

## Section 9: Neonatal Abstinence Syndrome

Women with opioid use disorders, whether receiving medication assisted treatment with methadone or buprenorphine, or using illicitly, should receive prenatal education about neonatal abstinence syndrome in preparation for birth and newborn care.

### ***Key points***

- Neonatal Abstinence Syndrome (NAS), also known as Neonatal Opioid Withdrawal Syndrome (NOWS), refers to a cluster of symptoms due to neonatal withdrawal after chronic prenatal exposure to opioids, whether prescribed or non-prescribed.
- NAS symptoms mirror symptoms experienced by adults in withdrawal: neurologic symptoms including anxiety/irritability, and seizures; rhinorrhea/sneezing; gastrointestinal symptoms.
- More severe NAS symptoms are associated with polysubstance use and/or the use of illicit opioids
- Buprenorphine is associated with similar rates but later onset, shorter duration, and less severe NAS symptoms than methadone in most studies (Jones, Kaltenbach, Heil, et al, 2010)
- There appears to be no significant difference in NAS symptoms for infants exposed to buprenorphine monoproprietary compared to buprenorphine-naloxone (Jumah, Edwards, Balfour-Boehm, et al, 2016; Debelak, Morrone, O’Grady, et al, 2013) although research is limited
- There is no clear association between methadone or buprenorphine dose and severity of NAS symptoms (Jones, Kaltenbach, Heil, et al, 2010; Jones, Deppen, Hudak, et al 2014)
- With appropriate treatment, NAS is a time-limited condition. Research about long term neurodevelopmental effects is ongoing, but results so far are reassuring (Kocherlakota, 2014).
- Nonpharmacologic care is the first line of treatment for NAS, and includes maximizing skin to skin contact, rooming-in with mother, a quiet environment, and breastfeeding unless contraindicated (Kocherlakota, 2014; Patrick, Schumacher, Horbar, et al 2016)
- Pharmacologic treatment is required if symptoms escalate and cause functional difficulty for the infant (see discussion of Eating, Sleeping, and Consoling Care Tool, below). Morphine is the most commonly used medication, although some programs use methadone, and the use of buprenorphine is being investigated (Kocherlakota, 2014; Kraft, Adeniyi-Jones, Chervoneva et al, 2017)

- Breastfeeding is beneficial unless contraindicated by maternal drug use or HIV positive status (Jones, Deppen, Hudak, et al 2014).
- Tobacco use during pregnancy and subsequent nicotine withdrawal is linked to greater intensity and earlier onset of NAS symptoms

## **Other medication linked to neonatal symptoms**

Other classes of medications are also linked to transient discontinuation syndromes in newborns after prenatal exposure. These include sedative-hypnotics (ex: barbiturates), anxiolytics (ex: benzodiazepines), anticonvulsants (ex: gabapentin), selective serotonin reuptake inhibitors (ex: fluoxetine, sertraline), and selective norepinephrine reuptake inhibitors (ex: venlafaxine). These medications do not cause the same neonatal abstinence symptoms seen following prenatal opioid exposure, but when they are used in combination with opioids during pregnancy, NAS symptoms can be prolonged or more intense. Typically these medications are associated with central nervous symptoms such as jitteriness, increased tone, and fussiness, but not gastrointestinal or metabolic symptoms. However, experts caution not to discontinue medications such as antidepressants which are essential to maintaining women's mental health (<https://womensmentalhealth.org/specialty-clinics/psychiatric-disorders-during-pregnancy/>)

## **Assessing and Treating Neonatal Abstinence Syndrome**

Symptoms of NAS usually start within 1-2 days after birth, but onset can be delayed for 4-5 days in the case of exposure to long acting opioids such as buprenorphine. Since the 1970s, assessment of the need for pharmacologic treatment for NAS has relied on the Finnegan Scoring System, named for one of its developers, Dr. Loretta Finnegan (Finnegan, 1975; Kocherlakota, 2014). This 21 item scoring system focuses on the three physiologic systems most impacted by withdrawal in newborns, the central and autonomic nervous systems, and the gastrointestinal system. The Finnegan Scoring System is used to guide decisions by pediatric providers regarding need for pharmacologic treatment of NAS. This scoring system remains the most commonly used internationally.

More recently, researchers at Yale-New Haven Children's Hospital, Boston Medical Center, and Children's Hospital at Dartmouth-Hitchcock have developed an alternative scoring system and care approach (the Eating, Sleeping, and Consoling [ESC] Care Tool) which focuses specifically on three essential functions for newborns: the ability to eat, sleep, and console (Grossman, et al, 2017) and ensuring maximization of non-pharmacologic care first (e.g., rooming-(Holmes et al Pediatrics,

MacMillian et al (in press: JAMA Peds) and parental presence (Howard et al, 2017) prior to considering pharmacologic treatment.

The ESC Care Tool was designed to help care for opioid-exposed babies in a more baby-friendly and more specific manner. Eating, sleeping and consoling are the things that are most important to a baby functioning as a baby, and the scoring method focuses on these as main determinants of the baby's need for pharmacotherapy. Definitions are provided for when to consider that a baby's difficulties with eating, sleeping, or consoling are due to opioid withdrawal versus related to other factors instead.

Although a baby will likely still show other signs of withdrawal such as jitteriness, increased tone, sneezing, yawning, and loose stools, the baby is not started on a medicine unless she is having significant problems eating, sleeping, or consoling, and only after all possible non-pharmacologic care measures are optimized first.

The ESC Care Tool also encourages staff to provide parents with education about ways they can help their baby do best with opioid withdrawal by encouraging rooming-in, parental presence, skin-to-skin contact, holding by a caregiver or cuddler, swaddling, breastfeeding and feeding the baby when she is hungry and until she is content, providing a quiet room, and limiting visitors if the baby is having difficulties with withdrawal.

The 3 centers mentioned have all noticed significant improvements in care related to NAS including decreased need for pharmacologic treatment, decreased length of stay, and lower hospital costs when using this ESC care method. Most importantly, this care approach helps mothers and their families learn best ways to care for their own baby, helping them for their transition home.

## ***Additional Resources for providers***

- Finnegan, L, Connaughton, J, Kron, R, Emich, J. Neonatal abstinence syndrome: assessment and management. *Addct. Disorders* 1975; 2; 1-2: 141-58.
- Grossman, M, Berkwitt, A, Osborn, R, Xu, Y, Esserman, D, Shapiro, E, Bizzarro, M. An initiative to improve the quality of care of infants with Neonatal Abstinence Syndrome. *J Pediatrics* 2017 139; 6: e1-8.
- Holmes AV, Atwood EC, Whalen B, et al. Rooming-In to Treat Neonatal Abstinence Syndrome: Improved Family-Centered Care at Lower Cost. *Pediatrics*, 2016; 137(6).
- Howard MB, Schiff MD, Penwill N, et al. Impact of Parental Presence at Infants' Bedside on Neonatal Abstinence Syndrome. *Hosp Pediatr*, 2017; 7(2): 63-69.
- MacMillan KDL, Rendon CP, Verma K, et al. Rooming-in for Neonatal Abstinence Syndrome: A Systematic Review and Meta-analysis. *JAMA Peds* (in press).
- Kocherlakota, P. Neonatal Abstinence Syndrome. *Pediatrics* 2014; 134; 2. Accessed from <http://pediatrics.aappublications.org/content/134/2/e547>
- Patrick, S, Schumacher, R, Horbar, J et al. Improving care for Neonatal Abstinence Syndrome. *Pediatrics* 2016; 137; 5. Accessed from <http://pediatrics.aappublications.org/content/early/2016/04/13/peds.2015-3835>

## ***Resources for patients***

- Pregnancy, methadone, buprenorphine, and NAS from PCSSMAT: [http://pcssmat.org/wp-content/uploads/2013/10/WAGBrochure-Opioid-Pregnancy\\_Final.pdf](http://pcssmat.org/wp-content/uploads/2013/10/WAGBrochure-Opioid-Pregnancy_Final.pdf)
- Neonatal Abstinence link for parents from March of Dimes: [http://www.marchofdimes.org/complications/neonatal-abstinence-syndrome-\(nas\).aspx](http://www.marchofdimes.org/complications/neonatal-abstinence-syndrome-(nas).aspx)