Management of Newborns with Prenatal Opioid Exposure: One Institution's Journey

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ABSTRACT

The prevalence of newborns with neonatal abstinence syndrome (NAS) is rising sharply. To respond to this crisis, our institution re-examined our policies and procedures regarding our approach to the management of newborns with prenatal opioid exposure. Our 6-pronged approach included: (1) a commitment to nonpharmacologic care as first-line treatment; (2) a simplified function-based approach to observation of the infant (Eat-Sleep-Console); (3) improved prenatal education to prepare parents for the newborn's postnatal course; (4) a cuddler program; (5) strategies to help parents remain at the bedside; and (6) change from morphine to methadone for infants who require medication for NAS. Our obstetrics collaborators and outpatient pediatric colleagues have partnered with us to prepare mothers for delivery by strengthening them in their recovery prenatally and helping them maintain their recovery after discharge. Among many improvements, our changes resulted in a decrease in medication treatment for NAS (from 87% to 40%), a decrease in the need for adjuvant medication (from 34% to 2%), and a decrease in length of hospital stay (from 18 days to 10 days). The 3 most significant factors that have contributed to our success have been: (1) a committed champion leader; (2) a strong collaborative multidisciplinary team; and (3) a quality improvement approach that facilitates implementation of ideas easily and provides timely feedback to guide further change. Although we have seen notable improvements with our new approach, emerging data from our outpatient colleagues indicate that much more is needed to help improve the long-term health of these dyads. (*Clin Ther*. 2019;41:1663–1668) © 2019 Published by Elsevier Inc.

INTRODUCTION

Neonatal abstinence syndrome (NAS) has reached epidemic proportions in the United States in the last 20 years.[1] Boston Medical Center (BMC), the largest safety net hospital in New England, cares for ~120 to 150 infants with NAS each year. Determining the best approach to care for substance-exposed newborns has always been a challenging aspect of our work as new therapies emerge and illicit drug use patterns change.[2]

Before recent critical changes in our approach, almost 90% of opioid-exposed infants at BMC were treated pharmacologically for NAS.[3] Our average hospital length of stay was >18 days (25 days for treated infants), at times closing our pediatric unit to other admissions with impacts on our neonatal intensive care unit, nursery, and pediatric emergency department.

A COMMON SCENARIO

A newborn with prenatal opioid exposure is placed with his mother in her postpartum room. His mother had poor prenatal care but now says she is committed to recovery and would like to breastfeed her infant. Having lost 2 previous children to foster care, the mother expresses her deep desire to "get it right this time." The infant is observed for NAS by using the Finnegan scoring system, a tool that looks at neurologic, gastrointestinal, and respiratory symptoms to determine which infants may need medication for withdrawal.[4] The mother's pregnancy is complicated by nicotine use (1 pack per day), and she is maintained on 120 mg of methadone daily. She takes methylphenidate for attention-deficit hyperactivity disorder, a selective serotonin reuptake inhibitor for depression, and clonidine to help her

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sleep. In the first 24 h after birth, the infant is noted to have sneezing, tremor, and increased tone. He cries vigorously throughout the night and spits up after feedings. By morning, the infant's nurse expresses her concern to the nursery team. The doctor informs the mother that the infant will require medication for withdrawal and needs to be moved to the nursery for further monitoring. The mother disagrees with the nurse's assessment and tearfully expresses her fear that treatment for NAS will result in the infant's removal from her custody. The nurse reassures the mother and places the infant in a quiet, darkened corner of the nursery for cardiorespiratory monitoring and to facilitate sleep. The nursery nurse carefully guards the infant, encouraging everyone to limit stimulation to help the infant sleep. Eventually, the infant becomes more dysregulated with high tone and a high-pitched cry. The team refers to the nursery algorithm, which recommends increased levels of morphine. The mother is discharged after 2 days and must return to her residential program or forfeit her placement. The infant remains in the hospital on formula for 2 more weeks to wean off morphine before discharge. Finally reunited after the infant's discharge, the mother brings her infant to a follow-up pediatric visit. Reviewing his complicated perinatal course with the doctor, the mother sighs, "I feel like it's all my fault."

Unfortunately, this scenario was all too common for us. We had a mother who came to us hoping for a new start and was instead left alone feeling guilt and shame. Although our hospital's mission is to provide "exceptional care without exception," this type of encounter indicated to us that we were falling far short of our goal when it came to mothers with substance use disorder (SUD) and their infants. In 2016, we embarked upon a new and intensive multidisciplinary effort to change our practice.

A COMMITMENT TO CHANGE

This effort began with a step-wise process of change. We reinforced our already existing multidisciplinary quality improvement (QI) collaborative to include at least one representative from every obstetric and pediatric area in our hospital led by one of our neonatologists who was committed to making a difference for these families.

Our objectives initially were to reduce the need for pharmacotherapy and length of hospital stay and to increase breastfeeding for all eligible mothers. Our obstetrics colleagues had already begun providing specialized care for pregnant women with SUD, which enabled the success of each of our postpartum initiatives by physically and mentally preparing mothers to participate in their newborn's care.

Our QI collaborative identified 6 key strategies that could be implemented in the perinatal period to meet our objectives: (1) an emphasis on nonpharmacologic care; (2) symptom prioritization (eating, sleeping, and consoling) to better identify which newborns require medication for withdrawal; (3) improved prenatal education; (4) a cuddler program to provide continuous consoling when mothers are exhausted or unavailable; (5) increased parental presence at the bedside; and (6) methadone in place of morphine for infants requiring medication treatment. In 1 year, this bundle of interventions reduced our pharmacotherapy rate from 87% to 40%, the need for adjuvant medications (clonidine and phenobarbital) from 34% to 2%, decreased our hospital length of stay from 18.4 days to 10.4 days, and increased breastfeeding initiation rates from 36% to 70%.[3]

NONPHARMACOLOGIC CARE

In May 2016, we began a campaign to maximize nonpharmacologic care: rooming in, skin-to-skin contact with the parent, breastfeeding for eligible infants, and a low-stimulation environment. Using a detailed brochure and prenatal counseling by a dedicated obstetrical team, we educated parents in the prenatal setting so they would be able to read the infant's cues, understand soothing techniques, and be prepared to keep their infant in the postpartum room. We re-presented the same information to mothers in the postpartum unit and talked with parents about what to expect during their postpartum stay. In addition to talking with mothers about the importance of rooming in and breastfeeding, we spoke with fathers about the importance of skin-to-skin contact and holding, swaddling, and soothing the infant.

The promotion of rooming-in (keeping the infant with infants with NAS) was a straightforward step for us because BMC received Baby-Friendly designation in 1999 and follows the Baby Friendly Hospital Initative Ten Steps to successful breastfeeding.[5] Our hospital staff was accustomed

to keeping all infants with mothers from birth through the postpartum stay unless medical treatment required separation. In addition, infants with NAS have traditionally been cared for on our Pediatric Inpatient Unit after maternal discharge, where rooming-in could continue.

SYMPTOM PRIORITIZATION AND EAT-SLEEP-CONSOLE

We changed our approach to determining which infants require medication for NAS. The Finnegan scoring tool includes a number of signs such as sneezing, yawning, tremor, and tone that have never been shown to be clinically significant in the treatment of NAS.[4] However, counting these signs raises the infant's NAS score and triggers high doses of medication. In addition, infants who had been exposed to multiple drugs, including psychiatric medications and nicotine, were especially likely to score above the Finnegan scale cut-off for treatment, even in the first 24 h of birth. This process led to important lessons learned. Although staff had been trained in the use of the Finnegan scale and exhibited a high level of interrater reliability, scoring is often subjective and dependent on the infant's symptoms at the time of scoring, as well as affected by co-exposure to substances other than opioids. Thus, the appropriate time to begin pharmacotherapy for NAS was often unclear. Treatment prolonged the infant's hospitalization and further marginalized the mother who was already discharged. Mothers often interpreted the need for medication for NAS as a failure on their part, and "scoring" the infant was perceived as "scoring" the mother. Giving their infants the same drug that they were striving to be freed from worsened the mother's feeling of guilt.

In response, we modified our protocol so that infants were only given medication for NAS if they were unable to eat, sleep, or be consoled within 10 min, consistent with the Yale Eat, Sleep, Console approach.[6,7] This approach reinforced the first-line treatment of nonpharmacologic care: supporting the infant to be able to eat, sleep, and be consoled using the mother as the primary treatment for the infant, leading to fewer infants requiring pharmacologic treatment and shorter lengths of stay. Over time, we transitioned from using both tools to ultimately discontinuing use of the Finnegan scale because it did not add additional value. Doctors and nurses were trained to use the Eat-Sleep-Console (ESC) NAS Care tool, replacing older "scoring" methods that had been perceived as judgmental by mothers.

In addition to maximizing nonpharmacologic support, the ESC emphasizes the importance of a team huddle, including the mother, for infants who are not eating, sleeping, or consoling, reinforcing the importance of the mother's input to assess the needs of her infant. This approach involves a discussion between the physician, the nurse, and the mother who come together to assess the infant. It gives a more accurate picture of the infant and ensures that the mother is a key part of the decision-making process. As our management of NAS was changing, we found ourselves partnering with the mother in the care of her infant rather than isolating her from the rest of the team.

PARENT EDUCATION AND PARTNERSHIP

Initially, some mothers were confused by our new approach to limit pharmacotherapy, as their community connections had told them that their infant would likely be placed on medication. We revised our NAS brochure to address these important concerns and to provide mothers with comprehensive information about the infant's postpartum course, expected length of stay (minimum 5–7 days), indications for medication, and plan for follow-up after discharge. Helping mothers know what to expect created an atmosphere of collaboration and trust between families and staff.

CUDDLERS

Frequent holding is critical to enable drug-exposed newborns to remain consoled. As we strove to maximize our efforts to provide nonpharmacologic care, we discovered that new mothers were exhausted and often alone in the postpartum period. Some mothers were not able to hold their infants because of medical needs of their own. In an effort to provide caregivers who would be available to hold infants when mothers and families could not, BMC created a cuddler program comprising employees, medical students, and community members. We currently have 150 active volunteers and a waiting list of ~200 people who have been enrolled in the program and committed to hold infants whose mothers are not available or who need a much-needed break for self-care.[3]

PARENTAL PRESENCE AT THE BEDSIDE

We discovered barriers that new parents experience as they try to remain at the infant's bedside. After postpartum discharge, mothers in residential treatment programs or shelters must return to their programs to comply with regulations and avoid forfeiting their placements. Representatives from our QI collaborative met with community residential treatment agencies and shelter organizations to educate them about the importance of continued parental engagement and rooming-in, leading to the relaxing of program rules in favor of mothers whose newborns remained hospitalized. We began documenting in the medical record the parental presence at the infant's bedside as a key process measure.[8] Providing parents with information prenatally about our care approach and the importance of rooming-in helped to increase parental presence at the bedside from 50% to 80% of the infant's hospital stay.[3]

MORPHINE VERSUS METHADONE: WHICH MEDICINE IS BEST?

From 2014 to 2016, BMC participated in a multicenter randomized trial to determine whether morphine or methadone is superior in the treatment of infants with NAS.[9] In July 2016, after the completion of that study, BMC transitioned from morphine to methadone, which was dosed every 8 h per Davis et al.[9] After that change, we examined the necessity of cardiorespiratory monitoring while on methadone treatment, tracking any adverse outcomes and finding nothing of clinical significance. We currently monitor infant postdosing for only 4 h in the nursery and are transitioning to eliminating the cardiorespiratory monitoring step altogether. In October 2017, we began to use methadone on an as-needed (prn) basis as has been done successfully by Grossman et al.[6] We chose to use prn methadone instead of prn morphine (as done in the study by Grossman et al), given our institutional protocol at the time was standing methadone (as not to introduce additional variables while making our change). Methadone is longer acting and may be associated with a longer duration of improved symptoms. This prn approach has further decreased the methadone treatment days for infants who require medication from an average of 11.7 days−2.5 days and has lowered the length of stay from 17.0 days to 10.5 days for these infants.[10]

PRENATAL CARE: PROJECT RESPECT

Before 2016, most mothers with SUD in the postpartum period were being prescribed multiple medications for SUD, anxiety, depression, and other psychiatric comorbidities.[11] The combination of methadone and polypharmacy for comorbidities made new mothers more sleepy and unsteady. At the same time the NAS collaborative was making changes in the newborn's treatment, our obstetrics colleagues were working to improve the care of pregnant women with SUD. Since 2006, eligible women were being offered buprenorphine as a treatment option during pregnancy. In 2006, the Obstetrics Department at BMC created a specialized prenatal program for women with SUD called Project RESPECT (Recovery, Empowerment, Social Services, Prenatal care, Education, Community and Treatment).[12] The Project RESPECT clinicians worked with mothers to decrease psychiatric medication overuse and misuse. Benzodiazepines and other psychiatric medications were tapered to the lowest safe and effective dose. Those nonmedically indicated were tapered off before delivery.

In Project RESPECT, women are given medical care and recovery supports to help them more actively participate in their own prenatal care and establish a stable regimen of methadone or buprenorphine. Project RESPECT provides intensive prenatal support, weekly visits, addiction recovery support, social services, and psychiatric services. The program has successfully helped women establish sobriety while on medication treatment for their SUD, and safely reduce or eliminate other prescribed and nonprescribed drugs during the prenatal period. Having achieved these successes and more stability in their lives, more women planned to breastfeed. This critical work that was being done in the prenatal setting readied mothers for success. Mothers in the postpartum setting were alert, engaged, and expected to be included in the care of their infant. Even in the early stages of our QI interventions, the newborn team noticed that many women were coming to the postpartum setting with a birth plan, including a plan to breastfeed. With the support of the prenatal team, mothers successfully maintained their stability in the postnatal period, which made it possible for them to assume full care of their infant in the mother's postpartum room. This successful prenatal effort resulted in an increased breastfeeding initiation rate

from 50% of eligible mothers in 2015 to 80% of eligible mothers in June 2018.

POSTDISCHARGE CARE

In 2008, we began following up infants with NAS after postpartum discharge in a high-risk infant developmental program called Baby Steps. The Baby Steps team includes nutritionists, occupational therapists, a family advocate, and a developmental pediatrician. Infants are assessed over 1 to 2 outpatient visits beginning at 1−2 months to ensure adequate growth and development and to ensure that these infants are enrolled in primary care and appropriate programs such as Early Intervention. The intensive needs of these families, however, call for a specialized primary care for mothers and infants, much like the intensive prenatal care received through Project RESPECT. In response, BMC began a dedicated primary care clinic in July 2017 for mothers with SUD and their infants, Supporting Our Families Through Addiction and Recovery (SOFAR).[13] SOFAR just completed its first 2 years of mother−infant primary care and currently has 141 mother−child pairs in their care. The team is composed of 2 primary care pediatricians, a developmental and behavioral pediatrician, a social worker, a navigator, and a program coordinator. Infants have weekly visits for the first 4 weeks and monthly visits for the first 12 months. The specialized clinic also addressed the ongoing health problems we had observed: infant dysregulation for as long as 3 months and problems with poor growth, feeding difficulties, and gastrointestinal reflux. Some infants have rapid weight gain after discharge, possibly due to use of food as a soothing measure. One-half of the infants had at least 1 emergency department visit during the first year, and a number required hospitalization for respiratory and gastrointestinal illness and fever. Even with the high level of wraparound health care, in the first year the SOFAR team became aware of 17 maternal relapses of the 69 charts reviewed and 1 maternal overdose death.[13] In addition, 8 paternal overdose deaths occurred in the program's first 18 months. These findings highlight how high-risk the postpartum period is, as well as the need for additional support services to help families after discharge.

DISCUSSION

Implementation of 6 perinatal strategies significantly helped provide the exceptional care for these dyads that is consistent with the hospital mission. The 3 critical elements that led to success were: (1) one passionate and dedicated champion leader (co-author E.M.W.); (2) a strong collaborative group representing every area that affects mothers and infants; and (3) a quality improvement Plan-Do-Study-Act approach to rapid implementation and feedback for the QI team. Moreover, our success would not have been possible without the specialized prenatal care of the Project RESPECT team that helped mothers to be ready to participate in their infant's care. Research has identified no difference in NAS symptoms with lower doses of methadone during pregnancy.[14] However, reducing the mothers' nonprescribed drugs and prescribed medications where possible enabled them to be active participants in the care of their infants.

Although our interventions resulted in improvement in short-term hospitalization outcomes, it is still uncertain if shorter hospitalization is associated with improved long-term outcomes.[2,15] More investigation is needed in this area. In addition, while the ESC approach has shown promise, it requires further validation and correlation with long-term outcomes before it can be recommended as the preferred tool for NAS assessments.

Our early SOFAR data tell us we have more work to do after the postpartum period. We need to cultivate stronger partnerships with parents in recovery to help them maintain their sobriety and prevent death. We need to do more research to understand the long-term health needs of their children.

One silver lining around the dark cloud of the opioid epidemic is the partnerships and innovative strategies that are emerging. As our multidisciplinary programs grow, mothers who come looking for a new start will find one.

CONCLUSION

While NAS has reached epidemic proportions in the Unites States, there are promising new strategies to improve outcomes for newborns exposed to opiates prenatally. High quality specialized care for pregnant women with SUD contributes to improved outcomes for their newborns. New mothers are at high risk for relapse and, therefore, high quality specialized primary care is essential to ensure that the mother-baby couplet will continue to thrive in the months after birth. More work is needed to understand the long term implications of these interventions on the newborn's development. One silver lining around the

dark cloud of the opioid epidemic is the partnerships that have emerged. As our multidisciplinary partnerships grow, our hope is that every mother who comes looking for a new start will find one.

CONFLICTS OF INTEREST

The authors have indicated that they have no conflicts of interest regarding the content of this article.

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