Addressing the Rise in Neonatal Abstinence Syndrome: A Multifaceted Approach

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ABSTRACT

With the rising incidence of neonatal abstinence syndrome (NAS) over the last decade, healthcare professionals are recognizing that close collaboration and standardized protocols aid in effectively diagnosing and treating newborns with drug withdrawal symptoms. Maternal use of prescription or illicit drugs during pregnancy can result in the newborn experiencing NAS, with symptoms of excessive or high-pitched crying, irritability, poor feeding, sleep problems, slow weight gain, and seizures. Pennsylvania Patient Safety Authority analysts identified 797 events involving newborns diagnosed with NAS that occurred from January 2005 through December 2014, with an increasing number of events reported each year. Healthcare professionals use a standardized scoring process, combinations of pharmacologic and nonpharmacologic interventions, and close care team collaboration to aid in the diagnosis and treatment of newborns with NAS. With the help of healthcare professionals, mothers and families can provide the supportive love and care needed to help their newborn through the withdrawal process. (Pa Patient Saf Advis 2015 Dec;12[4]:125-31.)

INTRODUCTION

The number of neonatal abstinence syndrome (NAS) cases involving newborns who experience withdrawal symptoms after birth from prenatal exposure to drugs such as opioids is dramatically increasing, causing hospitals to rethink their approaches to diagnosis and treatment.[1-3]

Opioid prescribing increased in the United States from around 76 million in 1991 to nearly 207 million in 2013, crossing all populations, including pregnant women.[4-6] Addiction may occur after opioids are prescribed for chronic pain caused by an accident, fibromyalgia, or other causes.[2]

Maternal use of prescription or illicit drugs during pregnancy can result in the newborn experiencing NAS.[4,7] Tolia et al. reported that the frequency of neonatal intensive care unit (NICU) admissions for newborns with NAS increased from 7 to 27 cases per 1,000 admissions in the United States from 2004 through 2013.[8] Patrick et al. calculated an increase in the rate of NAS from 3.4 to 5.8 per 1,000 hospital births per year in the United States from 2009 to 2012.[9]

Newborn symptoms of withdrawal measured using a scoring system such as the Modified Finnegan Neonatal Abstinence Scoring tool include neurologic signs such as irritability; inconsolable crying and seizures; gastrointestinal disturbances of vomiting, diarrhea, and poor feeding; and autonomic concerns of fever and mottling.[10]

Treatment for the infant depends on the type of drugs taken by the mother, the newborn's overall health, and whether the newborn was born at full term or prematurely. Depending on the type of opioid exposure, withdrawal can occur during the first day to three days after birth, and sometimes even up to five to seven days after birth, with an average onset of 48 hours.[10]

Pennsylvania Patient Safety Authority analysts performed a query of the Pennsylvania Patient Safety Reporting System (PA-PSRS) to identify event reports involving NAS and found an increasing number of events from January 2005 through December 2014. Healthcare professionals report using a standardized scoring process, combinations of pharmacologic and nonpharmacologic interventions, and close care team collaboration to aid in the diagnosis and treatment of newborns with NAS.

METHODS

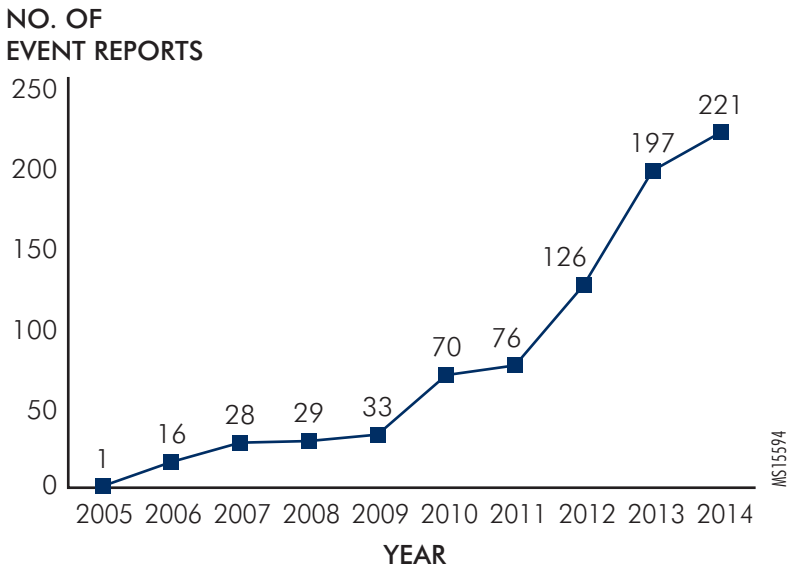
Analysts queried the PA-PSRS database for reports of events that occurred from January 2005 through December 2014 using keywords including but not limited to "neonatal abstinence," "NAS," "Finnegan," "drug dependent," "withdrawal," "opioid," and "oxycodone." Analysts manually reviewed the resulting set of event reports to identify those reports with event narratives that described NAS events.

Additionally, during review of event narratives, analysts determined whether licit or illicit drug use was reported by the mother. Analysts then sorted the resulting data set into the categories of (1) methadone, (2) buprenorphine, (3) other prescription opioids, (4) benzodiazepines, and (5) illicit substances.

RESULTS

Analysts identified 797 NAS events (Figure 1). All of the identified events were submitted in the event type category of "complication of procedure/treatment/test" and the subcategory of "neonatal complication." The majority of the NAS events (n = 602, 75.5%)

Figure 1. Number of Neonatal Abstinence Syndrome Events Reported to the Pennsylvania Patient Safety Authority, 2005 through 2014



involved newborns who had an unplanned transfer to the NICU. The remainder of the events (n = 195, 24.5%) were listed under "other."

Types of Drugs

Specific drugs were mentioned in 289 reports, with 68% describing drugs used to treat opioid dependence (i.e., methadone and buprenorphine) (Figure 2).

Types of NAS Events

The following are examples of events reported to the Authority involving NAS:*

> *Infant delivered by C-section. Infant showed signs of possible drug withdrawal. Finnegan score observed over initial period and was noted to be increasing. Infant was observed by physician and was transferred to NICU. Mother denied any drug use.*
>
> *Mother positive for oxycodone and other drugs. Infant showed signs of withdrawal with Finnegan scores of 10 and 14. Transferred to NICU for further evaluation and possible treatment.*
>
> *Baby girl was being scored for withdrawal from methadone and benzodiazepines. She had increased Finnegan scores multiple times in a row. Physician from the NICU was called and came to evaluate her. Infant was transferred to NICU to be started on morphine. Physician spoke with parents, and infant was taken to NICU.*
>
> *Infant delivered by a mother with a history of marijuana, cocaine, and Percocet use during the pregnancy. Initial NAS score was low; however, as time progressed, NAS score increased to 16. The infant was very fussy and jittery. Decision was made to transfer to a higher level of care.*
>
> *Change in infant status. High-pitched cry and severe tremors. Providers assessed infant. Infant NAS scored at 16. Parents deny all drug use. Infant transferred to NICU.*
>
> *NAS scoring was done on the night shift with [resulting scores of] 9 and 12; in the morning also 12. Symptoms included excoriation, excessive yawning, sneezing, and sucking with increased tone. A neonatologist was notified, and the patient was transferred to NICU.*

* The details of the PA-PSRS event narratives in this article have been modified to preserve confidentiality.

DISCUSSION

Helping newborns through the difficult time of withdrawal requires a series of observations over a period of time for correct diagnosis and collaboration of all healthcare professionals who contribute to treatment, including pharmacologic and nonpharmacologic interventions.[1-3] Families also play a key role in learning how to interact with their newborn, whose symptoms may include irritability, inconsolable crying, vomiting, and poor feeding.[2,3,10,11]

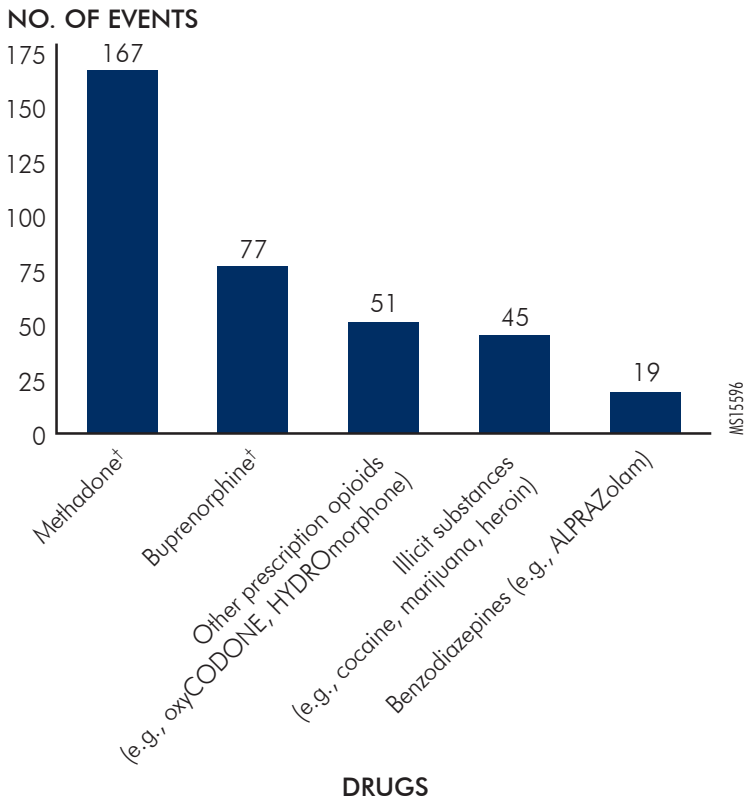
Dramatic increases in US addiction rates spurred the recent passage of a bill calling for information about NAS and opioid dependency in women. See "Addiction Surges in the United States" and "Protecting Our Infants Act" for more information.

Multidisciplinary Approach

The healthcare team. Treating the newborn with NAS requires a team approach using family-centered care, according to John Chuo, MD, MS, neonatal quality officer and medical director of telemedicine at the Children's Hospital of Philadelphia.[3] "The care team has the opportunity to set the attitude and tone towards the mom, being empathetic and non-accusatory," he said.[3] Management can include pharmacologic treatments, such as using a morphine wean, and nonpharmacologic treatments, such as encouraging breastfeeding, swaddling, and skin-to-skin contact, Chuo said.[3]

The neonatologist relies on information assessed by the nursing staff to determine the type and dose of pharmacologic

Figure 2. Maternal Use of Prescription and Illicit Drugs* as Described in Neonatal Abstinence Syndrome Events Reported to the Pennsylvania Patient Safety Authority, 2005 through 2014



*** Two hundred and eighty-nine events described specific drugs. More than one drug was identified in 50 events.**

† Used in the treatment of opioid dependence.

intervention. "Adjusting medication dosages often requires a discussion amongst the care providers, including physicians, nurses, and pharmacologists, especially when the baby's Finnegan scores are borderline," he said.[3]

Assessing and treating newborns with NAS is "definitely a multidisciplinary approach," according to Scott Wexelblatt, MD, regional medical director for newborn services, Cincinnati Children's Hospital Medical Center, who has conducted studies on NAS.[2]

"Nurses are key in this process," Wexelblatt said. "These babies are at higher risk for weight loss, so we also work with the nutrition department. We often need to involve social services because the moms have extra needs. We also use volunteers who swaddle and hold the babies. And then we need to have follow-up with these babies. We send them to the high-risk [follow-up] clinic, and we need to hand them off to their pediatrician for monitoring."[2]

Nursing's role. The healthcare team of physicians, nurses, social workers, and dietitians coordinate the care of the newborn with NAS. Nursing's role is particularly vital in helping to send home a healthy and strong family unit, according to Bawn Maguire, MSN, RN, outreach coordinator and programmatic nurse specialist, Magee-Womens Hospital of the University of Pittsburgh Medical Center. "Nursing's role is more than taking a vital sign and changing a diaper," she said.[11] "They are helping these families to become stronger, and become a family. The nurse holds the power in her hands to help these families care for the baby, see the baby, and understand the baby. The true treatment is the time the mom starts to care for her baby. The stronger nursing can make the unit, the healthier the family. That's what this is all about."[11]

Finnegan Scoring System

Tools available for quantifying the severity of neonatal withdrawal include the Lipsitz tool, the Neonatal Withdrawal Inventory, the Neonatal Narcotic Withdrawal Index, and the Finnegan Neonatal Abstinence Scoring System.[10] The Finnegan scoring system is the most commonly used NAS assessment tool in the United States.[1,10] A version of the Modified Finnegan Neonatal Abstinence Scoring tool can be accessed at http://www.lkpz.nl/docs/lkpz_pdf_1310485469.pdf.

The Finnegan scoring system is used to score symptoms over time and can be used to initiate, wean, or escalate pharmacologic treatment. The nurse scores the newborn throughout the course of the hospital stay, assigning a predetermined number of points for specific symptoms of gastrointestinal, metabolic, vasomotor, respiratory, and central nervous system disturbances.[10]

The first abstinence score is recorded approximately two hours after birth or upon admission to the nursery for a baseline score. Following the baseline score, newborns are scored at four-hour intervals. Depending on the results, the frequency of scoring can be increased to every two hours.[12] If the combined score is greater than or equal to 8 on any three

ADDICTION SURGES IN THE UNITED STATES

Addiction has surged over the past decade and is closely related to the nation's ongoing prescription drug epidemic.[1-3] Following are findings that illustrate the increases in opioid and heroin usage and addiction:

- The number of prescriptions for opioids such as hydrocodone and oxycodone increased from about 76 million in 1991 to nearly 207 million in 2013.[2]
- In 2013, an estimated 517,000 people reported past-year heroin abuse or dependence, a nearly 150% increase since 2007.[1]
- About 75% of new heroin users first became addicted to prescription opioids.[1]
- Heroin use is reaching new populations, including women and middle-class users.[1]
- Heroin overdose death rates nearly quadrupled in the United States from 2002 to 2013.[1]
- Factors that may have contributed to the rise include the following:[1,4]
  - Dramatic increases in the number of pain management prescriptions written and dispensed (usually for chronic pain)
  - Greater social acceptance for using medications for pain management
  - Aggressive marketing campaigns by pharmaceutical companies

Notes

1 Jones CM, Logan J, Gladden RM, et al. Vital signs: demographic and substance use trends among heroin users, United States, 2002–2013. *MMWR Morb Mortal Wkly Rep* 2015 Jul 10;64(26):719-25.

2 Volkow ND. America's addiction to opioids: heroin and prescription drug abuse [online]. Senate Caucus on International Narcotics Control. 2014 May 14 [cited 2015 Aug 14]. http://www.drugabuse.gov/about-nida/legislative-activities/testimony-to-congress/2014/americas-addiction-to-opioids-heroin-prescription-drug-abuse

3 Warren MD, Miller AM, Traylor J, et al. Implementation of a statewide surveillance system for neonatal abstinence syndrome—Tennessee, 2013. *MMWR Morb Mortal Wkly Rep* 2015 Feb 13;64(5):125-8.

4 Calabresi M. Why America can't kick its painkiller problem. *Time* 2015 Jul 15;185(22):26-33.

consecutive ratings, the average of two scores is greater than or equal to 12, or the scores for two consecutive ratings are greater than or equal to 12, the newborn is assessed for pharmacologic treatment.[12]

Standardizing scoring methods. Neonatal Services, a joint venture between Nationwide Children's Hospital and five maternity hospitals in central Ohio, found that excessive variability in the scores recorded by the neonatal nurses complicated the management of newborns with NAS.[13]

The Finnegan scoring method should be objective rather than subjective, Wexelblatt said. "The nurses are all trained to do the Finnegan scoring system, and we rely on those scores to initiate treatment, wean treatment, or escalate treatment."[2]

Neonatal Services initiated a "train the trainer" program in which a nursing expert used an instructional video for key nurses to ensure they received specific training on how to best evaluate NAS symptoms. These "super users" then trained the rest of the nursing staff with video instruction, two practice exams, and an instruction manual with proper scoring definitions.[13]

Neonatal Services reduced its length of stay for newborns with NAS from 36 days to 18 days by training in the assessment of NAS symptoms using the Finnegan scoring system along with a standardized pharmacologic protocol.[13]

Pharmacologic Approaches

Drug therapy is indicated for moderate to severe NAS to ease the withdrawal process and prevent complications such as weight loss and seizures; however, unnecessary use of drugs could prolong withdrawal and the duration of hospitalization.[1] There are currently no uniformly accepted pharmacologic interventions or standardized treatments for NAS management.[1]

Most treatment strategies include gradual weaning of a single opioid.[14] Typically, clinicians use morphine or methadone as the first drug of choice.[14] A sedative, such as phenobarbital or clonidine, may be added as an additional medication when opioid treatment alone is ineffective.[14]

Standardized treatment. A multicenter cohort study of treatments and hospital outcomes in Ohio concluded that regardless of the initial opioid used in treatment of newborns with NAS, use of a standard treatment protocol with stringent weaning guidelines significantly reduced duration of pharmacologic intervention (17.7 versus 32.1 days, $P < .0001$) and length of stay (22.7 versus 32.1 days, $P = .004$).[14]

Nonpharmacologic Bundle

Nursing manages the nonpharmacologic bundle at Cincinnati Children's Hospital Medical Center and works with mothers and other family members, Wexelblatt said. "We rely on nurses for swaddling, decreasing stimulation, providing parental education, and helping the babies with their feedings," he said.[2]

"Learning how to feed the baby appropriately is essential since they have an uncoordinated suck," he said. "Knowing how to soothe the baby is very important.

PROTECTING OUR INFANTS ACT

In November 2015, the president signed a bill requiring the Agency for Healthcare Research and Quality to report on prenatal opioid abuse and neonatal abstinence syndrome. The bill calls for examination of relevant literature, causes and treatment, and barriers to care for pregnant women to help develop recommendations for preventing, identifying, and treating opioid dependency.

The act can be accessed at https://www.congress.gov/bill/114th-congress/senate-bill/799.

We help the family learn the soothing techniques that will help their individual baby and help the family manage the stress of a baby that is going to cry more than a typical baby."[2]

Other nonpharmacologic interventions can include a quiet environment, with dim lighting and soft music, according to Maguire.[11] "We do a lot of comfort measures," she said. "We like the baby to be held a lot. These babies enjoy being rocked and enjoy low humming. They also do not like a lot of eye contact."

Breastfeeding support. The literature recommends breastfeeding for mothers who are part of a drug treatment program.[1] Breastfeeding is contraindicated if the mother is taking illicit drugs, abusing multiple drugs, or infected with HIV.[1] Multiple studies have confirmed that breast milk contains only minimal quantities of drugs used in the maintenance programs for drug-dependent women.[1] Breastfeeding increases bonding between the mother and newborn, enhances maternal confidence, and helps mothers feel involved in treating the newborn for withdrawal.[15]

"About half of our moms breastfeed," Maguire said. "And many of our moms are successful."

Other methods. A "cuddler" program in Phoenixville Hospital helps families who cannot always be with their newborns in the NICU,[16] according to Jayne Clemens, RN-C, NICU staff nurse. "If the parents are not available, we have volunteers who hold the babies," she said. Volunteers can include high school or college students or retired adults.[16]

Other methods used at Phoenixville Hospital to soothe the newborns include placing the newborn in a quiet and dark room that has the least amount of stimulation, Clemens said. "For some newborns, soothing music is helpful, but it depends on the baby," she said.[16]

Compassionate Treatment

Mothers may feel guilty that their baby is requiring treatment, and they may also feel that they are being judged by the staff doctors, nurses, therapists, and social workers. "We have been working on trying to improve the nonjudgmental care for these moms," Wexelblatt said.[2]

Substance abuse is a medical condition, Maguire said.[11] "We don't judge people with chronic diseases such as diabetes and hypertension," she said. "This is another medical condition. We remind the nurse that these women love these babies as any woman would love her baby."

Role models. Through role modeling and training, Maguire helps nurses look beyond judging the addicted mom.[11] Magee Womens Hospital has been treating mothers with substance abuse for about 13 years and has seen a 10-fold increase in NAS over the last 12 years.[11]

"In the ideal world, a mom's heart is so overflowing with love for her baby," Maguire said. "There are a lot of moms with substance abuse who have felt unloved for so long. Their cup is empty, and they don't have a lot to give to their babies. They are looking to their baby as a source of love for them," she said. "But their baby cannot provide this because of the physical process of going through withdrawal." Nurses work with mothers to help them understand the transient nature of withdrawal, Maguire said.[11]

The nurses learn to speak frankly with a mom who is already feeling guilty that her newborn is going through withdrawal, Maguire said. "This is quite a fragile time with moms. If we allow the guilt to fester, it doesn't do the mom any good."[11]

"We tell the moms that the bottom line is you can't change the past," she said. "You can learn from the past but cannot dwell on this. You have got to keep moving forward. Your baby only knows the future, and you will continue to grow with your baby."[11]

CONCLUSION

NAS is a growing problem in Pennsylvania and throughout the United States as use of prescribed and illicit drugs by pregnant women continues to escalate.[1,17] Effective use of a standardized method of NAS assessment (such as the Finnegan scoring system), medications, and a combination of nonpharmacologic interventions tailored to the newborn's individual needs are suggested to help newborns through the difficult time of drug withdrawal.[2,3] Nonjudgmental and compassionate care by all healthcare workers versed in the management of maternal substance abuse and NAS is recommended.[11]

Acknowledgments

Lea Anne Gardner, PhD, RN, senior patient safety analyst, Pennsylvania Patient Safety Authority, and Monica Williams, BSN, RN, psychiatric nurse, Mercy Philadelphia Hospital, contributed to data acquisition for this article. Matthew Grissinger, RPh, FISMP, FASCP, manager, medication safety analysis, Pennsylvania Patient Safety Authority, provided pharmacologic expertise.

NOTES

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(See the following page for self-assessment questions.)

LEARNING OBJECTIVES

- Identify the symptoms of neonatal abstinence syndrome (NAS).
- Recall the most commonly used NAS assessment tool.
- Recognize pharmacologic and nonpharmacologic interventions for newborns exhibiting NAS.
- Assess family interventions and techniques to help parents care for their newborn with NAS.

SELF-ASSESSMENT QUESTIONS

The following questions about this article may be useful for internal education an assessment. You may use the following examples or come up with your own questions.

1. The following are symptoms of the newborn exhibiting NAS *except*:
   a. High-pitched crying
   b. Increased appetite
   c. Sleep problems
   d. Seizures
2. Which of the following is the most commonly used NAS assessment tool?
   a. The Finnegan Neonatal Abstinence Scoring System
   b. The Neonatal Withdrawal Inventory
   c. The Neonatal Narcotic Withdrawal Index
   d. The Lipsitz tool
3. Which is the first drug class of choice typically used in NAS management?
   a. Benzodiazepines
   b. Barbiturates
   c. Anticholinergics
   d. Opioids
4. According to Kocherlakota, breastfeeding newborns who exhibit NAS is *not* recommended if the mother:
   a. Uses buprenorphine
   b. Participates in a treatment program
   c. Is HIV-positive
   d. Uses methadone
5. Which of the following nonpharmacologic interventions is helpful for newborns exhibiting NAS?
   a. Bright lights
   b. Soothing music
   c. Vigorous rocking
   d. Decreased room temperature

Question 6 refers to the following scenario:

Within a day of birth, a newborn exhibits high-pitched crying, severe tremors, and other signs of drug withdrawal. A scoring system is used to observe the newborn, and the score is increasing. When approached, the parents of the newborn deny maternal drug use.

6. Which of the following represents the best scenario and outcome:
   a. Tell the mother you believe she was taking opioids during her pregnancy and you will be notifying social services.
   b. Transfer the newborn to the neonatal intensive care unit before involving the parents.
   c. Meet with the parents, explain what is happening to their newborn, and determine a treatment plan.
   d. Keep the newborn in the nursery and have the nursing staff administer treatment.

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