Identifying Neonatal Abstinence Syndrome (NAS) and Treatment Guidelines

University of Iowa Children's Hospital -2/11/13

What is Neonatal Abstinence Syndrome?

- Neonatal withdrawal after intrauterine exposure to certain drugs (illicit or prescription)
- Occurs with the abrupt cessation of the drug exposure at birth
- Most commonly seen with opioid exposure, but also seen after exposure to sedatives, polysubstance abuse, and occasionally barbiturates and alcohol
- Develops in 55-94% of drug-exposed infants

Screening

- Maternal history
- Urine drug screen

- Meconium drug testing
- Umbilical cord testing

Clinical Signs of Withdrawal

Neurological	Gastrointestinal	Autonomic
Irritability	Vomiting	Diaphoresis
Increased wakefulness	• Diarrhea	Nasal stuffiness
• High-pitched cry	Dehydration	• Fever
• Tremor	• Poor weight gain	Mottling
• Increased muscle tone	Poor feeding	Temperature instability
• Hyperactive deep	• Uncoordinated and	Piloerection
tendon reflexes	constant sucking	• Mild elevations in
• Frequent yawning		respiratory rate and
Sneezing		blood pressure
Seizures		

Onset of withdrawal symptoms

• Onset of withdrawal depends on the half-life of the drug, duration of the addiction, and time of last maternal dose prior to delivery. On average, observation period for symptoms to appear is 3 days.

Drug	Approximate time to onset of withdrawal symptoms
Barbiturates	4-7 days but can range from 1-14 days
Cocaine	Usually no withdrawal signs but sometimes neurobehavioral abnormalities (decreased
	arousal and physiologic stress) occur at 48-60 hours
Alcohol	3-12 hours
Heroin	Within 24 hours
Marijuana	Usually no clinical withdrawal signs
Methadone	3 days but up to 5-7 days; rate of severity of withdraw cannot be correlated to dose of
	maternal methadone
Methamphetamines	Usually no withdrawal signs but sometimes neurobehavioral abnormalities (decreased
	arousal, increased physiologic stress, and poor quality of movement) occur at 48-60 hours
Opioids	24-36 hours but can be up to 5-7 days
Sedatives	1-3 days
SSRIs	Several hours to several days—withdrawal linked with 3 rd trimester use

Preterm Infants and NAS

• Due to immaturity, less total body fat, and differences in total drug exposure, preterm infants may exhibit fewer signs of withdrawal than near-term and term infants.

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Treatment of Neonatal Abstinence Syndrome

Goal: stabilize clinical manifestations of withdrawal and restore normal newborn activity

Scoring of NAS

- Finnegan scoring (tool to quantify severity of NAS) (See last page for Finnegan Scoring System)
 - Begin scoring within 2 hours of life
 - Continue scoring every 4 hours
- Used to determine initiation of pharmacologic therapy

Non-Pharmacologic Intervention

- Swaddling
- Rocking
- Minimal sensory or environmental stimulation
- Maintain temperature stability
- Feed (consider alternating bottle and pacifier during feed to compensate for excessive sucking and possibly prevent emesis)
- Breast milk feedings when appropriate can help reduce the need for pharmacological intervention

Pharmacologic Therapy

- Begin when 3 consecutive Finnegan scores are ≥ 8 or when the <u>sum</u> of 3 consecutive Finnegan scores is ≥ 24 .
- Morphine is the first-line agent and the mainstay of treatment.
- Phenobarbital is the first line additional therapy for polysubstance exposure and may be used in combination with opioid therapy for NAS secondary to opiate withdrawal.
- Opioid-dependency is likely seen after exposure to buprenorphine (Subutex), codeine, heroin, hydrocodone (Lortab, Vicodin), hydromorphone (Dilaudid), methadone, morphine, oxycodone (Percocet).
- Polysubstance-dependency is likely seen with the above drugs as well as barbiturates, sedatives, SSRIs.
- See next page for *Pharmacologic Management of NAS* guidelines.

Pharmacologic Management of Neonatal Abstinence Syndrome in the NICU

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*0.05 mg/kg PO is recommended starting dose for NAS

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Tapering Schedule (Start this AFTER the patient is stabilized on a dose)

- Dosing on chart is in absolute mgs (NOT mg/kg)
- Find the dose on the chart that is <u>closest to the dose</u> the patient has been stabilized on and start there (this means you may not be starting at the top of the chart)
- Taper dose every 24-48 hours as tolerated, guided by Finnegan Scores of < 8

Recommended Tapering Schedule AFTER the infant is stabilized on a dose and read				
Morphine TAPERING schedule	Morphine TAPERING schedule			
(follow this side for infants > 3 kgs)	(follow this side for infants \leq 3 kgs)			
0.4 mg PO q 4 hrs	0.4 mg PO q 4 hrs			
0.3 mg PO q 4 hrs	0.3 mg PO q 4 hrs			
0.2 mg PO q 4 hrs	0.2 mg PO q 4 hrs			
0.2 mg PO q 6 hrs	0.1 mg PO q 4 hrs			
0.2 mg PO q 8 hrs	0.1 mg PO q 6 hrs			
0.2 mg PO q 12 hrs	0.1 mg PO q 8 hrs			
0.2 mg PO q 24 hrs	0.1 mg PO q 12 hrs			
Discontinue	0.1 mg PO q 24 hrs			
	Discontinue			

Recommended Tapering Schedule AFTER the infant is stabilized on a dose and ready to wean

Alternative pharmacological treatment (not first-line at UIHC NICU)

- Methadone for opioid-dependency as an alternative to morphine. Dose 0.05 mg/kg PO every 12 hours. Increase by 0.05 mg/kg every 12 hours until NAS scores stabilize. Adverse effects include bradycardia and tachycardia and an ECG should be obtained to evaluate for QT-prolongation. Methadone has an extremely long half-life which can be up to 24 hours in a neonate. Methadone must be tapered by 10-20% per week over 4-6 weeks.
- 2) Clonidine as an alternative to phenobarbital. Clonidine is given in addition to morphine for polysubstance-dependency in term neonates with moderate to severe NAS uncontrolled by morphine alone. Dose 1 mcg/kg PO every 4 hours. Adverse effects include hypotension, rebound hypertension if clonidine is not tapered off over more than a week, AV-block, and bradycardia. MUST taper clonidine off over 10-14 days.

Alcohol	Acute ingestion: Hyperactivity, tremors for 72 hours followed by lethargy
	for 48 hours
	Chronic ingestion: abnormalities include CNS, growth deficiency, facial
	features, cardiac and musculoskeletal anomalies.
Amphetamines	IUGR, cardiac anomalies
Cocaine	Neurological complications (infarct, IVH, cystic lesions)
	Higher incidence of prematurity, low birth weight, placental abruption
	Associated with higher incidence of genitourinary tract and gastrointestinal
	anomalies
	Short and/or long term neurobehavioral abnormality
Heroin	Low birth weight
Marijuana	Higher incidence of tremors and altered visual responses
Methamphetamines	IUGR, prematurity, placental abruption, fetal distress, adverse long-term
	neurotoxic effects on behavior, cognitive skills, and physical dexterity.
Opioids	Active/passive detoxification results in fetal distress or fetal loss
	No other adverse outcomes identified so far
SSRIs	No adverse neurodevelopmental outcomes identified so far

Outcomes

Finnegan Scoring System

System	Symptoms	Points	Score	
	Excessive high pitched (or other) cry (< 5 min)	2		
	Continuous high pitched (or other) cry (> 5 min)	3		
u	Sleep < 1 hour after feeding	3		
ten	Sleep < 2 hours after feeding	2		
ys 1	Sleep < 3 hours after feeding	1		
S.	Hyperactive Moro reflex	2		
sno	Moderately hyperactive Moro reflex	3		
[ervo	Mild tremors when disturbed	1		
	Moderate-severe tremors when disturbed	2		
	Mild tremors when undisturbed	3		
ra	Moderate-severe tremors when undisturbed	4		
Increased muscle tone		1		
Ce	Excoriation (eg. Chin, knees, elbows, toes, nose)	1		
	Myclonic jerks (twitching/jerking of limbs)	3		
	Generalized convulsions	5		
tabolism somotor ipiratory	Sweating	1		
	Hyperthermia (37.2 – 38.2°C)	1		
	Hyperthermia (\geq 38.4°C)	2		
	Frequent yawning (>3-4/interval)	1		
	Molting	1		
	Nasal stuffiness	1		
Me Va Res	Frequent sneezing (> 3-4/interval)	1		
	Nasal flaring	2		
	Respiratory rate $> 60/min$	1		
	Respiratory rate $> 60/min$ with retractions	2		
	Excessive sucking	1		
-0- nal	Poor feeding (infrequent/uncoordinated suck)	2		
Gastr intesti	Regurgitation (≥ 2 times during/past feed)	2		
	Projectile vomiting	3		
	Loose stool	2		
	Watery stool	3		
	TOTAL SCORE			

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