownell, E, Cleveland, LM. The role of stigma in the nursing care of families impacted by Neonatal Abstinence Syndrome. *Adv. Neonatal Care.* 2020; 20(5):354-363. Doi 10.1097//ANC.0000000000000778
28. Shannon, J, Blythe, S, Peters, K. The complexities associated with caring for hospitalized infants with Neonatal Abstinence Syndrome: The perspectives of nurses and midwives. *Children.* 2021; 8(2): 1-11. Doi: .org/10.3390/children8020152
29. Welborn, A.I Moral distress of nurses surrounding neonatal abstinence syndrome: Application of a theoretical framework. *Nurs.Forum.* 2019;54: 499-504. Doi: 10.1111/nuf.12362
30. Edwards, L, Brown, LF. Nonpharmacologic management of Neonatal Abstinence Syndrome: An integrative review. *Neonatal Netw* 2019; 35(5):305-313. Doi.org/10.1891/0730-0832.35.5.305
31. Adrian, A, Newman, S, Mueller, M, Phillips, S. A mixed-methods study to investigate barriers and enablers to nurses' implementation of nonpharmacological interventions for infants with Neonatal Abstinence Syndrome. *Adv.Neonatal Care.* 2020; 20(6) 450-463. Doi: 10.1097/ANC.0000000000000794
32. Shuman, CJ, Wilson, R, VanAntwerp, K, Morgan, M, Weber, A. Elucidating the context for implementing nonpharmacologic care for neonatal opioid withdrawal syndrome: a qualitative study of perinatal nurses. *BMC Pediatr.* 2021; 21(489): 1-14. Doi.org/10.1186/s12887-021-02955-y