Universal Maternal Drug Testing in a High-Prevalence Region of Prescription Opiate Abuse

Scott L. Wexelblatt, MD[1,2,3], Laura P. Ward, MD[1,2,3], Kimberly Torok, RN[3], Elizabeth Tisdale, RN, NNP[3], Jareen K. Meinzen-Derr, PhD[1,4], and James M. Greenberg, MD[1,2,3]

Objective To evaluate the efficacy of a universal maternal drug testing protocol for all mothers in a community hospital setting that experienced a 3-fold increase in neonatal abstinence syndrome (NAS) over the previous 5 years.

Study design We conducted a retrospective cohort study between May 2012 and November 2013 after the implementation of universal maternal urine drug testing. All subjects with positive urine tests were reviewed to identify a history or suspicion of drug use, insufficient prenatal care, placental abruption, sexually transmitted disease, or admission from a justice center, which would have prompted urine testing using our previous risk-based screening guidelines. We also reviewed the records of infants born to mothers with a positive toxicology for opioids to determine whether admission to the special care nursery was required.

Results Out of the 2956 maternal specimens, 159 (5.4%) positive results were recorded. Of these, 96 were positive for opioids, representing 3.2% of all maternity admissions. Nineteen of the 96 (20%) opioid-positive urine tests were recorded in mothers without screening risk factors. Seven of these 19 infants (37%) required admission to the special care nursery for worsening signs of NAS, and 1 of these 7 required pharmacologic treatment.

Conclusion Universal maternal drug testing improves the identification of infants at risk for the development of NAS. Traditional screening methods underestimate in utero opioid exposure. *(J Pediatr 2015;166:582-6)*.

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Widespread abuse of new, powerful prescription narcotics now accounts for a major source of opioid addiction. In the US, there was an almost 3-fold increase in the incidence of neonatal abstinence syndrome (NAS) between 2000 and 2009.[1] In Ohio, a 6-fold increase in hospitalization for NAS was recorded between 2004 and 2011.[2] The incidence of in utero drug exposure has increased 6-fold over the past 5 years in the Cincinnati region (**Figure**). Approximately 60% of infants exposed to methadone develop NAS, presenting with signs of narcotic withdrawal after delivery.[3] The number of infants who develop NAS after prescription drug exposure has not been widely examined, but prevalence appears to be lower than that of NAS after methadone exposure.[4] The manifestations of NAS include extreme irritability, feeding intolerance and diarrhea, abnormalities of tone, and seizures.[5] Newborns with NAS require extended hospitalization and present social and economic burdens for families, healthcare providers, social service institutions, and government agencies.[1,2,6]

Prompt diagnosis of NAS allows for timely initiation of treatments, including nonpharmacologic interventions such as swaddling and, in more severe cases, administration of narcotics, which are weaned over a period of days to mitigate signs of withdrawal, optimize feeding, and reduce the possibility of seizure activity.[7] The consequences of a missed diagnosis and lack of treatment are significant. Affected newborns may fail to thrive, develop seizures, and experience respiratory compromise. Their extreme irritability also may prove challenging for caregivers, increasing the susceptibility to abuse and neglect.[8]

Signs of NAS may not appear until 72 hours after birth and can vary in intensity,[9] not consistently related to the extent of maternal opioid exposure.[3] A maternal history of narcotic use during pregnancy can alert providers to the risk of NAS in a newborn, but accurate information is inconsistently obtained at the time of delivery. Risk-based screening criteria are often applied to trigger maternal testing for opioid exposure[10]; however, this strategy might not be sufficiently robust to identify all newborns at risk for NAS, especially before discharge from the newborn nursery,[11] given the underreporting of maternal drug use.[12]

Considering the importance of prompt, accurate NAS diagnosis, we studied the efficacy of a universal testing protocol for all mothers delivering at a community hospital that has experienced a 3-fold increase in the prevalence of NAS over the past 5 years. We hypothesized that universal testing would identify

NAS	Neonatal abstinence syndrome
SCN	Special care nursery
UDS9	Siemens 1650 enzyme immunoassay

From the [1]Division of Neonatology, Perinatal Institute, Cincinnati Children's Hospital Medical Center; [2]Department of Pediatrics, University of Cincinnati College of Medicine; [3]Family Birthing Center, Mercy Anderson Hospital; and [4]Department of Biostatistics and Epidemiology, Cincinnati Children's Hospital Medical Center, Cincinnati, OH

The authors declare no conflicts of interest.

http://dx.doi.org/10.1016/j.jpeds.2014.10.004

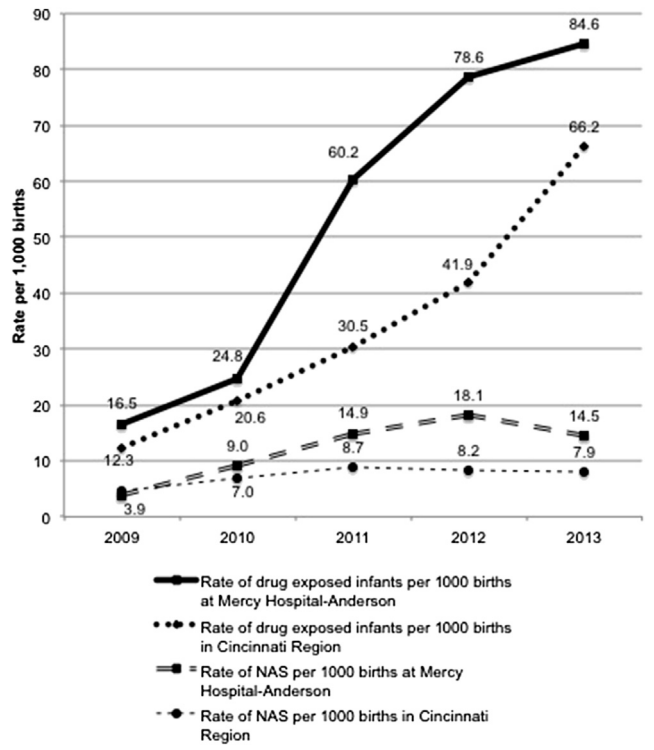

Figure. Rates of NAS and drug-exposed infants per 1000 births obtained from *International Classification of Diseases, Ninth Revision* codes 760.70, 760.71, 760.72, 760.73, 760.75, 760.77, and 779.5 at Mercy Anderson Hospital and the Cincinnati region (unpublished local data, Perinatal Institute, Cincinnati Children's Hospital Medical Center, November 2013).

opioid-exposed infants born to mothers who did not meet the criteria for urine drug testing under current risk-based assessment protocols.

Methods

We conducted a retrospective cohort study from May 2012 through November 2013 at Mercy Anderson Hospital, a community hospital in southwestern Ohio that serves the eastern Cincinnati metropolitan area. During the study period, the hospital cared for 2995 mothers for delivery of 2979 infants (with 38 intrauterine fetal deaths and 22 multiple births), of whom 95% were Caucasian, 52% were married, and 53% had private insurance. Hospital mother-infant services, including a level II nursery and high-risk maternity services, are provided through the Family Birth Center. Our query identified newborns born at Mercy Anderson Hospital with an *International Classification of Diseases, Ninth Revision* code of 760.70, 760.71, 760.72, 760.73, 760.75, 760.77, or 779.5. We used code 779.5 if the infant required pharmacologic treatment for NAS. Birth rates were calculated from data provided by the Hamilton County Public Health Department.

All mothers who delivered at the Family Birth Center during the study period were eligible for enrollment. The Mercy Anderson Hospital Institutional Review Board reviewed and approved the screening protocols. All data were collected through our review of the electronic health record. The hospital's Obstetrics Patient Safety Committee and Department of Risk Management were consulted regarding maternal consent for urine drug testing and determined that the general consent for care and treatment at admission was appropriate support for the institution of universal drug testing. Hospital-based risk management determined that the previously established screening policy promoted "profiling"; thus, universal maternal urine testing was deemed a preferable alternative.

Patient care staff explained the nature and rationale for urine drug testing to each patient admitted for labor or scheduled cesarean delivery. The discussion included information on how the test results would be used. Mothers had the opportunity to opt out of testing.

Current practice at Mercy Anderson Hospital and most newborn nurseries in the US limits nursery length of stay to <48 hours for an uncomplicated vaginal delivery and <72 hours for an uncomplicated cesarian delivery. Signs of NAS might not become evident until 48 hours after delivery, however. Our recent work demonstrated a mean onset of signs at 46.2 hours[13]; thus, we observed all infants exposed to opioids for a minimum of 72 hours in the hospital nursery, or a minimum of 96 hours total if methadone or buprenorphine exposure was identified. This is consistent with the current American Academy of Pediatrics guidelines for opioid exposure.[14]

Family Birth Center registered nurses documented Finnegan scores[15] for infants with opioid-positive maternal tests within 24 hours of delivery. Those with a score of >8 on 3 occasions over a 24-hour period or a score of >12 on 2 occasions over a 24-hour period were admitted to the level II nursery for observation and treatment. Initial treatment included a nonpharmacologic bundle composed of swaddling, parental education, use of lactose-free formula when necessary, and decreased stimulation. For an infant with persistent high Finnegan scores, a methadone taper was initiated in the level II nursery.

Hospital-based social service providers conducted a discharge safety assessment for all women or infants with a positive toxicology test, as well as those who opted out. During this safety assessment, resources for addiction treatment programs were provided if appropriate. The social service safety assessment was not modified during the study period.

Standard neonatal care was maintained throughout the study period. This included neonatal urine and meconium drug testing if the mother had a positive drug test at the time of delivery that could not be explained by medications administered during labor and delivery. Standard practice also included submission of infant meconium for drug testing if maternal risk factors were present (**Table I**).

Urine testing was performed at the Mercy Anderson Hospital laboratory using a Siemens 1650 enzyme immunoassay