Neonatal Abstinence Syndrome: Infants and Families at Risk

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Objectives

• Describe epidemiology of drug addiction and NAS in the United States
• Identify commonly used assessment tools for NAS and their benefits and drawbacks
• Identify nursing interventions and pharmacologic treatment of infants with NAS
Definitions

• Opioid: a drug that binds opioid receptors (mu, delta, kappa)
• Opiate: a drug from natural sources
• Drug dependency: physiologic reliance upon a chemical substance, associated with tolerance. Cessation of the drug will cause withdrawal symptoms.
• Drug addiction: chronic disease characterized by substance abuse, drug dependency, and drug-seeking behaviors.

Addiction

From the American Society of Addiction Medicine:

• Addiction is a primary, chronic disease of brain reward, motivation, memory and related circuitry. Dysfunction in these circuits leads to characteristic biological, psychological, social and spiritual manifestations. This is reflected in an individual pathologically pursuing reward and/or relief by substance use and other behaviors.
• Addiction is characterized by inability to consistently abstain, impairment in behavioral control, craving, diminished recognition of significant problems with one’s behaviors and interpersonal relationships, and a dysfunctional emotional response. Like other chronic diseases, addiction often involves cycles of relapse and remission. Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death.

Neonatal Abstinence Syndrome

• A constellation of neurological and behavioral signs and symptoms resulting from abrupt discontinuation of opioids after extended intrauterine exposure
• Prescription or non-prescription drugs, used licitly or illicitly
• Opioid drugs include:
  • Heroin
  • Methadone
  • Oxycodone (Oxycontin, Percocet)
  • Codeine
  • Meperidine (Demerol)
  • Hydromorphone (Dilaudid)
  • Hydrocodone (Lortab, Vicodin)
  • Buprenorphine (Suboxone, Subutex)
  • Fentanyl
  • Tramadol
  • Propoxyphene (Darvon, Darvocet)

(Hudak & Tan, 2012; Johnson, 2012)
Past Month Illicit Drug Use among Persons Aged 12 or Older: 2011

- 22.5 million users of illicit drugs—8.7% of population 12 or older
- Illicit drugs include marijuana, hashish, cocaine/crack, heroin, hallucinogens, inhalants, prescription-type therapeutics used illicitly.

(SAMHSA, 2012)
Past Month Illicit Drug Use among Persons Aged 12 or Older, by Age: 2002-2011

Evolving patterns?

Past Month Nonmedical Use of Types of Psychotherapeutic Drugs among Persons Aged 12 or Older: 2002-2011

Past Month and Past Year Heroin Use among Persons Aged 12 or Older: 2002-2011

Source Where Pain RelieversWere Obtained for Most Recent Nonmedical Use among Past Year Users Aged 12 or Older: 2010-2011
Prescription drug use

http://dartmed.dartmouth.edu/summer09/html/vs_opioid.php

POOH CORNER Rx

Overdose

- 1991: 34 persons/day; death rate 3.6/100,000
- 2007: 100 persons/day; death rate 11.8/100,000
- Prescription drug overdoses are the leading cause of accidental death in 17 states and account for more deaths than heroin and cocaine combined

ED visits (2009):
- 1 million ER visits r/t illicit drug use
- 1.2 million ER visits r/t misuse of pharmaceuticals

(Johnson, 2012; CDC MMWR, 2011)
The high you get from oxy is the greatest high in the world, better than coke, and all that, it's indescribable. If you think about it it's kind of like an insta-tanked pill. Once you take it you're loose and free kinda like being drunk but you won't get sick and you don't feel bad in the morning.

You can also party like a rockstar all night long without getting tired. If you have a hangover or you're getting sick bust a rail you'll be better in seconds.

Needless to say there are many reasons to get on oxy but a warning to all... You will spend every dime you have and a lot more, you'll hit rock bottom and guess what, there's nothing you can do about it because you physically can't stop railing this magic pill. You sleep habits get messed up 12 hours of sleep will feel like only 4 hours of sleep, the only way to wake up is to hit up...

You'll start taking oxy because it helps you work or it makes you feel good whatever but watch out take too much oxycontin for too long and you'll end up where if you don't do it, you'll be in the worst pain of your life.

Imagine the pain of the worst flu you've ever had in your life, take away the stomach aches and multiply the weakness, body aches and the feeling of pins and needle in every muscle of your body by about 10 and you have the pain of an oxy withdraw.

(www.urbandictionary.com/oxycodone)
Incidence of NAS

- 500% increase in opiate use and dependency among pregnant women since 2000
- Withdrawal will develop in 50-94% of infants exposed to opiates
- Rate of NAS
  - Incidence has tripled from 2000-2009
  - 2009: 13,539 infants*
  - 10-fold increase Florida from 1995 to 2009

*May underestimate true incidence

(Hudak & Tan, 2012; Burgos & Burke, 2009)

ADDICTED NEWBORNS
Tennessee has seen a tenfold increase in babies born addicted to drugs, known as neonatal abstinence syndrome, or NAS.

Costs of NAS

<table>
<thead>
<tr>
<th>Incidence (per 1,000 births)</th>
<th>2000</th>
<th>2005</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of NAS</td>
<td>0</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Length of stay, days</td>
<td>12</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>
| Prolonged LOS: 16.4 days compared to 3.3 days
| Cost: $53K versus $9.5K
| Estimated cost of $720 million
| 77.6% of costs paid by state Medicaid programs
| Complications (prematurity, LBW) increase costs

(Patrick et al., 2012)
Pathophysiology of NAS

- Opioids pass through placental barrier
- Opioid receptors are located in CNS and gut
- Abrupt cessation of opioids (birth):
  - causes rebound effect
  - increased release of neurotransmitters, including norepinephrine and cyclic adenosine monophosphate
- Withdrawal causes CNS irritability, over-reactivity in autonomic nervous system, and GI dysfunction

Actions of opioids

- Bradycardia and hypotension
- Anorexia
- Diminished pupillary size
- Analgesia
- Miosis
- Euphoria
- Respiratory depression
- Itching
- Constipation
- Ameliorate cough reflex
- Nausea and vomiting
- Sedation

Opioids pass through blood-brain barrier
Activate mu-receptors
Inhibit release of norepinephrine
Produce analgesia, sedation and euphoria
Side effects include respiratory depression, decreased GI motility

(Hudak & Tan, 2012; Bio, Siu & Poon, 2011; Hamden, 2012)
NAS: A multi-system disorder

Neurological
- Irritability
- Increased wakefulness
- High-pitched cry
- Tremor
- Increased muscle tone
- Hyperactive deep tendon reflexes
- Frequent yawning
- Frequent sneezing
- Seizures

Gastrointestinal
- Diaphoresis
- Nasal stuffiness
- Fever
- Shivering
- Temperature instability
- Piloerection
- Tachypnea
- Hypertension

Central Nervous System
- Irritability
- Increased wakefulness
- Shriek high-pitched cry
- Tremor
- Increased muscle tone
- Hyperactive deep tendon reflexes
- Frequent yawning
- Frequent sneezing
- Seizures (myoclonic)

Gastrointestinal
- Hyperphagia
- Vomiting
- Loose stools
- Dehydration
- Poor feeding
- Uncoordinated suck
- Constant suck

Impact on growth
- Increased caloric expenditure
- Increased caloric requirement 130-250 kcal/kg/day
- Weight loss, poor growth, failure to thrive

(photo from www.choosehelp.com)
Autonomic/Vasomotor

• Diaphoresis
• Nasal stuffiness
• Fever/temperature instability
• Mottling
• Piloerection
• Tachypnea with or without distress
• Hypertension

Other system involvement

• Skin excoriation
• Diaper dermatitis
• Apnea

Problems associated with drug use

• Prematurity
• Unexplained IUGR
• Low birthweight
• Urogenital abnormalities
• CVA
• NEC in healthy term infants
• Opioid manifestations
Factors affecting clinical manifestation of NAS

- Drug
- Half-life of drug
- Maternal drug history
- Timing of last dose before delivery
- Maternal metabolism
- Net transfer across placenta
- Infant metabolism and excretion
- Polydrug use
- Excess environmental stimuli
- Infant hunger

*The degree of withdrawal is not necessarily directly related to dose of drug*

(Mudak & Tan, 2012)

Onset of withdrawal

<table>
<thead>
<tr>
<th>Drug</th>
<th>Onset</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heroin</td>
<td>24 – 48 hours</td>
<td>1 – 2 weeks</td>
</tr>
<tr>
<td>Methadone</td>
<td>2 – 7 days</td>
<td>Months to weeks</td>
</tr>
<tr>
<td>Buprenorphine</td>
<td>48 – 70 hours</td>
<td>Weeks to months</td>
</tr>
<tr>
<td>Other opioids</td>
<td>48 – 72 hours</td>
<td>Weeks to months</td>
</tr>
</tbody>
</table>

If one week or longer has passed since the last dose of maternal opioid and delivery of the infant, the incidence of NAS is relatively low. Subacute effects may linger for months.

Methadone

- Category
  - Full mu-opioid agonist
  - Schedule II controlled substance
  - Class C pregnancy drug
- Advantages
  - Maintains opioid concentration
  - Minimizes craving
  - Suppresses abstinence symptoms
  - Blocks euphoria
  - Prevents fetal distress associated with detoxification
- Disadvantages
  - Mother is unlikely to achieve detoxification after delivery
  - Severe and prolonged NAS

(George Soros: Methadone Man comic)
Benefits of methadone treatment

- Known safety profile
- Counseling and monitoring for illicit drug use
- Stable and predictable environment
- More likely to have prenatal care
- Better nutrition and weight gain
- Less likely to have a preterm or LBW infant
- Pregnant women on methadone are doing the best they can do for their unborn baby

Buprenorphine

- Trade names
  - Subutex
  - Suboxone (contains naloxone)
- Category
  - Partial mu-opioid agonist
  - Schedule III controlled substance
  - Class C pregnancy drug
  - Methadone alternative
- Advantages
  - Less potential for abuse
  - Shorter half-life
  - Shorter duration of NAS
  - Lower cumulative morphine dose in infants treated for NAS
- Disadvantages
  - Relatively new therapy
  - Not FDA approved for use in pregnant women

MOTHER Study

- Multi-center, double-blinded RCT
- Compared buprenorphine and methadone for treatment of pregnant women with opioid dependency
- Buprenorphine-exposed infants
  - Shorter hospital stay
  - Shorter duration of treatment
  - Required less morphine

(Jones et al., 2010)
Complicating the picture: Concomitant drugs

<table>
<thead>
<tr>
<th>Drug</th>
<th>Signs</th>
<th>Onset</th>
<th>Duration of signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSRIs</td>
<td>Crying, irritability, tremors, poor sleep, seizures, hyperactivity, diaphoresis, tachycardia, tachypnea</td>
<td>Hours - days</td>
<td>1-2 weeks</td>
</tr>
<tr>
<td>Alcohol*</td>
<td>Impaired feeding, irritability, roars, tremors, tachycardia, seizures, hypoactivity, poor sleep, hypothermia, diaphoresis</td>
<td>3 – 12 hours</td>
<td>1-6 months</td>
</tr>
<tr>
<td>Nicotine</td>
<td>Impaired feeding, irritability, tremors, tachycardia, seizures, hypoactivity, poor sleep, hypothermia</td>
<td>Hours - days</td>
<td>Weeks – months</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>Impaired feeding, irritability, tremors, tachycardia, seizures, hypoactivity, poor sleep, hypothermia</td>
<td>3 – 7 days</td>
<td>Months</td>
</tr>
<tr>
<td>Barbiturates</td>
<td>Impaired feeding, irritability, tremors, tachycardia, seizures, hypoactivity, poor sleep, hypothermia</td>
<td>3 – 14 days</td>
<td>4 – 6 months</td>
</tr>
<tr>
<td>Cocaine*</td>
<td>Impaired feeding, irritability, tremors, tachycardia, seizures, hypoactivity, poor sleep, hypothermia</td>
<td>Within first 24 hours</td>
<td>2 – 3 days; longer with heavy maternal use</td>
</tr>
<tr>
<td>Amphetamines*</td>
<td>Impaired feeding, irritability, tremors, tachycardia, seizures, hypoactivity, poor sleep, hypothermia</td>
<td>Within first 24 hours</td>
<td>2 – 3 days; longer with heavy maternal use</td>
</tr>
</tbody>
</table>

Prenatal counseling

- Teratogenicity and effects on fetus
- Expected clinical course
- Breastfeeding and lactation
- Social considerations

Counseling: Teratogenicity and fetal effects

- Alcohol is the only drug known to cause serious birth defects
- Opiates and stimulants may cause poor fetal growth, spontaneous abortion, preterm delivery, stillbirth, placental abruption, MSF
- Effects on brain chemistry and organization
- Possible long-term developmental effects
- Direct drug effects versus home environment
Counseling: Expected clinical course

- Observation and scoring for NAS
- NAS effects: CNS, GI, autonomic, respiratory, vasomotor
- Infants should be observed a minimum of 72-96 hours, possibly longer for methadone exposure
- 50-94% of narcotic exposed infants will experience withdrawal
- Withdrawal may be mild and require only supportive care
- Severe symptoms will require medication and prolonged hospitalization
- Symptoms may last weeks or months
- Care is individualized to severity of symptoms
- Every baby is different: your baby is not the same as your friend's baby

Counseling: Breastfeeding and lactation

- Prescribed narcotics for pain control and maintenance therapy are in low concentrations in human milk.
- Breastfeeding is not contraindicated with methadone treatment.
- Some SSRIs (especially fluoxetine/Prozac) can have adverse effects; an appropriate agent should be selected and the infant observed.
- Polydrug use?
- Breastfeeding is not compatible with ongoing substance abuse.

Counseling: Social considerations

- Anxiety and guilt are normal responses
- Clinicians should be honest, empathetic and non-judgmental
- Consider risk-benefit profile of medications for mother and baby
- Risk of post-partum depression
- Assure family that confidentiality will be maintained
- Length of stay
Written materials for families

- Definition
- Observation
- Symptoms
- Scoring tool
- Treatment
- LOS
- Consoling infant
- Discharge criteria

Nursing management

- Screening
- Management at delivery
- Assessing and scoring
- Nonpharmacologic care
- Pharmacologic intervention
- Discharge criteria

Lessons from VON

- The care of NAS babies is time and resource intensive
- Maternal screening must be consistent and informed
- Which scoring tool is used is less important than one be used consistently and staff trained in its use
- A written policy improves outcomes
- The family unit should be involved, supported, and educated
- Risks and benefits of breastfeeding should be weighed and supported when appropriate

Nursing management: Screening

• Detailed history to include:
  — Prescription and non-prescription drugs
  — Drug history of partner and household members
• Self-reporting may be limited
• Provide privacy
  — Interview mother alone
• Maintain empathy and nonjudgmental approach

5 Ps screening tool

<table>
<thead>
<tr>
<th>5 Ps For Substance AbuseScreening tool: Alcohol and Drugs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Name</td>
<td>Patient Room</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Reviewer</td>
<td>Did Complete</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Has any of your parents have problems with alcohol or drug use?  
   _No_ _Yes_

2. Has any of your friends ever had problems with alcohol or drug use?  
   _No_ _Yes_

3. Does your partner have a problem with alcohol or drug use?  
   _No_ _Yes_

4. Before you were pregnant, did you have problems with alcohol or drug use?  
   _No_ _Yes_

5. In the past month, did you drink alcohol, wine, or liquor, or use other drugs?  
   _No_ _Yes_
Nursing management: Screening

• Maternal characteristics suggestive of illicit drug use
  – No PNC
  – Unexplained fetal demise(s)
  – Repeated SAB
  – Placental abruption
  – Precipitous labor
  – Hypertensive episodes/CVA/MI
  – Severe mood swings

Screening: Biological specimens

• Biological sample:
  • Maternal urine
  • Infant urine
  • Neonatal hair
  • Meconium: specificity of 94.6%
  • Umbilical cord tissue

• Methods:
  • Screening: immunoassay
  • Confirmation: gas chromatography/mass spectrometry

• Issues
  • No test is 100% accurate: false positives/false negatives
  • Cost
  • Forensic issues: collection and identification
  • "targeting" versus "profiling"

(Noi, Sku, Poon, 2011)

Nursing considerations at delivery

• Obtain history prior to delivery if possible
• If an infant is born depressed: Naloxone (Narcan) is contraindicated
  – May precipitate withdrawal
• Follow the NRP algorithm for resuscitation of a depressed infant
  – Warm/dry/provide tactile stimulation
  – Clear the airway
  – Positive pressure ventilation for apnea, gasping, HR <100
  – Intubate if respiratory status does not improve
  – Cardiac compressions if HR <60
  – Epinephrine remains the first-line drug for neonatal resuscitation

(AAP, 2011)
Differential diagnosis

- "No clinical signs should be attributed solely to drug withdrawal without appropriate assessment and diagnostic tests to rule out other causes." (AAP, 1998, p 1081)
- Differential includes:
  - Sepsis
  - Hypoglycemia
  - Hypocalcemia
  - Hypomagnesemia
  - Anoxic brain injury
  - CNS trauma

Nursing management: Assessment

- "Each nursery should adopt an abstinence scoring method to measure the severity of withdrawal" (AAP 1998).
- Scoring tools
  - Finnegan and variations
  - Other tools
- Goals
  - Provide objective and systematic evaluation
  - Quantify severity of symptoms
  - Basis for initiation of pharmacological treatment

<table>
<thead>
<tr>
<th>System</th>
<th># Items</th>
<th>Scoring</th>
<th># threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finnegan (1975)</td>
<td>12</td>
<td>Numeric scale</td>
<td>8</td>
</tr>
<tr>
<td>Modified Finnegan-THASST (1982)</td>
<td>21</td>
<td>Numeric scale</td>
<td>8</td>
</tr>
<tr>
<td>Lipsitz</td>
<td>11</td>
<td>Numeric scale</td>
<td>4</td>
</tr>
<tr>
<td>Ostrea</td>
<td>6</td>
<td>Ranking</td>
<td>Mild/mod/severe</td>
</tr>
<tr>
<td>Neonatal Withdrawal Inventory</td>
<td>8</td>
<td>Numeric</td>
<td>7 NAS items 4 point behavioral distress scale</td>
</tr>
<tr>
<td>Neonatal Narcotic Withdrawal Index</td>
<td>6</td>
<td>Numeric</td>
<td>5</td>
</tr>
</tbody>
</table>

Other: other “modified” Finnegan, Riley Infant Pain Scale, Kelnar & Harvey, St. Michael’s (UK), homegrown
Principles in scoring

• When and how often: Initiate scoring at 2 hours of life, score Q 3-4 hours
• Score is based on entire observation period
• "Excessive environmental stimuli and hunger will exacerbate the perceived severity of NAS." (Hudak, 2012)
• Soothe and comfort the baby before scoring
• Ideal time to score infant is 30-60 minutes after eating but before the baby falls asleep
• May be subject to bias, subjectivity, misuse
• Apply scoring tools consistently: use consistent definitions and applications
• Team approach to handling the numbers
• Enlist the parents: make them your allies
Special considerations

• Preterm infants
  — NAS scores are often lower than in term infants
  — Developmental immaturity?
  — Less total drug exposure?
  — Lower fat deposits?
  — Use of tool developed for term infants?
• Older infants
  — Different sleeping/feeding patterns
  — May outgrow standard tools
• Acquired NAS
  — Withdrawal from meds used in hospital
  — Older and sensitized to ICU environment

Nursing management: Non-pharmacologic

• Myth: It’s not withdrawal if the baby is not being treated with morphine
• Fact: Withdrawal spans a spectrum: All exposed infants have NAS
• 30-90% of infants with NAS will need pharmacological therapy
• ALL exposed infants need non-pharmacologic treatment

Nursing management: Non-pharmacologic

Goals:
• Minimize noxious stimuli
• Optimize nutrition and hydration
• Promote adaptation
• Facilitate maternal bonding
• Plan for safe environment at home
Supportive interventions: Environmental

- Keep light levels low
- Maintain quiet environment
  - Keep voices low
  - Low volume for TV, music
- Single room care: mother-baby dyad
- Limit number of caregivers
- Minimize caregiver interruptions
- Work with ancillary services

Supportive interventions: Comfort

- Slow, gentle approach
- Swaddle using cotton blanket: hands free for sucking
- Contain extremities during care
- Maintain flexion: “C-position”
- Create boundaries
- Slowly introduce stimulation, increase or decrease responding to infant’s cues
- Skin-to-skin care with parent
- Swaying and vertical rocking
- Patting
- Pacifier
- Mechanical swing—do not use as sleeping device

(McGreh 2013)
Supportive interventions: Skin care

- Assess skin regularly for excoriation
  - Especially chin and other areas of contact
  - Under and near ID bands and sensors
- Apply transparent dressings or barrier ointment (Aquaphor) to points of friction
- Stockingette under ID band
- Mittens over hands if scratching face
- Change diaper frequently
  - Initiate before erythema is present
- Assess for candidiasis
  - Thrush
  - Diaper dermatitis

Supportive interventions: Thermoregulation

- Lightly dress baby
- Swaddle in light cotton blanket
- Maintain consistent room temperature
- Avoid heavy or fleecy blankets
- Do not assume that fever is caused by NAS!

Supportive interventions: Family

- Support family as primary caregivers
- Support bonding
- Couplet care
- Make parents partners in scoring/assessing
- Assess strengths, weaknesses, knowledge deficits
- Teach parents how to interact with infant
- Coordinate with mother’s treatment plan
Nursing management: Safety

- Monitoring of cardiovascular, respiratory, and oxygenation status while on medication and until s/s resolve
- Parents may not be able to adequately care for baby, may be chemically impaired
- Infant abduction prevention
- SIDS prevention
  - Increased incidence in drug-exposed infants
  - Model safe sleep in the hospital setting
    * No co-sleeping
    * Back to sleep at all times
    * Nothing in the crib but the baby
    * Smoking cessation and/or precautions

Nursing management: Nutrition

- Increased caloric demand: tone, activity, crying, temperature, decreased sleep
- Decreased caloric intake: poor feeding, disorganized suck, vomiting/diarrhea
- Monitor I/O; assess hydration
- Electrolytes and blood glucose as needed
- Monitor growth: daily weight, weekly HC

Nursing management: Nutrition

- Small frequent feedings
- Avoid over-feeding
- Swaddle during bottle feedings
- Support jaw for disorganized suck
- Provide quiet environment without distractions
- High calorie formula (22 or 24 Cal/oz) or human milk fortifier for poor weight gain
- Hydrolysate formula or "sensitive" formula
- Gavage feedings or IV fluid if oral intake is disorganized
- Support breastfeeding if not contraindicated
Breastfeeding recommendations

<table>
<thead>
<tr>
<th>Breastfeeding should be supported:</th>
<th>Breastfeeding should be discouraged:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Stable methadone maintenance in treatment program</td>
<td>• No PNC</td>
</tr>
<tr>
<td>• History of substance abuse with 90 days of abstinence PTD and demonstrated outpatient sobriety</td>
<td>• Relapse in 30 day period PTD</td>
</tr>
<tr>
<td>• Enrolled in treatment plan with negative urine toxicology</td>
<td>• Refusal to enroll in treatment plan and/or enrolled in plan but refuse consent for contact with counselor</td>
</tr>
<tr>
<td>• Prescription medications used as directed</td>
<td>• No plan for postpartum substance abuse treatment or pediatric care</td>
</tr>
<tr>
<td>• Anti-depressant rx with appropriate agent</td>
<td>• Positive urine toxicology at delivery</td>
</tr>
</tbody>
</table>

Breastfeeding should be carefully evaluated with plan for monitoring:

| • Relapse within 90 days of delivery with documented abstinence in 30 days prior to delivery |
| • Concomitant use of prescribed psychotropics medications |
| • Late PNC and/or substance abuse treatment in second trimester or later |
| • History of sobriety only in inpatient setting |

(Academy of Breastfeeding Medicine, 2009)

Nursing management:

**Pharmacologic**

- **Threshold for treatment**
  - FNAST ≥ 8 x 3 or ≥ 12 x 2
  - If nearing threshold: Consider rescoring after one hour before beginning meds

- **Choice of medication**
  - First-line: opioid

- **Adjunct medications**

- **Dosing regimen**

- **Weaning and duration of treatment**

**Medications**

- Paregoric
- Dilute tincture of opium
- Morphine
- Methadone
- Morphine
- Buprenorphine
- Phenobarbital
- Clonidine
Paregoric and DTO

**Paregoric**
- Anhydrous solution of morphine
- Contains:
  - Papaverine & noscapine
  - Camphor
  - 45% ethanol
  - Benzyl alcohol
- Side effects include:
  - Acidosis
  - Respiratory depression
  - CNS depression
  - Hypotension
  - Renal insufficiency
  - Seizures
- No longer recommended

(Kraft, 2013; Bio et al 2011)

**Tincture of opium (DTO)**
- Commercially available as 10 mg/ml morphine
- Diluted with sterile water to 4 mg/ml morphine
- 0.19% ethanol
- Non-standardized alkaloid contents with opioid-like activity
- Variations in dosing

**Morphine**
- Diluted to 0.4 mg/ml
- 0% ethanol
- Shorter half-life than methadone (4.5-13.3 hours, prolonged in preterms)
- 4 hour dosing interval
- Two approaches: weight-based versus symptom-based
- Consider adjunct medication for persistent severe symptoms

(Kraft 2013; Bio et al 2011; Jansson et al 2009)

**Morphine: Weight versus symptom-based dosing**

<table>
<thead>
<tr>
<th>Weight-based</th>
<th>Symptom-based</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Starting dose</strong> 0.04-0.07 mg/kg Q 4 hours</td>
<td><strong>Weight score</strong></td>
</tr>
<tr>
<td>Increase 10-20% for persistent threshold scores</td>
<td><strong>Starting dose</strong></td>
</tr>
<tr>
<td>Rescue dose: give previous dose between scheduled times</td>
<td><strong>Increase</strong></td>
</tr>
<tr>
<td>Wean by 10% Q 24-48 hours</td>
<td><strong>Mean</strong></td>
</tr>
<tr>
<td>Max dose 0.2 mg/kg</td>
<td>0.08 mg</td>
</tr>
<tr>
<td>Observe 24-48 hours after discontinuing morphine</td>
<td>0.16 mg</td>
</tr>
</tbody>
</table>

(Kraft 2013; Bio et al 2011; Jansson et al 2009)
Methadone

- Variations in dosing regimens
  - 0.05-0.15 mg/kg/dose
  - Q12 hour dosing
  - Loading dose? Load Q4-6 hours and titrate to response, convert to Q12 hours
- Long half-life: mean 26 hours, range 4-62
  - Consider half-life for discharge planning
- Limited pharmacokinetic data in neonates
  - Cardiac effects in infants?
- Associated with long QT syndrome in adults
- 8% ethanol content


Buprenorphine

- Investigative drug
- No protocols for neonatal dosing
- Sublingual administration
- 30% ethanol in commercial formulation; diluted for neonatal use
- Advantages: safety margin, less potential for diversion

(Kraft 2013; Bio et al 2011)

Adjunct medications

- Phenobarbital
  - Barbiturate
  - Depresses sensory cortex, decreases motor activity, causes drowsiness, sedative effect
  - Loading dose 20 mg/kg, maintenance 1 mg/kg
  - 15% ethanol
  - Does not treat specific opioid symptoms (diarrhea, poor feeding), may impair suck
  - Possible long-term neurodevelopmental effects
- Clonidine
  - alpha-2 adrenergic receptor agonist
  - Reduces sympathetic NS activity
  - Decreases autonomic symptoms: tachycardia, HTN, diarrhea, restlessness
  - Used in adult population as alternative to opioid.
  - Dose 0.5-1 mcg/kg q 4-6 hours

(Kraft 2013; Bio et al 2011; Janson et al 2009)
To discharge on meds or not?

- NAS medications can cause respiratory depression and other morbidities
- Potential for misuse and diversion: trigger for relapse
- Lack of close observation can cause over- or under-medication
- Time in hospital can be used productively
- Follow-up plan

(Jansson et al., 2009)

Nursing management: Discharge criteria

- 24-48 hours of stable scores after discontinuation of medication OR after infant is adequately captured and stabilized
- Good oral feeding pattern
- Stable weight gain
- Stable vital signs
- Child protective services clearance if there is active substance abuse: safety plan
- Pediatric provider identified and appointment scheduled

Nursing management: Discharge planning

- Pediatric follow-up within a week of discharge
- Written information on sub-acute withdrawal and interventions
- Home evaluation
- Services in the home
- Maternal treatment plan
Long term outcome

- Mixed findings
- Lower scores on developmental assessments?
- Predisposition to substance abuse?
- Effects of polydrug exposure
- Dysfunctional family environment
- Higher rate of foster home placement
- Children lost to follow-up

(Hunt et al 2008; Hudak et al 2012; Behnke et al 2013)

http://www.drugs.ie/drugs_info/about_drugs/drugs_and_pregnancy/

Developmental outcome

Fetal effects
- Teratogenic
- Altered brain development and organization
- Altered maternal behaviors
- Altered placental blood flow

Social factors
- Impaired parenting
- Altered family environment
- Unstable home

Long term outcome
- Growth
- Behavior
- Cognition
- Language
- Achievement
- Risk of drug use

Neonatal effects
- Teratogenic
- Growth
- Withdrawal
- Drug toxicity
- Neurobehavioral
- Nutrition
- Impaired bonding

http://www.drugs.ie/drugs_info/about_drugs/drugs_and_pregnancy/
Developmental outcome: Effect of prenatal exposure

(Hahnke et al 2013)

Developmental outcome: Growth

Table 2. Growth patterns in infants with BW<compared to normal birthweight infants

(Hunt et al 2008)

Developmental outcome: Neurodevelopment

(Hunt et al 2008)
Substance abuse and child abuse

• 50-80% of families in the child welfare system are affected by addiction
• Children from families in which there is substance abuse are:
  – 3 times more likely to be abused
  – 4 times more likely to be neglected

This is not easy!

Nurses’ ethical concerns:
• Caring for infants with NAS
• Distress and frustration
• Difficult to console
• Pain: “something has to hurt”
• Coping with families
  • Manipulative or abusive families
  • Anger
• Discharging to home
  • Fear for infant’s safety

(Maguire, Webb, Passmore & Cline, 2012)

Ethical principles

• Beneficence: the obligation to do good
  – How can I take care of this baby and family when I feel angry and frustrated?
  – What is the long-term outcome?
• Nonmaleficence: do no harm
  – How can I send this baby home with that family?
  – Will there be legal repercussions?
• Autonomy
  – Parents are usually the decision-makers for their children
  – Courts/agencies may be involved
  – Parents may not make good decisions
• Justice
  – Allocation of resources
• Moral agency
  – Barriers to acting according to personal moral code

(Maguire, Webb, Passmore & Cline, 2012)
Caring for the infant

“I want to take a recorder and just record their crying, and have the mom have to sit at the bedside and whenever they fall asleep just put it on and say, Listen, we have to deal with this weaning process that you put them through. And you just get to come at the end of this and say, ‘Okay, I’m ready to get my baby.’”

“We are trained as [ICU] nurses, not full-term drug-addicted baby nurses...You know, that’s not what we signed up for.”

(Carey, Webb, Passmore & Cline, 2012)

Coping with families

“You just want to say, your baby is here because you wouldn’t stop using cocaine, and you would not stop oxycontin. And you can’t say that to them. That’s an issue too, where you have to be nice to a person who’s blaming you for what they’ve done.”

“Depro [sic] should come with them all.”

(Carey, Webb, Passmore & Cline, 2012)

Concerns about discharge

“...if you can’t take care of yourself without using drugs on a daily basis, how in the world are you going to take care of a child who is more difficult that most children?...I just think, how are we doing this...as a society, how are we sending these children home with these moms and dads?”

(Carey, Webb, Passmore & Cline, 2012)
Concerns about discharge

“I was just afraid he was going to be screaming in the middle of the night and she was just going to drop him, throw him at a wall, you know, that’s what I thought…”

“[I told her] This baby is going to cry and you’re not going to be able to stop him…You need to promise me right now that when that baby does that, you will put him in his crib, put the side rail up on the crib, and walk out of the room. I don’t want to read in the newspaper that you dropped him, that you threw him, that you drowned him, that you hurt him.”

(Maguire, Webb, Passmore & Cline, 2012)

Caring for drug-addicted patients

• “Addiction is the one disease that you are criminalized for having.”
• A disease with no ongoing relationship with a health care provider.
• Drug addiction is multifactorial
• Physical and/or emotional trauma
• Self-medication with drugs or alcohol
• Principles of trauma-informed care

(Cath, 2012; Mencelica, 2012)

ANA Position Statement

The ANA directs registered nurses working in the perinatal field to seek out appropriate rehabilitation and therapy treatment for women abusing substances (illicit or prescribed drugs, and/or alcohol) and to identify and offer appropriate therapy to infants exposed to these substances. The registered nurse works with social services, rather than law enforcement or the judicial system, to obtain help for the woman and infant.

• Substance addiction is a treatable illness.
• Addiction is a primary disease requiring specialized treatment to achieve recovery.
• The threat of criminal prosecution prevents many women from seeking prenatal care and treatment for substance abuse.
• The nurse’s role is focused on social service rather than law enforcement
Legal issues

- Child Abuse Prevention and Treatment Act (CAPTA; 1974)
  - Abuse and neglect must be reported
  - States must have procedures in place to address reports
  - Healthcare providers must report infants affected by substance abuse
  - Prenatal substance abuse is not synonymous with child abuse
  - Requires physicians to notify CPS of infant affected by illicit drug use or withdrawing
- State laws vary: know your responsibilities
- Hospital policies must be consistent
- Drug-testing must be informed
- Get risk management involved

Harm reduction

- Pragmatic approach
- Reduction rather than complete abstinence
- Recognize that trauma, mental illness, and substance abuse may be inter-connected
- Set attainable goals with the family

(Chassin, 2013; Marcellus, 2013; Johnson, 2012)

Resetting the reward system

- Being invested in caring for the infant competes for dopamine pathways
- BF is a positive focus
- Evidence-based interventions
  - Improving maternal nutrition
  - Case management to access services
  - Building parenting skills
  - Strengthening supportive social networks
  - Mediating with DFS
  - Nonjudgmental attitudes

(Catlin, 2012)
The work you are doing is good

The work you are doing is important

The work you are doing makes a difference

Thank you

References


• Tufts Medical Center (2013). Improving outcomes in neonatal abstinence syndrome. Available at www.clinicaltrials.gov. Identifier: NCT01985476