SUPPORTING MOTHERS IN CARING FOR THEIR INFANTS WITH NEONATAL ABSTINENCE SYNDROME: BETTER OUTCOMES AND LOWER COSTS FRAN E. HODGINS, MPP, MBA, JESSICA M. LANG, PhD, GRIFFIN JONES, MPP, MARY HOUGHTON, MPH, AND MUNISH GUPTA, MD

INTRODUCTION

Coinciding with the opioid crisis, there has been a sharp increase in the incidence of neonatal abstinence syndrome (NAS) among infants born in the United States since 2010, a trend seen even more acutely in Massachusetts.¹ NAS is a condition that can affect a subset of infants with prenatal exposure to opioids as a result of the mother's use of opioids and/or prescribed medication for addiction treatment (MAT). The diagnosis is characterized by a constellation of symptoms that typically develop in the first few days after birth and can include fever, difficulty feeding, and sleep disturbances. In some cases, infants experience more severe symptoms such as excessive weight loss and seizures.

Historically, infants with NAS have required pharmacotherapy treatment in the neonatal intensive care unit (NICU). While sometimes unavoidable, these practices can increase length of stay, increase costs, and contribute to overtreatment. Furthermore, locating infants in the NICU can interfere with mother-infant bonding and may contribute to the stigma that mothers with OUD face in health care settings. The Massachusetts Health Policy Commission (HPC) launched the Mother and Infant-Focused NAS Interventions to pilot and accelerate the adoption of evidence-based interventions and emerging best practices to treat mothers and infants affected by opioid use disorder (OUD).

THE HPC'S NAS INTERVENTIONS & STUDY DESIGN

In 2017, the HPC launched NAS Interventions across six hospitals.² Hospitals implemented various emerging best practices to improve care and reduce length of stay for infants with opioid exposure. Key components included:

- Increasing non-pharmacologic interventions. Hospitals focused on promoting non-pharmacologic interventions such as rooming-in, skinto-skin contact, breastfeeding, and sustained maternal presence at the infant's bedside, particularly after maternal discharge. See **Figure 1** for more information.
- **Optimizing NAS pharmacologic treatment.** Hospitals standardized assessment and scoring of NAS symptoms and optimized protocols for pharmacologic treatment. Some programs standardized their use of the Finnegan scoring system, while others implemented the Eat, Sleep, Console model.
- Increasing access to services for mother and infant after discharge. Hospitals implemented NAS discharge care plans and eased transitions to family support, peer counseling, early intervention services, and primary care.

A core element of the NAS Interventions was the engagement of mothers in providing treatment for their infants, particularly through the promotion of non-pharmacological treatments. Recognizing that supporting mothers is key to both their recovery and ability to care for their infants, hospitals increased perinatal supports for mothers and conducted staff training to reduce stigma.

For the 24 months following the Intervention launch (~April 2017–March 2019), the six participating hospitals collected quarterly data, including infant length-of-stay, site of care, need for pharmacologic treatment, and adoption of non-pharmacologic interventions. Where possible, data from the 24 month performance period was compared to 15 months of baseline data (January 2016–March 2017). The HPC collaborated with the Neonatal Quality Improvement Collaborative of Massachusetts (NeoQIC) to support data collection and analysis and to provide technical assistance to hospitals. In addition, the HPC collected written reflections and conducted semi-structured interviews with 3-5 staff at each hospital, including social workers, peer recovery coaches, nurses, obstetricians, and neonatologists.

FIGURE 1: Non-Pharmacologic Interventions

Promoting Breastfeeding

Breast milk has the potential to reduce symptom severity of NAS, leading to shorter stays and reduced need for pharmacologic treatment.

Encouraging Rooming-In Between Mother and Infant When infants stay in the hospital room with their mothers, breastfeeding, skin-to-skin contact, and mother-infant bonding are facilitated.

Involving Volunteer Cuddlers

Volunteer cuddler programs enable continued nurturing of infants when their parents have schedule conflicts that require them to be away from the hospital.



Engaging Families in Infant Care

Changes in hospital policies and practices, including providing trainings for staff and designating spaces for mothers to room-in with their infants post-discharge, encourage parent-infant bonding and empower families to participate in providing treatment for their infants.

Connecting Mothers to Peer Support

Peer mentors with lived experience support mothers during pregnancy and postpartum by helping mothers navigate care for themselves and their infants and by promoting best practices, such as breastfeeding.

Over the 24 month performance period, approximately 900 mother-infant dyads were treated as part of the NAS Intervention. Across the six hospitals, these interventions were associated with shorter infant length-of-stay, less frequent placement in the NICU, and reduced need for pharmacologic treatment. Compared to baseline data, hospitals observed a 53% reduction in median hospital length of stay for infants, decreasing from 17 days to 8 days over the 24 months following program launch. Much of this reduction is attributed to the reduced need for pharmacologic therapy, which decreased from 66% of infants to 42% of infants. Because pharmacologic therapy is often administered in the NICU or special care nursery, hospitals also observed a 23% decrease in the percentage of infants requiring care in the NICU or special care nursery.

Hospitals found that non-pharmacologic interventions, particularly those interventions that involved the mother in infant care, are an effective treatment for NAS symptoms used in parallel to pharmacologic treatment or, when appropriate, as an alternative to pharmacologic treatment. Furthermore, these practices promote maternal-infant bonding and center the mother and family in treatment, contributing to positive long-term family outcomes. During the performance period, the median infant length-of-stay was 36% shorter for infants who received breastmilk (7 days compared to 11 days) (**Figure 2**), and infants who received breastmilk were less likely to require pharmacologic treatment (36% compared to 51%) (Figure 3).

Similarly, infants who roomed-in with their mother for at least one night had a 59% shorter median length of stay (7 days compared to 17 days) (**Figure 4**), and infants who roomed-in were less likely to require pharmacologic treatment (38% compared to 64%) (**Figure 5**).

In interviews and written materials, hospital staff emphasized the importance of empowering mothers and families to be the "first line of treatment" in the care of their infants. To promote maternal engagement, staff worked with mothers and families, especially prenatally, to educate them about what to expect in the hospital and how they could care for their infants. Early program engagement was also important for supporting the mother's recovery, which increased the likelihood that she was eligible to provide non-pharmacologic care for her infant. For many hospitals, these practices required changes in both processes and culture. Hospitals implemented trainings, such as Trauma Informed Care and addiction medicine trainings, to educate staff about caring for infants and families impacted by OUD. Many staff cited reduction in stigma and changes in staff attitudes as the most important shift in how care was delivered for mothers and infants impacted by OUD.

FINDINGS



No Breastmilk 20% $20^{17}0^2$ $20^{17}0^3$ $20^{17}0^4$ $20^{18}0^1$ $20^{18}0^2$ $20^{18}0^3$ $20^{18}0^4$ $20^{19}0^1$





FIGURE 5: Percent of Term OENs Requiring Pharm Therapy for **Treatment of NAS by Reciept of Rooming-In**





IMPLICATIONS

- Family-centered treatment approaches, in which mothers and families are included in first line treatment for symptoms of NAS, may be preferable and more cost-effective.
- Policies and processes that enable mothers and families to be present at the bedside and/or room-in with infants are important for the promotion of non-pharmacologic treatments.
- Training hospital staff on Trauma Informed Care, addiction medicine, and other related topics can help reduce stigma towards mothers and families affected by OUD, which is a precursor to meaningful improvements in their care.
- Shorter stays and less reliance on the NICU or special care nursery have significant implications for cost savings.
- Recognizing that supporting mothers is key to their recovery and ability to care for their infants, it is important that appropriate treatment for OUD is accessible for pregnant and postpartum women.
- State investment in capacity-building interventions can accelerate the adoption of best practices to support families impacted by OUD; low-cost interventions, such as trainings and updating protocols, have potential for meaningful impact on patient experience and cost.

LIMITATIONS

An important limitation of this study is that women who are eligible to breastfeed and room-in with their infants may have different characteristics than women who are ineligible to breastfeed or room-in due to continued illicit drug use and/or custody concerns. These differences make it challenging to compare outcomes between infants who received and did not receive non-pharmacologic treatments. In addition, this study did not interview families whose infants were impacted by opioid exposure.

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Massachusetts Health Policy Commission. Opioid-Related Acute Hospitalization Utilization. June 2019.

As part of the Health Care Innovation Investment (HCII) program, the HPC awarded nearly \$3 million to six hospitals. Awards ranged from \$250,000 to \$1 million for a performance period of 12 or 24 months. The participating hospitals were Baystate Medical Center, Boston Medical Center, Lahey Health–Beverly Hospital, Lawrence General Hospital, Lowell General Hospital, and UMass Memorial Medical Center. The Neonatal Quality Improvement Collaborative of Massachusetts (Neo-QIC) provided technical assistance to the participating hospitals.