Mothers on Methadone: Care in the NICU

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Abstract

When women addicted to opioids seek prenatal care, the treatment of choice is methadone.[1,2] Methadone mediates the addiction by reducing fluctuations in maternal serum opioid levels and protecting the fetus from repeated withdrawal episodes.[3] Methadone maintenance is associated with increased maternal weight gain, decreased illegal drug use, and improved compliance with prenatal care.[4] Although the risks are less when compared with street drugs, the risk to the fetus is physical dependence. Despite the magnitude of this national problem, there is a dearth of literature to guide NICU nurses on how to best support mothers of infants with neonatal abstinence syndrome (NAS) in the care of their infants. The purposes of this article are to review what is known about women in methadone treatment who have a history of opioid addiction and apply that evidence to guide neonatal nurses to support mothers of infants with NAS in the NICU.

Keywords: substance abuse; methadone maintenance; NICU; nursing management; neonatal outcomes

Substance abuse is a national problem that is bordering on an epidemic, with more than 22 million Americans using illicit substances annually and 3.1 million new users each year.[1] Second only to marijuana, nonprescription use of pain medications was the first drug used by 1.9 million (14 percent) of the new users.[1] The highest rate of illicit drug abuse is in the West (10.5 percent), followed by the Northeast (9.2 percent), Midwest (8.5 percent), and South (7.5 percent).[1] Rates are highest in large metropolitan counties (9.2 percent) and lowest in rural counties (5.7 percent).[1] The Substance Abuse and Mental Health Services Administration (SAMHSA) reported that 5.0 percent of pregnant women used illicit drugs in 2011, higher than the previous reporting period (4.5 percent). The highest rates are among pregnant women aged 15–17 years (20.9 percent) and those aged 18–25 years (8.2 percent).[1] For those women addicted to opiates such as heroin, morphine, oxycodone, or hydrocodone who seek prenatal care, the treatment of choice is methadone, the only treatment approved by the Federal Drug Administration (FDA) for treatment of opioid addiction during pregnancy.[2–4]

Methadone maintenance therapy has been the standard of care for pregnant women who are opioid dependent since 1995, when the United States federal government issued a position statement supporting the practice.[5] Methadone mediates the addiction by reducing fluctuations in maternal serum opioid levels and protecting the fetus from repeated withdrawal episodes. Methadone maintenance is associated with increased maternal weight gain, decreased illegal drug use, and improved compliance with prenatal care.[6,7] Methadone withdrawal during pregnancy is not recommended because of increased risk of fetal death and maternal relapse. Mothers in a methadone treatment program are encouraged to breastfeed if they are not HIV positive, not abusing substances, or do not have a disease or infection in which breastfeeding is contraindicated.[8–10] Although the risks of methadone are less than compared with street drugs, the risk to the fetus is physical dependence often resulting in neonatal abstinence syndrome (NAS) during the first week of life. The risk of NAS to infants exposed to methadone in utero is reported to range from 45 to 71 percent.[11–13] The problem of NAS is not limited to illicit use. Incredibly, many pregnant women are prescribed opioids to manage back pain or following oral surgery. Buprenorphine, an alternative to methadone, has been shown to result in fewer cases of NAS, but more studies are needed before it will be approved for use during pregnancy.[14–15]

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Despite the magnitude of this national problem, there is a dearth of literature to guide NICU nurses to best advocate and support mothers of infants with NAS in the care of their infants. The purpose of this article is to review what is known about women in methadone treatment who have a history of opioid abuse and apply that evidence to guide neonatal nurses to advocate and support mothers of infants with NAS in the NICU.

BACKGROUND

NAS is becoming a very common diagnosis in the NICU, ranging from 20 to 35 percent of the annual NICU admissions in the midwest region of Florida.[16] Because maternal drug screening is not standardized care in all obstetrical practices, the prevalence of NAS is probably underreported.[3,7,17] In some cases, however, infants might be double-counted when they are transferred to a higher level of care. Many women are reluctant to report prescription opioid use to their obstetrician for fear of being discharged from the practice or, worse, reported to a child welfare agency. Some women who seek prenatal care often choose obstetric practices that do not routinely screen for drug use. It is not uncommon for hospitals whose obstetricians do not order drug screens to experience a sharp increase in the number of infants with NAS, whereas those that do screen report a drop in census. The SAMHSA statistics mentioned earlier are based on self-report, and the figures should be regarded as underreported. To illustrate the stark contrast, Kellogg and colleagues reviewed more than 26,000 deliveries at the Mayo Clinic for the rate of prescription narcotic use and reported a significant increase in the number of women who used prescription narcotics for chronic pain during their pregnancy over an 11-year period ($p<.0001$).[18] Because routine screening is not mandated, the actual number of pregnant women who are addicted to illicit substances is difficult to quantify with accuracy. It is no wonder that SAMHSA statistics do not reflect the experience of NICU nurses, because NAS continues to be a source of moral distress.[19,20] Because more mothers are routinely screened and their infants assessed for NAS, more infants will be admitted to the NICU for NAS treatment.

NAS is one of the most challenging conditions faced by neonatal nurses today. Not only do the infants fail to respond to commonly used comfort techniques, the mothers can be preoccupied by their own addictions. Nursing management of NAS requires knowledge that has not been traditionally associated with neonatal intensive care, such as maternal addiction, social risk factors, and psychosocial needs of mothers with substance abuse problems.[21,22] Mothers taking methadone face daily challenges that most nurses cannot imagine. Although not certainly true for all, they may be unable to leave an abusive relationship or are homeless and living in a shelter because they did save themselves. They are marginalized by society, and many have mental health issues. They may rely on others for transportation and have very little money for food. They may want to do the right thing, but the power of their addiction prohibits them from taking action. They may experience profound guilt over their infant's hospitalization but do everything they can to hide that vulnerability. The disease of addiction results in cravings for drugs that are far more powerful than their love for people they care about, even themselves. They continue to take drugs even though they know it is harmful to themselves and those around them. The repeated exposure to drugs causes a fundamental change in their brain that prohibits them from enjoying the simple pleasures of a baby's sweet smell or wonder of a new life. Research indicates that it takes one to two years of drug abstinence to enable the brain to return to normal, and thus every day is a monumental struggle.[23,24]

Drug abuse is often associated with a trigger, which is a stimulus that sets off an action, process, or series of events. Common triggers for cigarette smokers, for example, may be following a meal or drinking an alcoholic beverage. It is well known that drug addicts also have triggers that precede use.[25] Difficulty avoiding or disassociating with triggers are two of the reasons that drug addicts relapse many times before they are successful. It is important, then, for women in methadone treatment programs to know their personal triggers and consciously work to avoid them. For many, a powerful trigger is the people they used drugs with or the neighborhood they live in. If their spouse or father of the baby is a trigger, the risk for relapse is very high. Recognizing the triggers that challenge mothers in methadone programs may help establish a caring connection between the nurse and mother.

Most addiction specialists agree that caregivers' attitude toward addiction is a powerful determinant to successful addict recovery.[23] However, nurses who lack understanding of the disease of addiction frequently have negative attitudes toward women who abuse drugs.[24,25] In addition to reporting judgmental attitudes toward mothers of infants with NAS, Maguire and colleagues found that NICU nurses did not realize that methadone should not be discontinued during pregnancy, speculating that this knowledge gap may play a role in shaping their attitude.[26] These authors recommend that recognizing enrollment in a methadone treatment program as a positive step in a mother's recovery will help build a trusting relationship with the mother that is critical to her success. Nurse attitudes toward the infants, however, have consistently been reported to be positive.[20,26,27]

RISK DIFFERENTIAL FOR WOMEN

There are gender differences for risk of illicit drug use and the reasons why people abuse illicit drugs. Women have an increased risk of becoming dependent on illicit substances because of increased availability and access to drugs and become addicted in a much shorter time frame than men.[28] Women typically present with a more severe addiction than men, even when they have used less of the substance for a shorter period.[28] The accelerated progression toward addiction is a phenomenon called telescoping and is attributed to

women who use opioids, cannabis, and alcohol.[28,29] When women enter drug treatment, their drug problem is more severe than men because of these characteristics.[21] There are many potential explanations for the increased vulnerability of women to the adverse consequences, including hormonal, stress response, mood and anxiety disorders, and eating disorders.

Women at the highest risk for substance abuse are those who have mood or depressive disorders, eating disorders, or post-traumatic stress disorder or who have sustained sexual or physical abuse.[30–33] Many women of childbearing age, however, abuse drugs without having any risk-related history. Peer pressure during the teenage years can have powerful effects on teen choices. Among teens aged 12–17 years, females had a slightly higher rate of substance abuse than males in 2010.[34] In a study of 120 patients with chronic pain, Back and colleagues found that women were more likely to hoard prescription medications.[35] There is also evidence to suggest that children who are raised by drug-addicted parents are more likely to abuse drugs themselves.[36]

In addition to expected barriers to substance abuse treatment such as transportation problems, access to health care, poverty, and competing priorities of food and shelter, additional barriers faced by women include child care responsibilities.[37,38] There are few treatment facilities that enable women to stay with their children.[37] If a woman seeking treatment has children, she must find a reliable person who is willing to provide child care for an extended period. Many times, family members have given up on them, and mothers have few, if any, options. Furthermore, treatment for substance abuse has only recently been focused on the differences between men and women. When women are enrolled in treatment programs that focus on their specific needs, they have improved treatment engagement, retention, and outcomes.[39] The female social and economic environment, family, support systems, and the impact of gender and culture create the context for a supportive treatment regimen, which is supported by the best-known evidence.[39] However, many communities do not yet have substance abuse programs specifically targeted to women. Current programs fail to meet the unique needs of women, and the recovery rates are lower than gender-specific programs.

CONSEQUENCES OF OPIOID DRUG ABUSE

Women who abuse opioids are at higher risk of infections such as hepatitis B and C, chlamydia, gonorrhea, herpes, and HIV.[3] They are also less likely to begin early prenatal care because of the drug-related disruptions in their menstrual cycles and economic issues. These women suffer more from homelessness, poor nutrition, domestic violence, unemployment, and prostitution, all of which increase the risk for poor neonatal outcomes. It is also not uncommon for these women to experience problems with unemployment and access to health care. Skinner and colleagues followed 144 parents in methadone treatment for 12 years and reported high mortality, drug use, incarceration, homelessness, and health problems among the sample.[36] The women in the study were more likely to be in recovery than men, and they said their children or grandchildren were now the focus in their lives. More than half (52 percent) of the women in their sample were arrested more than ten times, and most of those who died in the sample were women. Depression was more significantly common among women ($p<.02$). More than half the women (55 percent) reported being unemployed in the past year. Most (89 percent) of the parents reported at least one residential change, but women were more likely to report it ($p<.04$).

Similarly, Conners and colleagues studied outcomes of a large group of women with a history of substance abuse who entered residential treatment.[40] They collected data from 50 publically funded residential treatment centers for four years that served 2,700 mothers and 4,000 children. The challenges faced by mothers in this study included few financial resources, unstable housing, history of abuse, legal problems, mental health problems, and lack of social support from family and friends. Most women were unemployed (89 percent), and 32 percent were homeless prior to the residential treatment. The barriers faced by women to escape the cycle of drug abuse are enormous, but, even among those without risk factors, the climb to recovery is challenged by multiple barriers.

EFFECTS OF OPIOIDS ON THE FETUS

Nonprescription use of opioids has varying effects on the fetus, and much is yet unknown. Heroin is the most studied, crossing the placenta within one hour of use.[41] Those who use heroin tend to ingest other harmful drugs, such as cocaine, alcohol, and amphetamines. However, intravenous drug use is strongly associated with infectious diseases such as chorioamnionitis and HIV.[3] Additional complications during pregnancy include intrauterine growth restriction, preterm delivery, vaginal bleeding, decreased head circumference, meconium staining, poor Apgar scores, and stillbirth.[41] In a study of women who used oxycodone regularly during pregnancy, Kelly and colleagues reported equivalent birth weight and Apgar scores but significant differences in preterm birth and length of stay in comparison to women who did not use oxycodone.[42] The rate of NAS among oxycodone-exposed infants was 29.5 percent in 482 births, and 66.0 percent among those who used daily.

Because there were few comprehensive studies of the effects of prenatal opiate exposure other than heroin, Davis and colleagues tested the effects of oxycodone addiction in an animal model.[43] The exposed pups had no severe toxicities such as birth defects. Gestation and maternal weight gain were all within normal parameters, but the pups had lower birth weight and withdrawal symptoms. When the pups matured, however, all the oxycodone-exposed adult males demonstrated significant deficits in learning and memory. Animal research is conducted under controlled conditions that are different from the human experience and therefore

must be considered as such. These results, however, support those from a long-term study of development in children of women who used combinations of heroin, cocaine, and methadone during their pregnancy.[44] These authors also found delays in cognitive development through age five years, especially in language development. Although it is difficult to conduct long-term studies of women who abuse just one substance, developmental delays have been associated with cocaine and marijuana but are not strongly linked to opiates.[45–48]

The incidence of birth defects was investigated in a large case-control population-based study of more than eight years.[49] The investigators studied pregnant women who were prescribed opioids at least one month prior to pregnancy and continued through the first trimester. They excluded mothers who had preexisting diabetes and those who reported exposure to opiate-containing street drugs. The birth defects strongly associated with prescription opioid use in early pregnancy were ventricular septal defect (OR = 2.7; 95% CI, 1.1–6.3), atrioventricular septal defects (OR = 2.0; 95% CI, 1.2–3.6), hypoplastic heart syndrome (OR = 2.4; 95% CI, 1.4–4.1), spina bifida (OR = 2.0; 95% CI, 1.3–3.2), and gastroschisis (OR = 1.8; 95% CI, 1.1–2.9). Similar incidences of birth defects were reported in a British cohort using methadone.[12] If women who take opioids under the direction of their physician for acute pain have such high risk for birth defects, it can be expected that the risk for opiate-addicted pregnant women is at least as high, if not higher. Parikh and colleagues recently reported significantly prolonged QT intervals in infants born to mothers on methadone.[50] The findings resolved by DOL 7, and no infant sustained any rhythm disturbance.

Although methadone maintenance is the standard of care for opiate-addicted pregnant women, methadone dosing is controversial. The increasing plasma volumes associated with pregnancy are thought to necessitate gradual increases in methadone dose to avoid maternal withdrawal symptoms. There is conflicting evidence as to whether the methadone dose is correlated to severity of NAS. A retrospective chart study by Lim and colleagues demonstrated increasing length of stay and NAS severity for every 5.5 mg increase in methadone (n = 68).[51] Other more comprehensive studies demonstrate that maternal dose is not associated with NAS incidence or severity, even when stratified by low, medium, and high doses.[52,53]

FACTORS THAT MEDIATE OUTCOMES

In addition to the gender-focused treatment that addresses the needs of women, there is strong evidence that prenatal care for women with substance abuse problems improves perinatal outcomes. A study of nearly 50,000 pregnant women who enrolled in an "Early Start" program reported significantly lower rates of mechanical ventilation, preterm delivery, and low birth weight in the group of women treated for substance abuse during their prenatal visits than those who were not.[54] The treated women reported the highest use of methamphetamine, cocaine, and tetrahydrocannabinol (THC) use. Although the authors did not report the rates of NAS, it is clear that infants of women who have prenatal care and are treated for their substance abuse have better outcomes. Similarly, data evaluated from 13 studies in an integrated review indicated higher growth parameters in children whose mothers were enrolled in integrated treatment programs.[55]

Retention in a methadone treatment program also appears to improve outcomes. Skinner and colleagues followed 144 parents with drug addictions and 177 children in methadone treatment for 12 years using parameters that included drug use, incarceration, employment, homelessness, and family and friend relationships.[36] They found that mothers were more likely to recover if they had long-term methadone treatment and had supportive relationships. Overall, the investigators recommended that parents need skills to maintain supportive-recovery friends and coping skills to avoid associations with deviant friends. Work has also been done to engage the male partners of pregnant women in treatment programs with promising results.[56] Men in the intervention were more likely to provide increased social support for their partners, although more research is needed to determine if the changes are sustained and have a positive impact on the family.

NURSING IMPLICATIONS

Nurses have a critical role in assessment, intervention, and attitude as demonstrated by several studies. French and colleagues reported improved interaction between mothers who used illicit substances in their pregnancy and their infants when they received prenatal care and a nursing teaching intervention.[57] Nurses demonstrated how to comfort the infants, respond to their cues, and develop ways to respond appropriately to the infants' needs. In a qualitative study of nurses caring for infants with NAS in Australia, Fraser and colleagues emphasized the important role that nurses have in creating a nurturing social environment that positively influences the parent–child relationship.[58] It is a time that nurses can strongly influence the parenting skills of new parents, especially those who are challenged by drug addiction.

Seeking continuing education that focuses on improving or developing relationships with parents who are addicted to drugs is a good first step for NICU nurses. Because many addicts have a history of trauma associated with their addiction, using the principles of trauma-informed care (TIC) can help create the supportive environment necessary for establishing good relationships.[59] The TIC adapts normal human services, programs, and interventions to accommodate the vulnerabilities or triggers of trauma survivors to be more supportive and avoid retraumatization.[59] Specific characteristics of TIC interventions include recognizing the survivors' need to be respected, informed, connected, and hopeful about their recovery; the interrelation between trauma and symptoms such as substance abuse; and the need to work collaboratively with the survivor, family, friends, and human

service agencies in a manner that empowers them.[59] The National Center for Trauma-Informed Care (http://www.samhsa.gov/nctic/) provides training to facilitate implementation of these principles, as well as many local organizations and universities. Hummer and Dollard provide an instrument used to assess organizations' readiness for TIC as part of their curriculum at the University of South Florida.[60]

Another skill that is useful and evidence based in addictions therapy is motivational interviewing (MI; http://motivationalinterview.org/index.html). This technique is based on the assumption that motivation to change emerges from a collaborative interpersonal context.[61] The MI is designed to strengthen an individual's motivation for change by exploring the persons' own arguments for change. Telling an addict why or how they should change their behavior rarely produces change. Instead, the nurse uses communication techniques that enable collaboration with the mother to draw out her own ideas about change, emphasizing her autonomy and recognizing that only she has the power to change. The principles involved in MI include empathy, supporting self-efficacy, rolling with resistance, and developing discrepancy.[61] Not surprisingly, MI also appears to be effective for other behaviors in which nurses are invested, such as promoting adaptive health behavior changes such as exercise, diet, and medication adherence.

Women who seek methadone treatment can be expected to have a severe substance abuse problem. They have taken a positive step, however, by acknowledging their addiction and seeking treatment. According to all the evidence, their action is more likely to protect their unborn infant from harm than their previous lifestyle.[3] Although there is conflicting evidence on maternal methadone dose and incidence of NAS, many infants are born without symptoms of NAS.[53] It should not matter what motivates women to seek treatment, although it is often the threat of child protective services involvement. Children can be a strong motivating factor for women to stay clean.[36] It is also likely that NICU nurses meet women at the start of their recovery and may influence their ability to be successful in the future. Some women require lifelong methadone treatment, depending on the severity of the addiction that is being treated. Experts in the field compare this to persons with diabetes, who need lifelong injections of insulin to maintain a normal life.[62] Both types of patients are dependent on the drug, not addicted to it. Methadone maintenance enables people to seek a college education, perform all types of intellectual and physical skills, marry, and have families. They no longer engage in risky activities to support their addiction.

Nurses should recognize that opioid addiction causes chemical changes in the brain that are so powerful people have no control over their craving for more.[63] That is precisely why they resort to illegal activities such as prostitution or stealing without apparent regard for consequences. Nothing matters more than feeding the addiction, even if it hurts them or their loved ones. The physical dependence on the drug blinds them to those realities, and they must resort to addictive behaviors to satisfy their dependence. The normal chemicals in the brain are no longer effective in the presence of opiates. Physical dependence such as this cannot stop easily or without professional help. The changes in the brain itself can take up to two years to reverse, which may be why there is such a high rate of relapse after rehabilitation treatment.[64] In many cases, prolonged methadone treatment of up to two years or longer is not uncommon and depends on many factors. Persons with severe and prolonged addictions to opiates may require lifelong treatment.[65–67] Fareed and colleagues reported statistically significant improvement in the addiction severity index among older adults who were addicted to heroin, as well as decreased chronic health conditions such as diabetes and cancer when they were in lifelong treatment.[65] Addicts successful in lifelong treatment are highly functioning members of society, holding jobs, going to college, and raising their families. Supportive attitudes and compassionate care will reinforce women's attempts to continue treatment and avoid triggers that render them defenseless. Recognition of the physiologic changes and chemical powerlessness of physical dependence provides the basis for compassionate care that is needed in this population. Nurses need orientation and/or continuing education on topics such as the drug-addicted brain, methadone maintenance programs, and therapeutic communication.

Mothers especially need continuous positive reinforcement to stay focused on doing the right thing for their children. Harsh, judgmental attitudes do not help women to break the cycle of addiction. Their feelings of guilt and low self-worth must continually be counterbalanced with the positive behaviors that they demonstrate.[68] Participating in a methadone maintenance program takes courage and demonstrates that the mother can make good choices. When a NICU nurse acknowledges that positively, the groundwork for a trusting relationship is made. Knowledge is a good first step in understanding, a quality needed for skilled, compassionate care of this vulnerable population.

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ERRATUM

Table 3, "Setting the Rate Using Inspiratory and Expiratory Times," that appeared on page 253 in the July/August 2013 issue of *Neonatal Network, 32*(4), in the article titled "Understanding Neonatal Ventilation: Strategies for Decision Making in the NICU," contained an error in the formula on line 2. The corrected table is presented here. We regret the error. A corrected version of the entire article is available at: http://neonatalnetwork.metapress.com/content/426h864527hl2556/

TABLE 3 ■ Setting the Rate Using Inspiratory and Expiratory Times

Confirm desired rate
Divide this into 60
From this number, subtract the inspiratory time (I_T)
This gives you the expiratory time (E_T) that you need to set to get the desired rate
Example 1—You want a rate of 60 and I_T of 0.4 second
60 divided by 60 = 1 second
1.0 minus 0.4 = 0.6 (set the E_T at 0.6 second)
This will give you a rate of 60
Example 2—You want a rate of 40 and I_T of 0.5 second
60 divided by 40 = 1.5 second
1.5 minus 0.5 = 1 second (set the E_T at 1 second)
This will give you a rate of 40