

Neonatal Abstinence Syndrome

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Abstract

Neonatal abstinence syndrome (NAS) is a condition in which opioid impact will be in neonates by the over usage of pregnant women. Incidence rate revealed that one baby per hour affected by neonatal abstinence syndrome. And it widely affecting gastro intestinal, autonomic and central nervous system. Etiology implies misuse of licit or illicit drugs. This article covering the management which includes the pharmacological and non-pharmacological treatment modalities and this article contain how can assess the newborn with the help of a modified Finnegan scoring system to identify the withdrawal symptoms. And some innovations in treatments are implemented now days are also embedded in this article. Finally this article winding up with the preventive measures for neonatal abstinence syndrome.

Keywords: Neonatal abstinence syndrome; Newborn; Opioids; Finnegan scale; Morphine; Methadone.

Introduction

In line with a growing worldwide trend of increasing illicit drug use there has been an increase in the incidence of women of childbearing age becoming dependent on drugs of addiction, resulting in higher drug use in pregnancy. Over the last decade, there has been increasing public health, medical, and political attention paid to the parallel rise in two trends: an increase in the prevalence of prescription opioid abuse and an increase in the incidence of neonatal abstinence syndrome. The two trends are likely intertwined, but many questions remain about the nature of the neonatal abstinence syndrome “epidemic” and how best to screen for affected infants and manage their symptoms.

A 2012 study from the University of Michigan and the University of Pittsburgh analyzed information on 7.4 million discharges from 4,121 hospitals in 44 states, to measure trends and costs associated with

NAS over the past decade. The study indicated that between 2000 and 2009, the number of mothers using opiates increased from 1.19 to 5.63 per 1,000 hospital births per year. Newborns with NAS were 19% more likely than all other hospital births to have low birth weight and 30% more like to have respiratory complications. Between 2000 and 2009, total hospital charges for NAS cases, adjusted for inflation, are estimated to have increased from \$190 million to \$720 million.[1]

What is NAS?

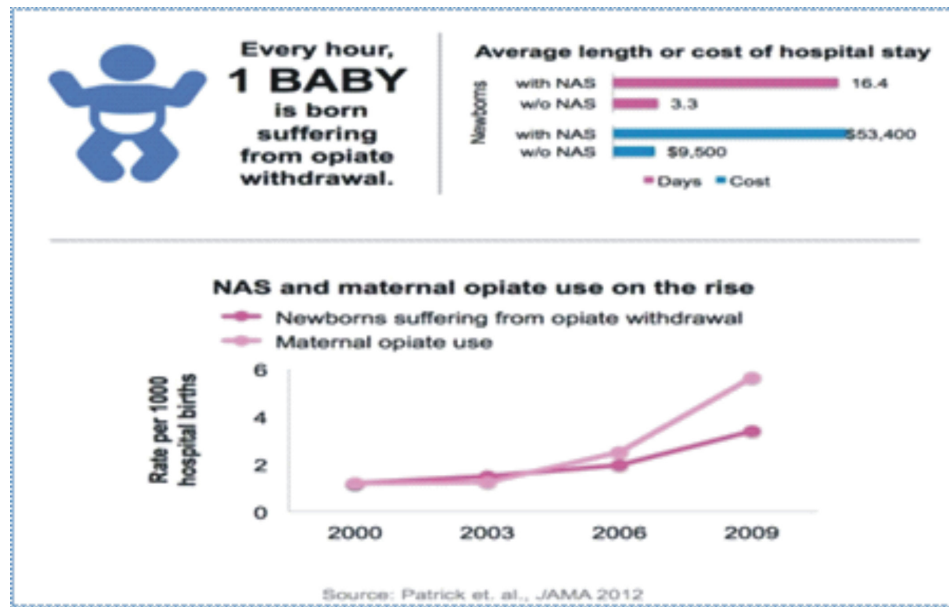
Neonatal withdrawal or neonatal abstinence syndrome (NAS) is a withdrawal syndrome of infants, caused by the cessation of the administration of licit or illicit drugs. The drugs involved may be for example opioids, SSRIs, ethanol and benzodiazepines. There are two types of NAS: prenatal and postnatal. Prenatal NAS is caused by discontinuation of drugs taken by the pregnant mother, while postnatal NAS is caused by discontinuation of drugs directly to the infant.[2]

In utero exposure to certain drugs can cause neonatal withdrawal after birth when the drug is abruptly stopped because the infant—like the mother—has developed physical dependence on the drug.

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Incidence

- In Queensland 2007, the reported incidence of NAS in newborn babies was 0.3%, however incidence may be higher than reported.[3]
- An Australian survey reported illicit drug use in 6% of women who were pregnant and/or breastfeeding in the preceding 12 months.[4]
- The ideal study in the United States reported 10.7% of mothers had used illicit drugs during pregnancy.[5]
- Alcohol use in Australia was reported in almost half of pregnant women and women who were breastfeeding up to 6 months postpartum. In the USA, 4.5% of pregnant women reported binge drinking in the past month.[4]
- A retrospective, serial, study to determine the national incidence of NAS and antepartum maternal opiate use and to characterize trends in national health care expenditures associated with NAS between 2000 and 2009. Results of this study revealed the separate years (2000, 2003, 2006, and 2009) of national discharge data included 2920 to 9674 unweighted discharges with NAS and 987 to 4563 unweighted discharges for mothers diagnosed with antepartum opiate use, within data sets including 784 191 to 1.1 million discharges for children (KID) and 816 554 to 879 910 discharges for all ages of delivering mothers (NIS). Between 2000 and 2009, the incidence

of NAS among newborns increased from 1.20 to 3.39 per 1000 hospital births per year. By 2009, 77.6% of charges for NAS were attributed to state Medicaid programs.[6]

Signs and Symptoms[14]

Symptoms of NAS depend on various factors including the type of drug the mother used, how much of the drug she used, how long she used the drug, and how the mother's body breaks down the drug. Infants that are at a high risk for withdrawal need to be watched very closely for any of these signs or symptoms. If the infant begins to show any signs or symptoms scoring must be started immediately. Symptoms may include the following:

Management of NAS

Trends[9]

- Increased research in clonidine and buprenorphine
- Pharmacogenetics
- Polysubstance abuse treatment
- Dose optimization

Pharmacological Management

Pharmacological management is indicated to relieve moderate to severe signs of NAS and prevent complications such as fever, weight loss, and seizures

Causes[7,8]
Substances used or misused

Opioids	CNS stimulants	CNS depressants	Hallucinogens
Agonists	Amphetamines	Alcohol	Alkaloids
Codeine	Amphetamine		Lysergic acid diethylamide (LSD)
Fentanyl	Dextroamphetamine	Barbiturates	Psilocin
Heroin (Diacetyl Morphine)	Methamphetamine		Psilocybin
Hydromorphone		Benzodiazepines	Dimethyltryptamine (DMT)
	Amphetamine related	Alprazolam	Diethyltryptamine (DET)
	Benzphetamine	Clonazepam	
Morphine	Diethylpropion	Diazepam	Inhalants
Methadone	Ephedrine	Flunitrazepam	Solvents and aerosols (glues, gasoline, paint thinner, cleaning solutions, nail polish remover,
Meperidine	Fenfluramine	Oxazepam	
Oxycodone			
	Mazindol	Temazepam	
Propoxyphene			freon))
	Methcathinone		
	Methylphenidate (Ritalin)	Cannabinoids	
Antagonists			Phenylethylamines
	Pemoline	Cannabis/marijuana	
Naltrexone	Phendimetrazine	Hashish	Mescaline
	Phentermine		Peyote
Mixed agonist-antagonists	Phenylpropanolamine		Stimulant with hallucinogenic properties
Buprenorphine (Subutex)	Caffeine		Methylenedioxyamphetamine (MDA)
	Cocaine		3-methoxy-4,5-methylenedioxyamphetamine
Butorphanol			
	Nicotine		(MMDA)
Nalbuphine			3,4-methylene dioxamphetamine (MDMA)(Ecstasy)
Pentazocine	Dissociative anaesthetics		3,4-methylenedioxyamphetamine (MDEA)
	Phencyclidine (PCP)		
	Ketamine		
	Selective serotonin reuptake inhibitors		Nitrites
	Citalopram (Cipramil, Celapram, Talam)		Nitrous oxide
	Escitalopram oxalate (Lexapro, Esipram)		
	Fluoxetine (Prozac, Lovan) (Luvox, Voxam)		
	Sertraline (Zoloft, Zydep, Seprone)		
	Serotonin-noradrenaline reuptake inhibitors (SNRIs)		
	Venlafaxine hydrochloride		

System	Signs and symptoms
Central nervous system	<ul style="list-style-type: none"> • Tremors • Irritability • Increased wakefulness • High pitched crying • Increased muscle tone • Hyperactive deep tendon reflexes • Exaggerated Moro reflex
Gastrointestinal	<ul style="list-style-type: none"> • Frequent yawning and sneezing • Poor feeding • Uncoordinated and constant sucking • Vomiting • Diarrhoea • Dehydration
Autonomic	<ul style="list-style-type: none"> • Poor weight gain • Increased sweating • Nasal stuffiness • Fever • Mottling • Temperature instability

if an infant is not responding to non-pharmacological support.

Pharmacological therapy, however, should be undertaken with caution because it can lengthen the hospital stay and may interfere with mother-infant bonding.

The first-line therapy for opioid withdrawal is treatment with an opiate.

- Morphine is an option and used only in the inpatient setting.
- Methadone is another option and may be weaned

After hospital discharge, but outpatient dosing requires good follow-up and teaching for families. Methadone has a variable half-life in infants, so the drug can accumulate in the infant and cause lethargy.[1]

The safety, feasibility, and efficacy of outpatient methadone treatment continue to be studied to identify pharmacological agents that would safely decrease the length of inpatient hospitalization in. Mainstay of pharmacologic NAS treatment is oral opiate therapy (morphine, methadone).

- Most physicians (94% in the UK and 83% in the US) use an oral opiate as the first

choice.[9]

- The American Academy of Pediatrics (AAP) guidelines for neonatal drug withdrawal supports the use of opiate treatment but makes no recommendation for drug of choice.[2]
- Phenobarbital and clonidine may also be used as an adjunct to opiate therapy[12]
- Buprenorphine is another potential new option for infant treatment, but this drug needs further study as a primary choice for NAS⁽¹²⁾.
- Clonidine and phenobarbital are drugs that may be used as adjunct therapy to the primary opiate treatment for NAS. Adjunct therapy or specially tailored regimens may be particularly important for infants with withdrawal following polydrug exposure.[12]

Methadone Maintenance Therapy

Methadone maintenance therapy (MMT) is the current standard of care for the management of opioid addiction in pregnancy. Several research studies address the multiple benefits of this treatment including improved neonatal outcomes and the potential for a strengthened maternal-infant relationship immediately following the infant's

birth. Methadone is administered daily under the care of a physician and pharmacist and, as such, offers consistent opportunities for engagement and intervention for medical and social risk factors.[10]

In the United States a national survey to determine the monitoring and treatment of NAS in neonatal intensive care units (NICUs) following opioid or polydrug exposure in utero, found that opioids (tincture of opium or morphine sulphate solution) were most commonly used for management of both opioid (63%) and polydrug withdrawal (52%), followed by phenobarbital (32%) for polydrug withdrawal and methadone (20%) for opioid withdrawal. Overall 70% of the respondents use phenobarbital and 25% use intravenous morphine to control opioid withdrawal seizures, with 81% of respondents using phenobarbital for polydrug withdrawal seizures. Only 70% of respondents always use a scoring system when deciding whether to start, titrate or cease pharmacologic treatment for neonatal withdrawal.[10]

Non-Pharmacological Care

Non-pharmacological management should be the standard of care for all opioid-exposed infants to help them sleep, eat, gain weight, and interact with caregivers. Non-pharmacological interventions include:

- Minimizing stimuli such as light and sound
- Avoiding infant auto stimulation by careful swaddling
- Responding early to an infant’s signals
- Adopting infant positioning and comforting techniques such as swaying, rocking, and pacifier use.[15]
- If there is no contraindication, such as HIV infection, mothers should be encouraged to breastfeed because it has been associated with ameliorating and delaying withdrawal symptoms, even after adjusting for prematurity and polydrug exposure.[16]
- Providing frequent small volumes of feeds to allow for adequate growth.

Infants who are being observed for withdrawal need to be continuously monitored, such as with pulse oximetry or a cardiorespiratory monitor, but if this can be conducted using a mother-baby unit, then

there is more opportunity to support mother-infant bonding.[16]

Some evidence indicates that the site of care may influence short-term outcomes. For example, infants who room-in with mothers instead of being transferred to a NICU had an increased likelihood of being discharged home with their mother and a decreased need for NAS drug therapy.[15]

Positive role modeling by healthcare providers on how to recognize and respond to infants’ cues can help set the tone for mother-infant attachment and healthy interactions.[16]

When to initiate pharmacologic treatment?

A scoring scale is implemented to assess severity of NAS, Many scales are available, but the Modified Neonatal Abstinence Scoring System, otherwise known as the modified Finnegan Score is the predominant tool used in the United States.[11]

- The modified Finnegan Score is a numeric description of the severity of symptoms and can be used to decide when to initiate treatment and to determine treatment efficacy. [11]

Neonatal Abstinence Syndrome Scoring Form[15]

Name:.....

DOB:.....

SIGNS:

Observation from past 3- 4 hours

BirthWeight:.....grams

Start new scoring sheet each calendar day.

Daily Weight :.....grams

Care of babies at risk of NAS born to substance using mothers.[17]

Ante natal care:

- Under taken a comprehensive physical and psychological assessments.
- Should identify women’s need eg: referral to community services, substance use in pregnancy services etc.

Date:	Score	Time	Time	Time	Time	Time	Time	Time	Time
High pitched cry: inconsolable >15 sec. OR intermittently for <5 min.	2								
High pitched cry: inconsolable >15 sec. AND intermittently for =5 min.	3								
Sleeps <1 hour after feeding	3								
Sleeps <2 hours after feeding	2								
Sleeps <3 hours after feeding	1								
Hyperactive Moro	1								
Markedly hyperactive Moro	2								
Mild tremors: disturbed	1								
Moderate-severe tremors: disturbed	2								
Mild tremors: undisturbed	1								
Moderate-severe tremors: undisturbed	2								
Increased muscle tone	1-2								
Excoriation (indicate specific area):	1-2								
<hr/>									
Generalized seizure	8								
Fever =37.2°C (99°F)	1								
Frequent yawning (=4 in an interval)	1								
Sweating	1								
Nasal stuffiness	1								
Sneezing (=4 in an interval)	1								
Tachypnea (rate >60/min.)	2								
Poor feeding	2								
Vomiting (or regurgitation)	2								
Loose stools	2								
=90% of birth weight	2								
Excessive irritability	1-3								
Total score									
Initials of scorer									

- Referral to home visiting services
- Antenatal collaboration and communication between drug and alcohol addiction treatment providers and antenatal care providers.
- Assess women's level of intoxication
- If in withdrawal, seek urgent drug and alcohol addiction treatment services
- Immediate case and assessment of the newborn at birth.

Post natal care:

- Assessment of newborn by Finnegan scale for identifying withdrawal symptoms.
- Assessment of maternal well being
- Continuing drug and alcohol addiction treatment for mother confirmed.
- Naloxone should not be administered to babies whose mothers are known or suspected to be dependent on opioids.

- A case conference should be conducted by a multidisciplinary team to formulate a discharge plan.
- Discharge planning meeting should be attended by the parents, member of multidisciplinary team and representatives from relevant services.

Discharge and follow-up [17]

- Mother and baby should be discharged only after a minimum of 5-7 days following medical and psychosocial assessment that indicates a stable condition.
- A formal discharge plan discussed with parents circulated to a multidisciplinary team and should make the referrals if necessary.

Infant follow-up:

- Infants at risk of NAS should be referred to