Neonatal Abstinence Syndrome: Reconstructing the Evidence

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Abstract

Neonatal abstinence syndrome (NAS) is the term used to describe the presence of withdrawal symptoms in neonates exposed prenatally to opiates. Much of what is known about NAS is based on the biomedical model of illness. There is less consideration of the social, historical, and political influences on knowledge development about the NAS phenomenon. Social construction presents an alternate framework within which to consider the diagnosis of NAS and on which to strengthen theoretical foundations, expand research programs, and improve practice.

Drug scares were a popular media creation throughout the 20th century.[1] Awareness of neonatal abstinence syndrome (NAS) emerged medically at the same time that society was dealing with the concern that narcotic addiction had reached epidemic proportions.[2] The possibility that opiates were teratogens was the subject of much research beginning in the 1970s, when heroin use was perceived to be a serious drug threat facing the nation.[3]

A large and still evolving body of health, social, and moral ideas and practices has contributed to identification and development of NAS as a clinical diagnosis. To date, accepted clinical practice guidelines remain grounded in research that was conducted 30 years ago, before the development of study designs with the ability to correct for the multiple confounders associated with maternal substance use.[4] Also, much of the literature on NAS is biomedical in nature. Consideration of the contexts of maternal substance use, including history, drug policy, and changing societal views of women and addiction, has the potential to contribute to a broader understanding of NAS.

Social construction, which falls within the field of medical sociology, offers a way of thinking about illness that contrasts with the biomedical model of health and illness that frequently dominates the practice of neonatal nursing. The social construction of health knowledge deals with the origins of health professionals' beliefs, diagnoses, and practices.[5] This article presents a social constructionist analysis of NAS and standards of nursing and medical practice during the neonatal period and contrasts that approach with current biomedical research and perspectives.

SOCIAL CONSTRUCTION

The term *social construction* is familiar to those in the social sciences, but not necessarily to those in the health sciences field, including nurses.[6] Although several versions apply to medical sociology, *social construction* is generally defined as the study of the forces that combine to create and modify a phenomenon.[5] Early social constructionists challenged the traditional biomedical view of social problems through exploration of a range of social, moral, and political dynamics that helped turn human conditions into "problems."[7] In health care, researchers have for the most part studied health and illness issues without acknowledging their socially constructed nature.[8] Proponents of social constructionism state that it offers much promise for building better theory, for conducting better research, and for influencing health policy.[5]

Accepted for publication August 2005. Revised October 2005.

A search for the keywords *social construction* in the article title using an academic search engine resulted in 382 references, demonstrating the extensive development of this approach in recent years. The social constructionist approach has been applied to health and illness issues as diverse as autism, cancer, and sexuality. It takes on particular significance in today's health care world with the increasing incidence of chronic illnesses, the widening diversity within communities, and the increasing awareness of the effects of policy and economics on health resources and living conditions.

Ivan Illich, in his 1976 text *Limits to Medicine,* proposes that each civilization constructs and defines its own diseases.[9] Consistent with Western biomedical assumptions about the basis of health and illness, the tendency within our health care system has been to medicalize social problems and to ignore or dismiss the effects of impoverished circumstances on health.[10] This holds particularly true in the neonatal intensive care setting, which is highly technical in nature.

LOOKING BACK: THE TRANSITION OF OPIATES FROM LEGAL TO ILLEGAL

As a class of drugs, opiates are one of the most important medical plants known and have been used by humans for centuries. Opium poppy capsules have been found in neolithic burial sites in southern Spain and have been dated radioactively to as far back as c. 4200 BC.[11] Ancient writings from Egypt, Assyria, and Greece contain many references to the role of opium for medicinal use, for use in religious ceremonies, and also to induce altered states of consciousness.

Around the world, opiates have been used at one time or another to treat almost every disease and condition imaginable. Despite a general lack of knowledge of how they worked, opiates were widely used in the absence of other effective drugs. Opium was recommended for everything from influenza to earache to hydrophobia, hemorrhage, and heart disease.[12] In addition to managing the symptoms of illness, opiates were used for pleasure. It was evident by the way in which they were sold and used in the first half of the 20th century that society in general had no fears about their use. Until the late 1800s, any person in Western society, whether qualified or not as a doctor or pharmacist, could buy and sell opium, and the range of opiate preparations available was enormous. At that time, there was little difference between medical and nonmedical use, and opium was used freely.[1] Opiates were frequently used by women to manage "female" problems (such as painful menstruation, childbirth, and puerperal fever), and use during pregnancy was also prevalent. Women were frequently prescribed opiates by physicians to relieve either physical or emotional distress, resulting in women being addicted to narcotics more often than men. This pattern eventually changed with the passage of drug laws, with men then being more likely than women to use illegal narcotics such as morphine and heroin.

A growing uneasiness about opium use eventually did develop, finding expression in the restrictions of the 1868 Pharmacy Act and in changed attitudes toward the drug. These changing responses to opiate use arose from 19th-century societal influences such as class tensions, the process of medical professionalization, morality, and racial hostility.[1] The influence of statistics and other information produced by newly established government agencies drew attention to public health issues. Data on poisoning and a new "disease" theory of addiction became more well known among medical practitioners, and a sustained campaign to limit the open availability and use of opiates began.

Drug laws are often influenced by history and politics, rather than being based on concern about the real harms posed by the drugs themselves.[13] In both the U.S. and Canada, early drug legislation was influenced by moralism, racism, and economic concerns.[14] There was, for example, public concern within the upper classes about opiates being used by the lower classes. Prohibition groups, some religious groups, and reformers promoted a shift toward a temperance approach (which included belief in self-control, morality, and abstinence). A backlash against immigrant Chinese railroad laborers and the Philippine opium trade in the early 1890s resulted in a closer examination of the unregulated opium industry. Science also contributed to concerns about the safety of opiates; pharmacologic creation of more potent synthetic compounds and the invention of devices such as the hypodermic syringe contributed to greater potential for abuse.

Early drug laws (the 1914 Harrison Act in the U.S. and the 1908 Opium Act in Canada) were direct responses to political pressures. Opium smoking was seen as an evil that needed to be immediately eliminated by government. The Harrison Act was originally conceived as a tax act and as a way of regulating access to opiates through registered physicians. The current drug act in the U.S. is the Controlled Substance Act of 1970, which is continually amended to deal with the changing availability of new synthetic drugs. The Canadian Opium Act eventually evolved into the current Canadian Controlled Substances Act, which governs more than 100 different substances, including cannabis, heroin, and cocaine. Many of these substances are not pharmacologic narcotics, but every drug listed in the schedule to the act is classified as a narcotic for legal purposes.[14]

NEONATAL ABSTINENCE SYNDROME

Although there were many earlier publications on the subject, a 1975 article by Finnegan and colleagues in the journal *Addictive Diseases* is considered to be a seminal (and often quoted) clinical publication on NAS. This group of neonatal, obstetric, and psychiatric researchers at the Philadelphia General Hospital sought to develop a collaborative study of maternal narcotic addiction and passive addiction in the neonate that would provide a basis for developing uniform criteria for assessment and treatment and act as a platform for comparative studies. The article defined a treatment protocol and described the Neonatal Abstinence Scoring System

(NASS).[2] This is still the most widely used scoring tool for measuring the severity of withdrawal symptoms in infants.

Today NAS is defined broadly as the presence of withdrawal behaviors in neonates exposed to dependency-producing drugs *in utero.* These behaviors include central nervous system hypersensitivity, autonomic dysfunction, and gastrointestinal disturbances.[15] A brief review of both early and current literature finds reference to many additional terms that essentially describe the process of neonatal withdrawal.These terms include *narcotic withdrawal syndrome, neonatal withdrawal syndrome, neonatal opiate abstinence syndrome, heroin withdrawal syndrome, neonatal opiate withdrawal, narcotic abstinence syndrome,* and *congenital neonatal narcotic addiction.* The term *NAS* most likely became dominant because of the ongoing work of Finnegan's productive research team.

Although it is a technically correct usage of the term *syndrome,* NAS in some cases becomes a label that remains with the child long after the withdrawal symptoms have disappeared. From a consistency perspective, the use of multiple terms for withdrawal may hamper literature searches and meta-analyses. Some references simply use the term *neonatal withdrawal* in place of NAS.[16,17] Consistent use of the basic term *neonatal withdrawal* might be useful in that it would describe the infant's experiences, reflect that they are limited to the neonatal period, and reduce the lifetime stigma of a "syndrome" label.

As with fetal alcohol spectrum disorder, diagnostic development of NAS represents evolution of both a clinical issue and a social problem.[18] Even though knowledge about substance use in pregnancy has advanced considerably, the public perceptions of and labels ascribed to substance-using mothers and their infants have remained mostly negative. When an infant is diagnosed with NAS, the images, beliefs, and perceptions associated with illegal drug use define the illness.[8] Past labels for affected infants—"idiots," "monsters," and "degenerate beings"—have been replaced by new labels—"crack babies," "drug babies," and "children of the damned."[3] A recent abstract for a neonatal conference reflects this continued perception in the presentation title "The Littlest Junkies: Drug-Addicted Babies. Whether it's Crack in the Cradle or Sucking on Embalming Fluid, Neonates are Increasingly Exposed to Drugs During Pregnancy."[19] Recently, a group of 30 of the top medical doctors and scientists in the area of U.S. perinatal substance abuse research released an open letter to the media calling for negative terminology such as "crack babies" to be dropped from use.[20]

A HEALTH ISSUE CAUGHT IN A MORAL PANIC: THE SOCIAL CONSTRUCTION OF NAS

From a social constructionist perspective, exploration of a diagnosis requires the tracing of its development. Brown describes a four-stage model (identification and diagnosis, illness experience, treatment, and outcome) that helps to identify the relative importance of various social forces across the disease discovery process.[5] Use of a model helps others to conduct new investigations and is useful in examining chronology. For example, homosexuality was a medicalized psychiatric disorder until external activist pressure convinced the American Psychiatric Association to delete it as a mental disorder. Brown's model will be used to examine the forces that combined to create and modify the phenomenon of NAS.

Stage I: Identification and Diagnosis—The Social Discovery of Disease

Most health-related position statements begin their examination of NAS by reviewing the epidemiology of prenatal substance exposure. Attempts have been made to calculate these figures, but each estimate has flaws.[21] Rates reported in surveys and studies vary greatly, depending on geographic location, differences in hospital practices, and reporting protocols. The 2004 National Survey on Drug Use and Health reported that, among pregnant women aged 15 to 44 years, an estimated 4.6 percent reported using illicit drugs in the past month.[22] At that point in time, the representativeness of the studies was limited because sampling had occurred primarily in large teaching hospitals.[23] It is also important to note that these reports include all illicit drugs. When statistics are broken down by substance, most women are reporting marijuana use; only 0.1 percent of women aged 15 to 44 reported use of heroin. Osbourne and associates write in their Cochrane review that in the U.S. an estimated 3,000 pregnant women are users of heroin.[24]

Infant exposure to opiates is not new. Historically, infants have been exposed to opiates both prenatally and after birth. In the late 1800s, the medical literature contained descriptions of symptoms displayed by infants born to women who used drugs, primarily opium, that are remarkably similar to current descriptions of neonatal withdrawal.[3] Dosing sick babies at home with a range of oils and opiates (usually patent medicines) was probably most parents' first response to illness throughout the 19th century.[25] Opium was in fact effective in treating the gastrointestinal disorders that at that time were the leading causes of infant deaths. In addition to use of opiates for medicinal purposes, some early sources suggest that working-class mothers who had to leave their children while they went to work dosed them with opiates ("syruping the infants").[12]

Before the 1960s, it was commonly believed that the placenta acted as a barrier to protect the fetus from noxious substances or circumstances. The thalidomide experience, in addition to spurring on the emerging fields of embryology and genetics, changed the ways in which both the public and doctors thought about pregnancy and the vulnerability of the fetus. The placenta could no longer be seen as an impermeable barrier, and a greater responsibility was placed on pregnant women to monitor and regulate their bodies during pregnancy.

There were two additional factors to consider in the 1970s. First was the emergence of the victimization of children as

both a medical diagnosis and a social problem. The problem of child abuse/neglect was first described in the medical literature in 1962; it was broadened in the 1970s to include not only physical battering, but emotional, sexual, and mental mistreatment.[26] Prenatal substance misuse has become equated with child abuse in the eyes of many legislators and professionals.[27] Second is that the diagnosis of fetal alcohol syndrome (FAS) was coined in 1972. NAS is often linked in literature to FAS, despite the teratogenic nature of alcohol and its specific effects on fetal development.

Current research finds that the opiate family of drugs (which includes morphine, heroin, and many synthetic compounds such as methadone and codeine) continues to be unexcelled for relief of severe physical pain.[28] Evans and colleagues suggest that it is a shame that, despite the presence of excellent research, the therapeutic potential of many opiates is ignored based solely on the reputation of their namesake, opium.[29] Health care professionals have been reluctant to provide full pain relief with opiates because of a fear of inducing addiction. In the case of care of the neonatal population, nurses and physicians are cautious about the risk of respiratory depression associated with opioid use. Recent advances in the field of palliative care and pain management provide evidence to counter this fear, yet many professionals still hold this belief.

First-generation drug and alcohol research was based on simple "effects" models that examined the direct effects of one suspected substance on specific aspects of child outcome.[30] However, very few studies have examined these children's lives beyond the first few years. The early research has been criticized for using small convenience samples, employing assessment methodologies that were not sensitive in identifying subtle or emergent effects, not addressing the issue of polydrug use, and failing to consider environmental factors. The state of the literature itself has also been questioned by some researchers, who have found that studies reporting no effects from cocaine exposure were less likely to be published than those reporting adverse outcomes.[31] A Cochrane review reports that opiate use in pregnancy and NAS resulting from opiate withdrawal are currently considered significant clinical and social problems—which they are, but sometimes not to the degree to which they are presented in many reports.[24]

Stage II: Experience of Illness

Originally representing the physiologic process of the infant's reacting to the sudden unavailability of maternal opiates, a diagnosis of NAS is now commonly applied to infants exposed to and experiencing withdrawal from substances other than opiates. Some researchers suggest that polydrug use is now the norm, rather than the exception.[32,33]

Neonates' responses to opiate withdrawal are similar to those of the adult, but because of the nature of newborn neurologic organization and development, the implications may be more severe in neonates.[15] Recent literature states that NAS is found to occur in varying degrees in 48–94 percent of infants whose mothers used opiates during pregnancy.[24] Methadone typically causes the most intense withdrawal, especially if high doses have been maintained throughout pregnancy. In mothers receiving <20 mg of methadone per day, less than half the infants develop signs of withdrawal. Withdrawal symptoms may appear in the first few days after birth or as late as two weeks after birth. Frequently seen symptoms include irritability, high-pitched cry, increased muscle tone, sleeping difficulties, feeding difficulties, and gastrointestinal dysfunction.[34–36] Withdrawal symptoms and the extent of withdrawal also vary in relation to the amount and type of drug or drugs used, as well as the gestational age of the infant.[15] In addition to withdrawal effects, infants whose mothers use opiates may also have specific risks related to injection drug use, maternal health, and social conditions, including human immunodeficiency virus, hepatitis C, sudden infant death syndrome, and low birth weight.

The NASS lists the signs and symptoms most commonly seen in the opiate-exposed neonate. This scoring system organizes signs and symptoms into groups, where they are weighted according to level of pathologic significance. A cutoff point represents the clinical situation in which infants require pharmacologic support because they are unable to maintain "control" with only environmental modifications such as swaddling.[2]

Other scoring scales have been developed, all with the goal of attempting to provide a structured assessment of the degree of withdrawal symptoms the infant is experiencing.[37] Critiques of all the scoring tools include the fact that they were normed on term newborn populations and may not be as accurate in premature or older infant populations or in infants exposed to substances other than opiates. These scoring systems also are unable to take into account how the type of handling the infants are receiving and the environment with which they are dealing affect their behavior.

Stage III: Treatment

With NAS, the accepted goals of treatment are to relieve the signs and symptoms of withdrawal, improve feeding and weight gain, prevent seizures, reduce unnecessary hospitalization, improve mother-infant interaction, and reduce the incidence of infant mortality and abnormal neurodevelopment.[24,34,38]

For many infants displaying mild, nonprogressing symptoms of withdrawal, conservative management with strategies such as holding, swaddling, and minimal stimulation is usually sufficient treatment.[4] For infants with more severe symptomatology, pharmacologic treatment may be required to stabilize the infant as far as physical dependence is concerned so that normal neonatal newborn patterns, such as sleep and sucking, can be restored and severe effects, such as seizures and dehydration, can be avoided. The American Academy of Pediatrics recommends that, for infants with confirmed drug exposure, the indications for drug therapy should be seizures, poor feeding, diarrhea and vomiting

resulting in excessive weight loss and dehydration, inability to sleep, and fever unrelated to infection.[34]

At this point, there is little evidence regarding the efficacy of different pharmacologic therapy regimens for treating NAS. Most published studies were conducted before the development of clinical epidemiology and modern study design and thus yielded only very limited comparative data on the benefits of different treatment protocols. Theis and colleagues performed a literature review between 1966 and April 1996 utilizing Medline. The heading *neonatal abstinence syndrome* yielded 638 citations, of which only 14 were comparative studies. When these studies were critically reviewed to highlight the methodological strengths and weaknesses and to extract and summarize the pertinent data, it was found that they did not allow meaningful comparisons in efficiencies between medications.[4] In summary, at present, good studies providing evidence for the selection of the best pharmacology for neonates are clearly missing.[4,24]

Most studies focus on pharmacologic management as the primary mode of treatment. Evidence assessing the effectiveness of conservative management strategies of daily care (nurses' work) is scarce. Only scattered studies of such strategies are found in the literature—for example, D'Apolito's study of the effectiveness of a rocking bed and Marcellus's study of Canadian standards of practice.[37,39] During the period of acute withdrawal, nurses are the key providers of care for infants with NAS, yet nursing practice and experience are still not adequately reflected in the research literature. The critical daily work of consoling infants experiencing withdrawal and supporting their families, who are often experiencing multiple stressors, remains invisible and is therefore vulnerable to not being included in research programs and standards of practice. Table 1 outlines some potential areas of research in this field.

TABLE 1 ■ Some Potential Areas of Study for NAS Research

Quantitative	Qualitative
Continued examination of the interrater reliability of scoring tools, particularly for infants cared for in settings other than the NICU	Natural history of infants with prenatal substance exposure
Psychometric comparison of scoring tools; further testing of the adequacy of published NAS scoring tools	Experiences of caregivers, including birth parents, kinship caregivers, foster parents, adoptive parents, and nurses
Testing of the adequacy of NAS scoring tools for substances other than opioids	Contrasting infants' experiences of withdrawal with their experiences of pain
Comparing scheduled feeding and handling with demand feeding and handling	Discourse analysis of standardized guidelines and protocols
Comparing minimal handling with cue-based care	Between-country/between-culture comparisons of the NAS experience
Measurement of the effect of the parent-as-partner approach on caregiving skills and infant withdrawal experience	Examination of health and child welfare transdisciplinary practice in relation to support of infants with NAS and their caregivers
The effect of one-to-one caregiving/primary nursing on infant withdrawal	Development of parent and caregiver support strategies
Comparative study of nursing interventions—level of environmental control, positioning, and other activities	Consideration of caring for infants with NAS in settings other than the NICU

Also unasked within the practice guidelines related to daily care are questions with neurodevelopmental and infant mental health implications. These include the potentially iatrogenic effects on the infant of an environment with minimal stimulation for a prolonged period, the effects of restricted caregiving and touch based on a concern for overstimulation, and the effects of separating the infant from the parents. In 1988, Kaltenbach and Finnegan referred to this potential for iatrogenesis when they raised the issue of whether a prolonged limited capacity for interaction in the infant was related to neonatal abstinence or if it was a result of pharmacotherapy.[40] These questions have interprofessional implications related not only to nursing, but also to medicine, social work, and child development. Best practice and research will be strengthened by considerations beyond the biomedical.

There has been little advancement in the management of NAS since the initial reports in the 1970s. Finnegan and colleagues' work continues to be held up as the gold standard and as the theoretical background on which current studies and practice guidelines are designed. Systematic research in infants in general has lagged considerably behind that in older children and adults, possibly for reasons such as the low status of infants in the social order or the ethical difficulties associated with conducting research on this vulnerable population.[41–44] It is also possible that continued research in the field of NAS lags because NAS lacks the "cachet" of other neonatal issues, being seen primarily as a social or moral issue.

Stage IV: Outcome

Early reports in the media based on anecdotal evidence resulted in a rush to judgment about the impact of illegal drugs on the growth and development of children.[45,46] Dire predictions were made about a generation of drug-exposed infants; they were represented as severely brain damaged. Beginning in the early 1990s, researchers in fields such as sociology, social work, psychology, and women's studies, and increasingly the health care field, began to urge a more balanced view of prenatal substance exposure.[47] Evidence began to be offered that social determinants of health (such as addiction, poverty, and lower levels of prenatal care) might impact fetal development as much as drug exposure.[45] For example, Frank and colleagues, in their meta-analysis of studies examining outcomes of children exposed prenatally to cocaine, concluded that maternal cocaine use should be recognized

not as the sole cause of fetal insult, but as a "red flag" for the social and environmental variables associated with cocaine use that may adversely affect the health and well-being of the baby, regardless of prenatal exposure.[48] Barry Lester, a leader in the field of perinatal substance use outcome research, has concluded that the greatest impediment to cognitive development in children is not drug use, but poverty.[49]

Despite the withdrawal they experience in their first year of life, research studies indicate that these children do well if their mothers did not abuse other substances (particularly alcohol) and if the children are raised in a supportive environment.[50–52] Only a limited number of studies that have followed these children into their school years is available. Some adverse effects noted by researchers include behavioral disturbances, brief attention span, temper outbursts, learning disabilities, delayed speech, and developmental delay. In longitudinal studies, researchers also need to incorporate additional environmental and contextual factors significant in the lives of children and families. Jacobsen and Jacobsen suggest that bringing together two lines of research that reflect different perspectives on the effects of parental drug and alcohol use—the long-term impact of teratogenic insult from prenatal exposure and the developmental risks associated with being reared by a substance-abusing parent or in an environment with diminished resources—will offer a better understanding of the complex interrelated influences of risk factors on child development.[53]

PRACTICE IMPLICATIONS FOR NEONATAL NURSES

Nursing guidelines related to the care of infants with prenatal substance exposure are based on historic medical research, anecdotal evidence, and limited current research. Because nursing support of infants experiencing withdrawal is not highly technical in nature, some staff perceive that advanced skills are not needed to manage this population. However, the sensitivity of this group of infants requires a unique skill set. Nurses caring for infants with prenatal substance exposure need complex skills in assessment, environmental modification, feeding, and particularly the ability to console infants experiencing increased and prolonged irritability. Nurses also require advanced communication and relational skills to work with and effectively support birth families that are coping with multiple life stressors and also often dealing with intervention from Child Protection Services. The level of knowledge, skill, patience, and commitment required to provide excellent nursing care to this group of infants should not be underestimated.

An understanding of the development of the evidence base related to NAS and of currently accepted standards of practice provides a framework for critiquing and advancing these standards of practice and a direction for future research. Nursing care greatly influences how infants progress through withdrawal and how parents are taught to support their infants. From a unit management perspective, infants who have their withdrawal symptoms managed effectively may not require opioid support as often or for as long a time as those who lack effective symptom management. From a parent-child perspective, the relationship formed at this time will affect ongoing relationship growth within these families and will influence developmental outcomes for these infants.

SUMMARY

Much of the literature and research on NAS is biomedical in nature. Social construction presents an alternate framework within which to consider the diagnosis of NAS and on which to strengthen theoretical foundations, expand research programs, and improve practice. Neonatal nurses are therefore challenged to look beyond the accepted biomedical and technical meanings of health and illness and to reflect on the social and political pressures that influence how drug-exposed infants and their families are perceived and supported, both in the hospital and after transition to the community.

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Acknowledgments: Financial support for this article was received from Social Sciences and Humanities Research Council of Canada and the Canadian Institutes for Health Research.

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