

Sandra Sundquist Beauman, MSN, RNC

## Identification and Management of Neonatal Abstinence Syndrome

### Abstract

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*The nursing care of infants experiencing withdrawal from drug abuse through passive exposure is often challenging. These infants are at higher risk for many medical complications in addition to withdrawal itself. Often, infusion nurses play an important role in caring for an infant with drug withdrawal by providing infusion therapy for the infant's compromised medical condition, poor oral intake, and withdrawal symptoms. This article focuses on drug abuse during pregnancy, the withdrawal symptoms it may cause in the infant, ways to recognize an infant experiencing neonatal abstinence syndrome, and available scoring tools and treatment options.*

The incidence of drug abuse during pregnancy is an important factor in understanding neonatal abstinence syndrome. Infusion nurses who work with these patients must be prepared to identify risk factors in each case, identify the very subtle signs of drug abuse, develop rapport with the patient, and take a unique opportunity to intervene if a problem is identified. Of particular concern is the effect that drugs have on an unborn infant. The infusion nurse frequently will be involved in the care of these infants because nutritional support often is administered intravenously. Pain management during venipuncture also presents some unique challenges in this population. This article discusses methods for providing infusion support to these patients and addresses the issue of pain management in the delivery of infusion therapies.

### • INCIDENCE OF DRUG ABUSE DURING PREGNANCY

The 2001 National Household Survey on Drug Abuse determined that 15.1% of pregnant women between the ages of 15 and 17 years were exposed to drugs.<sup>1</sup> Among nonpregnant women of the same age group, 14.1% admitted to drug use by a self-report. Rates of drug abuse among both pregnant and nonpregnant women were sim-

Sandra Sundquist Beauman is a Neonatal Clinical Nurse Specialist with CNS Consulting. She consults for hospitals and industry while maintaining clinical practice and providing continuing education to healthcare professionals. Ms. Beauman holds a master's degree in nursing with specialty in parent/child health and is licensed as a clinical nurse specialist. She is a member of the National Association of Neonatal Nurses (NANN), the Academy of Neonatal Nursing, the National Association of Clinical Nurse Specialists (NACNS) and Sigma Theta Tau.

Address correspondence to: Sandra Sundquist Beauman, e-mail: CNSConsulting@earthlink.net.

ilar for white, black, and Hispanic populations, but were lower for the Asian population. Young adults 18 to 25 years of age had the highest reported rate of abuse at 18.8%.<sup>2</sup> Lester et al<sup>3</sup> reported that approximately 134,110 infants were exposed to illicit drugs in 2001, or that 1 in 10 infants were exposed to drugs in utero.

The National Household Survey reports that the incidence of drug abuse is higher in inner city hospitals and metropolitan counties. There also is a reported increase in the use of oxycodone and ecstasy in the 2001 survey, as compared with the 2000 survey. There are many helpful Web sites that report the use of specific drugs in specific areas including [www.dea.gov/pub/states](http://www.dea.gov/pub/states) and [www.usdoj.gov](http://www.usdoj.gov). These Web sites report drug activity in specific areas of the country, but the numbers reported are not necessarily related to drug abuse during pregnancy. Still, this information is useful in determining the scope of the problem in a particular area.

Drug abuse during pregnancy presents specific problems for the healthcare provider. One such problem involves the legal considerations of illicit drug abuse. Criteria for screening should be determined by hospital policy to avoid allegations of discrimination. Some indications in the mother that commonly have been linked with drug abuse include preterm labor, placental abruption, sexually transmitted disease, and a documented or admitted history of drug abuse. Other identifiable indications of drug abuse are cardiovascular accidents of either the mother or infant and mothers who smoke during pregnancy.<sup>2</sup>

Indications of drug abuse in the infant include prematurity, positive maternal screen, meconium staining or aspiration at delivery, and growth retardation or cerebral hemorrhage at delivery.<sup>2,4,5</sup> Of course, there are other conditions in pregnancy and delivery that could lead to some of these same outcomes in the infant. For instance, maternal infection, incompetent cervix, and multiple pregnancies or multiple gestations also may cause premature birth. Meconium aspiration may result from any condition that causes distress in the term or postterm infant. Growth retardation also is associated with smoking during pregnancy, pregnancy-induced hypertension, and several congenital malformations.

A careful interview of the patient may encourage admission of drug abuse during pregnancy, making appropriate medical care possible without the additional time required for drug screening.<sup>5</sup> Chasnoff et al<sup>6</sup> recommended questioning the patient about the drug abuse practices of those close to her such as her parents or her partner. In addition, questioning the patient about past drug abuse may yield admission of drug use before the pregnancy, after which questioning can continue regarding current drug abuse. Ultimately, the patient should be informed that drug screening is not normally used for punitive purposes, but that it is in fact necessary if the best care is to be provided for the mother and the infant during pregnancy and after delivery.

Some facilities have chosen to require maternal consent before a drug screen is performed for the mother, partly because of a Supreme Court ruling in which a hospital was found to be discriminatory in screening practices. In the case of *Ferguson vs City of Charleston, South Carolina*, a city hospital in Charleston was found to be working with city law enforcement and using drug screening results to “coerce” patients into treatment programs. If the patients refused, they were incarcerated. A problem arose because all the participants in the class action suit were African Americans.<sup>7</sup> Therefore, a single criteria such as the patient’s age or race should not be used to determine screening requirements. In any case, it is advisable to document in the patient’s medical record that the mother was verbally informed and has given consent for drug screening as per facility protocol.

In addition to criteria for screening, the source for testing also must be considered. Urine is the most common substance tested for drugs of abuse in both the mother and the infant. Urine should be collected from the infant within 24 hours of birth.<sup>8</sup> The detection time for urine is longer than for blood, and the detection time for the infant’s urine generally is longer than for maternal urine because clearance of the drug through the kidney is slower in the infant.<sup>9</sup> Table 1 shows the usual times required for the clearance of various drugs from maternal urine. The sample is stable up to 48 hours when refrigerated and up to 2 weeks when frozen.<sup>9</sup>

Meconium is sometimes used for secondary or confirmatory testing in the neonate. This method often is not performed by the hospital laboratory, and it may take longer for results to be available. Meconium reflects drug exposure, starting as early as 20 to 24 weeks of gestation.<sup>9</sup> However, the drug does not diffuse uniformly through the meconium. Therefore, the clinician should collect all meconium for the best results because a single sample limits sensitivity of the screen. As a practical matter, however, this is not usually done, and most times only a single meconium stool is collected from the diaper. The sample

**TABLE 1**

**Usual Clearance Time for Various Drugs from Maternal Urine**

Drug	Time
Amphetamines	48 hr
Benzodiazepines	3 d
Alcohol	8-16 hr
Cocaine metabolite	2-4 d
LSD	48-72 hr
Opiates/methadone	48-72 hr
Phencyclidine (PCP)	8 d
Marijuana—depends on degree of use	5-20 d

Data from Reinarz and Ecord<sup>9</sup> and Zaichkin and Houston<sup>8</sup>.

can contain only meconium. If it contains milk stools or other contaminants, it will be rejected by the laboratory performing the test.<sup>9</sup> Therefore, attempts should be made to collect the first meconium stool, and this stool can be stored until needed. The meconium is stable for 14 days at room temperature and up to 30 days when refrigerated.<sup>9</sup>

Other less common methods of screening involve hair analysis, gastric aspirate, or nail clippings.<sup>9</sup> Gastric aspirate is not often used because this is amniotic fluid, and the amount of drug present may be so diluted as to be undetectable in some circumstances. Nail clippings require sample amounts that may not be available from the newborn, and hair analysis for the newborn usually is not done because this procedure is not available in most hospital laboratories. In addition, the advantage to hair analysis for older patients is that the timing of the abuse can be correlated with where the sample appears in the hair shaft.<sup>10</sup> This advantage does not exist for the newborn because the hair grows only during the last trimester. Vinner et al<sup>10</sup> discuss the use of meconium testing that demonstrates the use of the drug during the second trimester and the use of hair testing that demonstrates drug use during the third trimester. This is an advantage when the infant's risk of neonatal abstinence syndrome (NAS) is foreseen. However, given the difficulty of the procedure itself, other measures, such as scoring and maternal interviewing, are more practical for evaluating this risk.

#### ● PROBLEMS WITH MATERNAL CARE AND NEONATAL COMPLICATIONS

Several issues need to be considered in the provision of care to the neonate with passive exposure to illicit substances. In many cases, the history is unreliable.<sup>4,5,11,12</sup> This unreliable history often leads to inaccurate reports of actual drugs used, amounts of the drug used, or the time when drug was last used. The estimated date of confinement may not be known, making gestational age difficult to determine until after delivery. In addition, polysubstance abuse is common.<sup>13,14</sup> Johnson et al<sup>14</sup> reported that at least 15.6% of drug-exposed pregnant women used more than one illicit substance. This may complicate the effect that the drugs have on the infant, including the infant's reaction to withdrawal from the drugs. In addition, mothers who are homeless or frightened of law enforcement or visits from social services may report inaccurate addresses.

Poor nutritional status also is a common problem. At times this problem is attributable to lifestyle, and at other times it is attributable to the effect of the drug itself.<sup>11</sup> Parenting skills may be poor, leading to an increased risk for child abuse of infants experiencing withdrawal.<sup>5,12</sup> In

many cases, the women abusing drugs are or have been victims of physical, sexual, and emotional abuse.<sup>12</sup>

Neonatal complications of exposure to prenatal substance abuse include low birth weight, central nervous system disturbances, depression at delivery as measured by low Apgar scores, accelerated weight loss after delivery, and association with certain birth defects.<sup>12,15</sup> Other complications include an increased risk for sudden infant death syndrome, particularly in association with exposure to cocaine or heroin, and an increased risk for infection or sepsis, colic-like symptoms, and meconium aspiration syndrome, usually in association with heroin or methadone exposure.<sup>2,12</sup>

In addition, specific structural defects are associated with methamphetamine use during pregnancy. These may include cleft lip and palate, cardiac malformations, microcephaly, and growth retardation.<sup>16</sup> Ecstasy, a methamphetamine, has been linked specifically to a significantly increased risk for congenital deformities, including cardiac and musculoskeletal anomalies.<sup>16</sup> Ecstasy also presents a risk to the developing brain that may result in altered cerebral function.<sup>16</sup> Table 2 summarizes neonatal complications associated with prenatal drug exposure.

#### ● SUBSTANCE WITHDRAWAL

During pregnancy, every effort should be made to assist the heroin-addicted woman into a methadone treatment program. Withdrawal symptoms do occur with increased incidence and severity in the neonate exposed to methadone rather than heroin.<sup>4,17</sup> Nevertheless, methadone dosage delivered in a treatment program is more predictable, and there is less risk of intravenous drug abuse complications such as hepatitis C and human immunodeficiency virus.

**TABLE 2**

#### Summary of Neonatal Complications Associated With Prenatal Drug Exposure

- Low birth weight/growth retardation
- Prematurity
- CNS disturbances
- Low Apgar scores
- Drug withdrawal/neonatal abstinence syndrome
- Accelerated weight loss after delivery
- Various birth defects associated with some drugs
- Increased risk for SIDS—cocaine and heroin
- Infections/sepsis
- Necrotizing enterocolitis
- Colic-like symptoms
- Meconium aspiration syndrome—heroin/methadone

CNS, central nervous system; SIDS sudden infant death syndrome.

Both heroin and methadone readily cross the placenta. Drugs with a molecular weight greater than 600 do not cross the placenta. The lower the molecular weight, the quicker a drug crosses the placenta.<sup>18</sup> The molecular weight of methadone is 345, and the molecular weight of heroin is 369.<sup>18</sup>

The effects of heroin decrease within 24 hours and appear in fetal tissue within 1 hour. Methadone is much longer lasting, with effects that can last up to 24 hours.<sup>2</sup> The half-life of methadone in the newborn is 32 hours.<sup>2</sup> Methadone is stored in body fat, and withdrawal is more severe and prolonged in the term newborn than in the premature infant. This is most likely related to the amount of total body fat available to store the drug, allowing it to be released slowly over time.<sup>2</sup> In this situation, withdrawal symptoms may vary significantly in severity as the drug is released. One study of methadone showed no association between serum levels and withdrawal.<sup>19</sup> Other studies have shown an increase in NAS with methadone dosing greater than 20 mg/day to the mother.<sup>4,17,20</sup>

Withdrawal from methamphetamines and amphetamines usually is less intense than with methadone or heroin. However, the same constellation of symptoms can be seen.<sup>21</sup> Again, it is important to remember that polydrug abuse is very common, making it difficult to know the exact association of symptoms or sequelae with a specific drug.

#### • SYMPTOMS OF NEONATAL ABSTINENCE SYNDROME

Neonatal abstinence syndrome is a specific constellation of symptoms seen in infants experiencing withdrawal from opiates, amphetamines or methamphetamines, or benzodiazepines.<sup>14</sup> Although withdrawal is sometimes seen with other drugs such as cocaine and alcohol, the specific symptoms of withdrawal are different from those associated with abstinence syndrome, and there is greater variability in withdrawal symptoms. The timing of neona-

tal abstinence will vary, depending on the type of drug that was used, the amount of the drug taken, and the time of use before delivery.<sup>22</sup> In addition, medications given during labor and delivery will have an impact on the timing of withdrawal in the neonate, the infant's maturity and nutritional status, and the presence of other diseases.<sup>22</sup>

Dr. Loretta Finnegan was one of the first to identify and quantify a specific constellation of symptoms in the newborn with exposure to drugs during pregnancy.<sup>23</sup> A few tools have been developed to assist healthcare providers in the management of the infant with NAS. These tools are similar to pain assessment tools for the nonverbal patient. They provide a common language and parameters for assessment as well as a guide for clinical management.

The tool developed by Finnegan to measure these symptoms still is one of the most comprehensive and widely used tools.<sup>12</sup> With this tool, the symptoms are divided into neurologic, state, respiratory, and gastrointestinal symptoms.<sup>23</sup> Table 3 provides a list of specific symptoms that make up NAS. Other scoring tools that have been developed include the Neonatal Drug Withdrawal Scoring System, also known as the Lipsitz tool,<sup>24</sup> and more recently, the Neonatal Withdrawal Inventory.<sup>25</sup>

The Neonatal Drug Withdrawal Scoring System consists of assigning a score of 0, 1, 2, or 3 for each of the following symptoms: tremors, irritability, reflexes, stools, muscle tone, skin abrasions, and tachypnea. In addition, the following are assigned a yes (1) or no (0) score: repetitive sneezing, repetitive yawning, and vomiting or fever.<sup>24</sup> There has been little additional testing and validation of the Lipsitz tool.

The Neonatal Withdrawal Inventory assigns a score to hypertonicity, tremor, hyperactive Moro reflex, sweating/mottling, repeated sneezing/yawning, regurgitation, and diarrhea. In addition, a behavioral distress scale is used to provide an additional score between 1 and 4. Temperature and respiratory rate are evaluated, although they are not assigned a specific score.

Finnegan also has developed specific guidelines for the healthcare provider to follow when using the NAS tool to score for withdrawal. The decision to score can be based on observed symptoms, a positive maternal drug screen,

**TABLE 3**

#### Symptoms of Neonatal Abstinence

Central Nervous System	Gastrointestinal	Vasomotor
Cry—excessive or high-pitched	Excessive sucking	Sweating
Sleep difficulty	Poor feeding	Fever—low grade
Tremors	Vomiting	Nasal stuffiness
Skin breakdown	Diarrhea	Respiratory distress
Hypertonia/hyperreflexia	Frequent sneezing	
Myoclonic jerks	Frequent yawning	
Seizures		

Data from Jorgenson,<sup>30</sup> Franck and Vilardi,<sup>36</sup> and Finnegan et al.<sup>23</sup>



or a neonatal drug screen if no prior knowledge exists. It is recommended that the scoring start early if there is any indication or suspicion that the infant was exposed to drugs of abuse.<sup>26</sup> Scoring may occur every 2 to 4 hours depending on the severity of withdrawal. However, in both cases, the behavior and activity of the infant must be scored over the entire interval, not just when the health-care provider is documenting the score.<sup>26</sup> A score greater than 8 indicates distress in the infant and should trigger more frequent scoring. Repeated scores greater than 8 indicate a need to consider medical management.<sup>20,26</sup>

### • NURSING CONSIDERATIONS FOR NAS

General management techniques that are important for these infants, regardless of the scores obtained, include early recognition of possible perinatal drug exposure so that the use of naloxone is avoided.<sup>27,28</sup> Naloxone is a narcotic antagonist that can cause instant withdrawal with devastating results for the infant. Even if specific opiate use is not suspected or confirmed before delivery, naloxone use should be avoided in the substance-abusing delivery because of the frequency with which polydrug use occurs.<sup>27</sup> Relief of nasal congestion, frequently seen in these infants, also is important for assistance in respiratory stability and provision of comfort.<sup>13</sup>

Small, frequent feedings may aid tolerance and digestion and provide adequate calories for these infants, who often are underweight and gain weight slowly.<sup>29,30</sup> Many drug-exposed infants have a disorganized suck and may not be able to take the necessary amount of nutrition by breast or bottle. In such cases, provision of the nutrition with gavage feedings as indicated is recommended.<sup>30</sup>

Accelerated weight loss is another problem for these infants, and sufficient nutrition cannot be provided orally to overcome this. In some cases, an infusion of dextrose and electrolytes is required to avoid hypoglycemia, hypocalcemia, and other indications of inadequate nutritional intake in the drug-exposed infant. The use of a sucrose pacifier is recommended for minor pain relief with such procedures as venipunctures and heelsticks in infants.<sup>31-33</sup> However, it is believed that sucrose is an effective pain relief measure in response to decreased pain perception through opioid pathways.<sup>34</sup> There is some evidence to suggest that substance-exposed infants may not respond to the use of sucrose in the same way as nonsubstance exposed infants, requiring the infusion specialist to use other methods of pain management for these procedures.<sup>34</sup> Provision of a pacifier and swaddling also will calm these infants.<sup>35</sup>

In addition to ensuring adequate nutrition, energy expenditure also must be decreased. Efforts should be made to provide boundaries and to allow the infant hand-to-

mouth opportunities as a way of assisting the neonate in self-regulatory behaviors and thereby decreasing energy expenditure.<sup>13,29,30,36</sup> Figure 1 shows an infant to whom a darkened, quiet environment has been provided, assisting him in self-calming behaviors.<sup>29,30</sup> A soft sleeping surface and prone positioning is to be avoided in accordance with recommendations for preventing sudden infant death syndrome because of the increased risk for this syndrome in this population.<sup>27,36,37</sup> The use of clear transparent dressings over areas that are reddened or excoriated may help prevent further breakdown.<sup>27</sup> The areas particularly prone to this breakdown in the infant experiencing withdrawal are the knees, elbows, and the tip of the nose.<sup>23</sup>

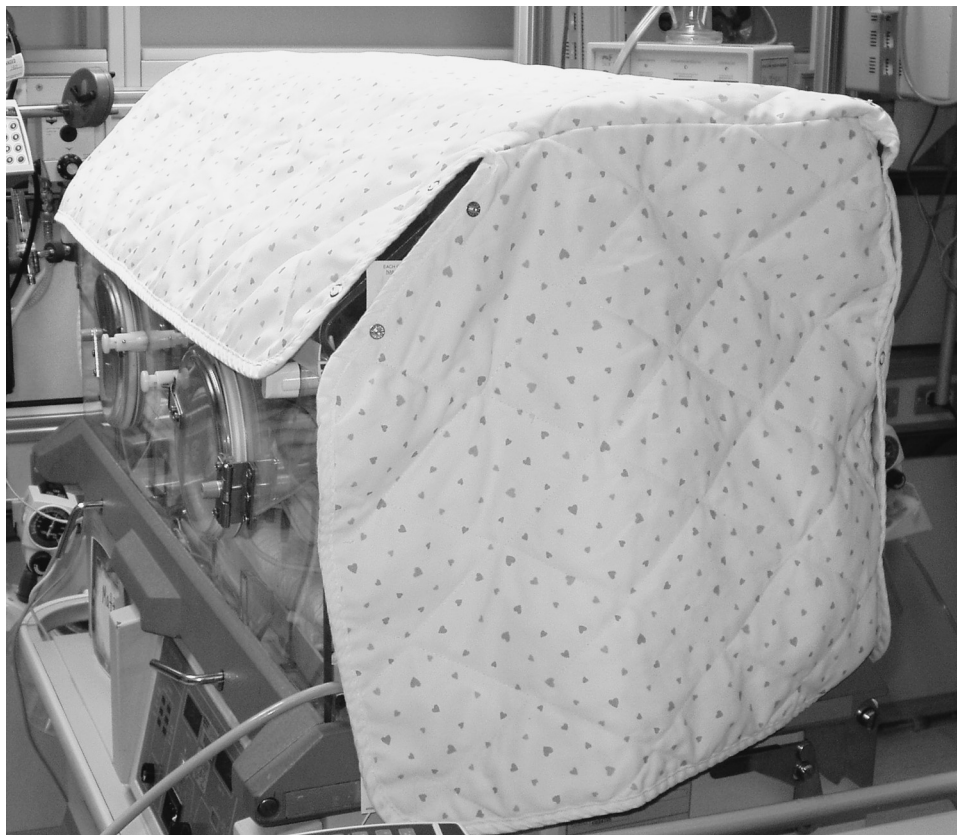
Finally, many infants experiencing drug withdrawal have diarrhea. This can cause loss of fluid, leading to some degree of dehydration and impaired nutritional status if the fluid is not replaced appropriately.<sup>27</sup> Most troublesome is the resulting skin breakdown from the frequent stools that are extremely irritating to the surrounding skin.<sup>27</sup> In some cases, full-thickness skin breakdown can occur. Precautions to be taken include frequent diaper changes and the use of a barrier cream before any breakdown or irritation occurs.<sup>38</sup>

### • MEDICAL MANAGEMENT

There are several options for medical management of the substance-exposed infant. The specific medication chosen for the management of withdrawal symptoms depends on the symptoms present as well as the drugs to which the infant has been exposed. An opiate is preferred for the management of opiate withdrawal.<sup>17</sup> However, sedatives, particularly phenobarbital, may be effective as well, particularly in combination therapy.<sup>39</sup> Treatment protocols with these medications are difficult to standardize because each infant's withdrawal will vary. Decisions to increase, maintain, wean, or discontinue medications should include a review of the infant's withdrawal scores. In addition, postdischarge care also must be considered. Infants discharged to the mother with a continuing drug problem usually are not continued on treatment medications after discharge because the mother may be tempted to ingest drugs prescribed for the infant. The following section describes options for the medical management of the neonate with NAS.

#### Phenobarbital

Phenobarbital is useful for control of central nervous system symptoms, but has no effect on gastrointestinal symptoms, so it is not effective for the control of diarrhea. Some clinicians have concerns about the potential effect that



**FIGURE 1.**  
Providing an infant with a darkened, quiet environment can assist him in necessary self-calming behaviors.

phenobarbital may have on the infant's suck reflex because it is a central nervous system depressant.<sup>12,27</sup> Dosing is adjusted according to withdrawal scores, with a serum level of 20 to 30 mg/dl for 94% of patients with withdrawal syndrome.<sup>39</sup> Levels exceeding 40 mg/dl result in lethargy and sedation.<sup>40</sup> Therefore, if levels are maintained in the recommended range, oversedation should not be a concern. Laboratory testing for phenobarbital levels is important throughout the course of treatment. Kandall<sup>27</sup> suggested a beginning dose of 5 mg/kg/day, increased by 1 mg/kg to a maximum of 10 mg/kg/day based on abstinence syndrome severity scores. A study by Finnegan and Ehrlich<sup>41</sup> found that length of hospital stay increased an average of 4 days with the use of paregoric, as compared with phenobarbital, for the treatment of withdrawal syndrome. Coyle et al<sup>39</sup> found a decreased length of hospitalization with the combined use of tincture of opium and phenobarbital. The neonate generally is weaned off phenobarbital by being allowed to outgrow the dose. This implies that the infant is discharged from the hospital still receiving phenobarbital.

### Diazepam

Diazepam has been used for the treatment of withdrawal syndrome. However, it is not effective as a single agent and must be combined with another treatment.<sup>29</sup> The

additional treatment usually is an opiate. There is a greater likelihood of oversedation and resulting apnea when diazepam is used with phenobarbital.<sup>42</sup> Osborn et al<sup>43</sup> reported two studies that demonstrate a significant reduction in treatment failure with phenobarbital alone rather than diazepam alone. In addition, diazepam has a long half-life, with elimination as long as 1 month after administration.<sup>12</sup> In some cases, late onset seizures also are seen with diazepam, possibly attributable to the presence of benzoic acid as a preservative.<sup>12</sup>

### Methadone

Methadone is effective for managing withdrawal symptoms. However, weaning is slow, and hospitalization is consequently prolonged.<sup>12,29</sup> In some cases, these infants are discharged on methadone with dosing to continue in the home environment. This is not a viable option if the infant is discharged to the home where the substance-abusing mother or other substance abusers will be present.

### Tincture of Opium

Tincture of opium also is effective for controlling withdrawal symptoms, but is very concentrated.<sup>40</sup> Therefore, a small error in dosing leads to a significant overdose to the

patient. A 1:25 dilution delivers the same amount of morphine concentration as paregoric, but tincture of opium does not control diarrhea as does paregoric.<sup>12,40</sup>

Morphine sulfate is observed to be useful in treating narcotic withdrawal.<sup>29</sup> There are no studies regarding the use of morphine sulfate for the management of drug withdrawal in the neonate. However, it is commonly used for neonatal pain management.<sup>12,40</sup> Because of the metabolism of morphine sulfate in infants, doses must be individualized to be effective. Larger doses actually may be needed.<sup>40</sup> The suggested dosage for narcotic withdrawal is 0.5 mg/kg/dose by mouth repeated every 4 hours.<sup>40</sup> This should be tapered according to withdrawal scoring criteria.

### Paregoric

Paregoric is the most effective medication for the management of diarrhea associated with drug withdrawal.<sup>27,29</sup> However, this medication is no longer recommended because it contains benzoic acid, which displaces bilirubin from binding sites, leading to kernicterus at lower bilirubin levels. It also has been linked with death in premature infants.<sup>40</sup> In addition, paregoric contains 45% alcohol, which can be a gastric irritant and may cause hepatic damage and hypoglycemia.<sup>40</sup>

### Clonidine

Clonidine has been studied in the adult population for use in withdrawal from substances of abuse.<sup>12</sup> The attraction of this medication is that treatment duration usually is significantly shorter than with other medications. Clonidine was found to control all symptoms of withdrawal except poor sleep in the adult population.<sup>13</sup> Clonidine has been used for years in the treatment of hypertension and attention deficit hyperactivity disorder. It works by modulating the release of norepinephrine and dopamine.<sup>44</sup> Risks of oversedation and cardiovascular effects exist. The drug is available in tablet and transdermal patch forms, both of which may create problems in dosing of the neonatal population.<sup>44</sup> Because supportive evidence in the neonate is lacking, Osborne et al<sup>43</sup> concluded that clonidine should be used only for randomized clinical trials in the neonatal population.

### Chlorpromazine

Chlorpromazine is effective for controlling gastrointestinal effects and central nervous symptoms.<sup>12,29</sup> This medication also has a prolonged half-life of 3 days, making titration and weaning difficult.<sup>12</sup> Adverse effects of chlorpromazine may include cerebellar dysfunction, lower

seizure threshold, and hematologic abnormalities.<sup>12,29</sup> The use of chlorpromazine is discouraged because of the high incidence of adverse effects.<sup>44</sup>

### ● OUTCOME FOR THE SUBSTANCE-EXPOSED INFANT

Follow-up studies in the substance-exposed infant population are difficult because infants often are exposed to more than one substance before delivery. It is almost impossible to determine reliably the amount of the drug to which the neonate was exposed, the frequency of exposure, and the time the neonate was exposed before delivery.<sup>2</sup> Other variables that also have an impact on infant outcome include family genetics, maternal characteristics, socioeconomic status, the overall lifestyle of the substance abuser and family, and the social supports available after discharge of the infant.<sup>45,46</sup> The focus of maternal support and education during the infant's hospital stay, and preferably during the perinatal period, should focus on encouraging the mother to participate in a treatment program.<sup>5,46</sup> Ongoing maternal drug use is most predictive of poor infant and child outcome.<sup>2,5,45,46</sup> The sooner the mother gets into a treatment program, the better the chances an infant has for a positive long-term outcome. This is one "window of opportunity" for intervention that should not be ignored. Many times, these women have been in treatment programs previously or have been encouraged to get into treatment, but they are only truly motivated to stay in the program and stay "clean" when they realize the effect of the drugs on their newborn.

Several studies have found that the actual home environment has more impact on the infant than prenatal drug exposure.<sup>45,47-49</sup> If the mother is looking for the next hit of heroin, she is less likely to be caring for, feeding, and loving her infant. For this reason, foster care may be arranged after discharge from the hospital. Whenever possible, another family member is appointed as the guardian for the infant. Guidelines for reunification of the family vary considerably from state to state and county to county. However, in every situation, reunification is the ultimate goal. In some cases, follow-up social services are instituted with home visits while the infant is left in the home. In other cases, the mother may be encouraged to enter a treatment program, and at its successful completion is allowed to gain custody of the infant. Unfortunately, because of a seriously overloaded family services system, some infants are discharged to a home in which drug abuse continues with little to no outpatient in-home follow up oversight.



Follow-up studies have found delays in speech/language ability and prolonged alteration of sleep states in infants who were exposed to drugs in utero.<sup>46</sup> In addition, impaired motor and play behavior, poorer state control, and attention deficit hyperactivity disorder often present themselves in childhood.<sup>2,3</sup>

## • CONCLUSION

Neonatal abstinence syndrome presents unique challenges to the infusion nurse caring for the affected infant. These infants often are exposed to multiple substances, compounding the withdrawal and the effect on their overall health. The response to the medication provided in the treatment of the infant may be affected by previous exposure to substances of abuse, maturity of the infant, and other factors.

Withdrawal can be monitored objectively through the use of scoring tools. Several scoring tools are presented in this article, along with nursing measures and medications that may be helpful in the management of the withdrawal. Although working with the substance-exposed infant and family can be difficult, the nurse caring for the infant should never underestimate the effect her actions and attitudes may have on the family unit, and ultimately the health and well-being of the infant.

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