

The misuse and abuse of prescription drugs has become a leading cause of harm among adults in New Hampshire, as highlighted recently in a collective action brief by the NH Bureau of Alcohol and Drug Services.¹ Newborns born to mothers physiologically dependent on opiates are at risk for an opiate withdrawal syndrome called Neonatal Abstinence Syndrome (NAS). Almost three-quarters of all newborns exposed chronically to opiates *in utero* will experience symptoms of NAS involving the gastrointestinal, central, and autonomic nervous systems. Studies reveal that approximately half of all newborns will require pharmacologic treatment for their NAS symptoms; treatment is associated with a prolonged length of stay.

The incidence of NAS has reached epidemic proportions in the United States. A recent national analysis revealed a near tripling of NAS over the last decade to 3.39 cases per 1,000 hospital births.² Data released recently by the NH Division of Public Health Services' Maternal and Child Health Section revealed an even more drastic increase locally with 120 infant discharges per 1,000 infant births having a diagnosis of NAS in 2009.¹ In 2012, our hospital cared for 84 newborns who were chronically exposed to opiates *in utero*. Sixty of these infants were born at Dartmouth-Hitchcock (D-H) representing 5.3% of all hospital births; the remaining were transferred to D-H from outside hospitals primarily for pharmacologic treatment of NAS. For infants born at D-H, almost one-third required pharmacologic treatment for their NAS with an average length of stay of 11 days. The remaining infants were able to be managed non-pharmacologically with optimal comfort care practices alone such as frequent skin-to-skin contact with their mothers, remaining in a calm, quiet non-stimulating environment, and through breastfeeding and swaddling. Average length of stay for these infants is 4 days.

Over the past year, the D-H Birthing Pavilion (BP), Intensive Care Nursery (ICN), and Inpatient Pediatrics Unit (Pediatrics) have participated in a national quality improvement initiative through the Vermont Oxford Network (VON) with the primary aim of improving care of newborns with NAS. After almost one year of work on this initiative through VON webinars, assessing current practice, working to improve inter-rater reliability in NAS scoring within and across units, and interviewing families of babies at risk regarding the care we provide, we have determined that the next essential step in improving care of this high-risk population is to work toward keeping mothers and infants together throughout their entire hospitalization unless the infant is critically ill. Thus our goal, which has emerged from our participation with VON and review of the evidence on NAS management, is to transition the pharmacologic initiation of treatment of infants with NAS from the ICN to Pediatrics.

Currently, when infants are thought to require pharmacologic treatment for NAS, they are transferred from the BP to the ICN for monitoring and a period of further observation before eventual initiation of morphine treatment. When their NAS symptoms have been "captured," they enter a maintenance phase. When they are able to start weaning from morphine, they are transferred to Pediatrics. The difficulty of transferring from unit to unit and inability to provide for a calm, quiet, private, non-stimulating environment in the ICN has emerged as a theme from our family interviews. One mother stated, "The BP (Birthing Pavilion) was okay. That was more one-on-one. I could take my shirt off and skin-to-skin and try to keep him calm. In the ICN, you had parents in there ... not as private. The privacy makes it easier to tend to your child." Another stated, "I think if we were able to stay in one area he might have been able to come home sooner."

Several research studies³⁻⁵ and experiences of centers of excellence presented by VON have demonstrated better outcomes for newborns with NAS when they are cared for with and by their mothers in single patient rooms ("rooming-in") rather than in the open, often over-stimulating environment of a neonatal intensive care unit. Infants who room-in with their mothers require lower maximal treatment doses of morphine, shorter durations of morphine treatment, and decreased lengths of stay for NAS. Rooming-in also facilitates privacy for mothers to provide frequent skin-to-skin contact with their infant and for breastfeeding, two practices known to help infants with the neurologic symptoms of NAS^{6,7} and are likely to shorten the length of hospital stay. Skin-to-skin and breastfeeding are also linked with significant improvements in the health and neurodevelopmental outcomes of infants, which is especially important for this population of infants who are at significant medical and psychosocial risk.^{7,8}

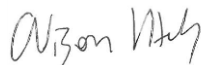
For these reasons, we propose that all medically stable 35 week and above infants with NAS be transferred to Pediatrics for the initiation of morphine treatment and to continue optimal non-pharmacologic practices of rooming-in and frequent skin-to-skin contact with their mothers in a calm, non-stimulating, private environment. We hypothesize that these changes in practice will lead to improved clinical outcomes of newborns with NAS including decreased total maximal dose of morphine needed to capture NAS symptoms, decreased total duration of treatment and length of stay, enhanced mother-infant bonding^{3,4,9} and breastfeeding, and improved family satisfaction with the care we provide.

We would like to set up a leadership meeting of the three units in the next several weeks to discuss how we can move forward in transitioning the pharmacologic initiation of treatment of infants with NAS from the ICN to Pediatrics with rooming-in management of NAS becoming the standard of care at D-H.

Thank you,



Bonny Whalen, MD
Medical Director, Newborn Nursery



Alison Holmes, MD, MPH
Chair, D-H NAS Quality
Improvement Committee



Shawn Ralston, MD
Section Chief, Pediatric Hospital
Medicine



William Edwards, MD
Section Chief, Neonatology

References

- 1) Collective Action Issue Brief #5: Prescription Pain Medication Misuse. Available at: <http://www.dhhs.nh.gov/dcbcs/bdas/documents/issue-brief-rxdrug.pdf>. Accessed October 30, 2013.
- 2) Patrick SW, Schumacher RE, Benneyworth BD, *et al.* Neonatal Abstinence Syndrome and Associated Health Care Expenditures United States, 2000-2009. *JAMA*. 2012;307:1934-1940.
- 3) Abrahams RR, Kelly SA, Payne S, *et al.* Rooming-in compared with standard care for newborns of mothers using methadone or heroin. *Can Fam Physician*. 2007;53:1723-1730.
- 4) Abrahams RR, MacKay-Dunn MH, Nevmerjitskaia V, *et al.* An evaluation of rooming-in among substance-exposed newborns in British Columbia. *JOGC*. 2010;32:866-871.
- 5) Saiki T, Lee S, Hannam S, Greenough A. Neonatal abstinence syndrome-postnatal ward versus neonatal unit management. *Eur J Pediatr*. 2010;169:95-98.
- 6) McQueen KA, Murphy-Oikonen J, Gerlach K, Montelpare W. The impact of infant feeding method on neonatal abstinence scores of methadone-exposed infants. *Advances in Neonatal Care*. 2011;11:282-290.
- 7) Moore ER, Anderson GC, Bergman N. Early skin-to-skin contact for mothers and their healthy newborn infants. *Cochrane Database Syst Rev*. 2007;18:CD003519.
- 8) Ip S, Chung M, Raman G, *et al.* Breastfeeding and maternal and infant health outcomes in developed countries. *Evid Rep Technol Assess (Full Rep)*. 2007;153:1-186.
- 9) Prodromidis M, Field T, Arendt R, S *et al.* Mothers touching newborns: a comparison of rooming-in versus minimal contact. *Birth*. 1995;22:196-200.