Neonatal Abstinence Syndrome

Modified Finnegan Scoring System

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- A group of symptoms
- Develop after birth
- Baby no longer getting a certain drug or medicine (illicit or prescription) he/she was receiving while in utero
- Most often seen with opioid exposure
- Can be sedatives, polysubstances, nicotine, alcohol
- Develops in 55-94% of drug exposed infants
Preterm Infants & NAS

- May exhibit fewer signs of withdrawal
  - Immaturity
  - Less total body fat
  - Difference in total drug exposure

Clinical Signs of Withdrawal

<table>
<thead>
<tr>
<th>Neurological</th>
<th>Autonomic</th>
<th>Gastrointestinal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irritability</td>
<td>Diaphoresis</td>
<td>Vomiting</td>
</tr>
<tr>
<td>Increased wakefulness</td>
<td>Nasal stuffiness</td>
<td>Diarrhea</td>
</tr>
<tr>
<td>High-pitched cry</td>
<td>Fever</td>
<td>Dehydration</td>
</tr>
<tr>
<td>Tremor</td>
<td>Motting</td>
<td>Poor weight gain</td>
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<tr>
<td>Increased muscle tone</td>
<td>Temperature instability</td>
<td>Poor feeding</td>
</tr>
<tr>
<td>Hyperactive deep tendon reflexes</td>
<td>Mild elevations in respiratory rate and blood pressure</td>
<td>Uncoordinated &amp; constant sucking</td>
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<tr>
<td>Frequent yawning</td>
<td>Seizures</td>
<td></td>
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<tr>
<td>Sneezing</td>
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</table>

Onset of Withdrawal Symptoms

<table>
<thead>
<tr>
<th>Drug</th>
<th>Approximate time to onset of withdrawal (W/D) symptoms</th>
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<tbody>
<tr>
<td>Alcohol</td>
<td>3-12 hours</td>
</tr>
<tr>
<td>Barbiturates</td>
<td>4-7 days but can range from 1-14 days</td>
</tr>
<tr>
<td>Cocaine</td>
<td>Usually no W/D signs but sometimes neurobehavioral abnormalities (↓ arousal &amp; physiologic stress) occur at 48-60 hours</td>
</tr>
<tr>
<td>Heroin</td>
<td>Within 24 hours</td>
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<tr>
<td>Marijuana</td>
<td>Usually no clinical W/D signs</td>
</tr>
<tr>
<td>Methadone</td>
<td>3 days but up to 5-7 days, severity varies</td>
</tr>
<tr>
<td>Methamphetamines</td>
<td>Usually no W/D signs but sometimes neurobehavioral abnormalities 48-60 hours</td>
</tr>
<tr>
<td>Opioids</td>
<td>24-36 hours but can be up to 5-7 days</td>
</tr>
<tr>
<td>Sedatives</td>
<td>1-3 days</td>
</tr>
<tr>
<td>SSRIs</td>
<td>Several hours to several days</td>
</tr>
</tbody>
</table>

Modified Finnegan Scoring System

- A semi-subjective scoring system
- List of 21 symptoms
  - Symptoms often seen with drug-exposed infants
  - Score assigned for each symptom and associated degree of severity
  - The total abstinence score is determined by totaling the score assigned to each symptom over the scoring period
NAS- Scoring Tool - Modified Finnegan Scoring System

- Designed for term infants on 4 hour feeding schedule
- Needs to be modified for preterm infants.
- Infants **should not** be awakened to score.

Assessment and Scoring

- A crying baby should be soothed and quieted before assessing muscle tone, Moro reflex and respiratory rate.

Scoring - Key Points

- First score/Baseline score – done approximately 2 hours after birth
- Re-scoring at 3-4 hour intervals
- Scoring is dynamic
  - All signs and symptoms observed during the scoring interval are included in the point total for that period.

Central Nervous System Disturbances

<table>
<thead>
<tr>
<th>Signs:</th>
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<tbody>
<tr>
<td>Cry</td>
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<tr>
<td>Sleep</td>
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<tr>
<td>Moro Reflex</td>
</tr>
<tr>
<td>Tremors</td>
</tr>
<tr>
<td>Muscle Tone</td>
</tr>
<tr>
<td>Excoriation</td>
</tr>
<tr>
<td>Myoclonic Jersks</td>
</tr>
<tr>
<td>Seizures</td>
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</tbody>
</table>

Crying

- Normally infant will use self-consoling measures such as finger sucking or fist sucking to diminish or eliminate crying within a 15 second period of time
- Offer holding, rocking or pacifier
- These measures usually work unless extremely hungry, in pain or in major discomfort due to a pathological condition

Excessive or high-pitched crying

- Score 2: Score 3: Unable to use self-consoling measures with in 15 seconds
- Cries intermittently or continuously for **less than** 5 minutes despite interventions
- Score whether the cry is high-pitched or not
Continuous High-Pitched Crying
• Score 3: Unable to use self-consoling measures with in 15 seconds
• Cries intermittently or continuously for greater than 5 minutes despite interventions
• Score whether the cry is high-pitched or not

Sleep
• Based on the longest period of light or deep sleep displayed by the infant, within the entire scoring interval

Sleep
• Scale of increasing severity
  – 1 score from the 3 levels of severity
    – Preterm- if eating every 3 hours can sleep for 2 1/2 hours.
• If a 3 hour scoring period is used due to a 3 hour medication schedule, do not score the “sleeps less than 3 hours” unless infant wakes on their own after sleeping at least 2 hours

Moro Reflex
• Prior to eliciting this reflex, quiet if irritable or crying
• Definitions:
  - Jittery- symmetric & involuntary rhythmic tremors
  - Clonus- involuntary repetitive jerks (out/in movements) of wrist or ankle

Moro Reflex
• Normal newborn reflex
• Lift infant off the crib by arms and allow to gently fall back onto mattress
• Arms should straighten and elbows will move away from the body
• Extension of the wrist & fanning/opening of the fingers
• Arms return to the chest and may begin to cross over each other
Moro reflex

- Score 2: pronounced jitteriness (rhythmic tremors that are symmetrical and involuntary) of the hands during or at the end of a Moro reflex.
- Score 3: jitteriness and clonus (repetitive involuntary jerks) of the hands and/or arms are present during or after the initiation of the reflex.

Tremors

- Tremors - involuntary rhythmic movements/quivers with equal amplitude occurring at a fixed point
- Scale of increasing severity
- Baby should only receive one score from the 4 levels of severity
- Undisturbed refers to baby asleep or at rest in crib

Tremors - Disturbed

- Mild tremors:
  - Score 1 if tremors of the hand or foot when handled
- Moderate-severe:
  - Score 2 if tremors of the arms or legs, with or without tremors of hands and feet when handled

Tremors - Undisturbed

- Mild tremors:
  - Score 1 if tremors of hand or foot when not being handled
  - Score 2 if tremors of arms or legs when not being handled

Increased muscle tone

- The ability of the muscle to resist movement
- Do not assess tone when asleep or crying
- Wake and/or comfort a crying infant prior to testing

Increased muscle tone

- Score 2: if excessive or above-normal muscle tone or tension is observed
  - muscles become “stiff” or rigid and the baby shows marked resistance to passive movements.
- Example:
  - no head lag when being pulled to the sitting position;
  - if there is tight flexion of the baby’s arms & legs (unable to slightly extend these when an attempt is made to extend and release the supine infant’s arms & legs)
**Excoriation**

- Skin abrasions - result from constant rubbing against a surface
- Score when excoriations first appear, increase or appear in a new area
- Continue to score until the rub marks are no longer present.

**Myoclonic jerks**

- Score 3: if involuntary muscular contractions
- Twitching or jerking of limbs
  - irregular
  - exceedingly abrupt (usually involving a single group of muscles)

**Generalized seizures**

- Referred to as tonic seizures
- Most often a generalized activity involving tonic extensions of all limbs
- Sometimes limited to one or both limbs on one side
- Activity doesn’t stop if limb is held

**Generalized seizures-cont.**

- Swimming
- Rowing
- Pedaling
- Bicycling
- Eye staring
- Rapid involuntary movements of eyes
- Chewing
- Back arching
- Fist clenching

**Metabolic/Vasomotor/Respiratory Disturbances**

<table>
<thead>
<tr>
<th>Signs</th>
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<tbody>
<tr>
<td>Fever</td>
<td>Sweating</td>
</tr>
<tr>
<td>Yawning</td>
<td>Mottling</td>
</tr>
<tr>
<td>Nasal Stiffness</td>
<td>Sneezing</td>
</tr>
<tr>
<td>Nasal Flaring</td>
<td>Respiratory rate</td>
</tr>
</tbody>
</table>

**Sweating**

- Score 1 If: spontaneous sweating — not due to excessive clothing or high room temperature
- Moisture on forehead, upper lip or back of neck
**Hyperthermia**
- Temperature taken per axilla
- Mild pyrexia - 99-100° is an early indication of heat produced by increased muscle tone or tremors
  - Score 1 if: 99-101°
  - Score 2 if: > 101°

**Yawning**
- Score 1 if: more than 3 yawns observed within the scoring interval

**Mottling**
- Score 1 if: mottling (marbled appearance of pink and pale or white areas) is present on the baby’s chest, trunk, arms or legs.

**Nasal stuffiness**
- Score 1 if: nasal drainage with or without stuffy nose

**Sneezing**
- Score 1 if: more than 3-4 sneezes observed within the scoring interval

**Nasal flaring**
- Score 2: Outward spreading of the nostrils is observed
**Respiratory rate**

- Infant should be quieted if crying prior to counting respiratory rate
- Score 1 if: >60 per minute without other evidence of lung or airways disease
- Score 2 if: respirations > 60 per minute & involve retractions

**Gastrointestinal Disturbances**

<table>
<thead>
<tr>
<th>Signs</th>
<th>Sucking</th>
<th>Feeding</th>
<th>Regurgitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectile</td>
<td>Loose Stools</td>
<td>Watery Stools</td>
<td></td>
</tr>
<tr>
<td>Vomiting</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Excessive sucking**

- Score 1:
  - Hyperactive/disorganized sucking
  - Increased rooting with swiping movements of hand across mouth
  - Attempting to suck on pacifier while moving head side to side, unable to suck on pacifier adequately

**Poor feeding**

- Score 2 if: baby demonstrates excessive sucking prior to feeding, yet sucks infrequently during a feeding taking inadequate volumes
- Demonstrates an uncoordinated sucking reflex (difficulty sucking and swallowing) gulping and stopping frequently to breathe

**Poor feeding - Prematures**

- Premature infants may require tube feeding and should not be scored for poor feeding if tube feeding is expected for their gestation

**Regurgitation / vomiting**

- Score 2 if: > 2 times during or after feeding - not associated with burping
- Score 3 if: projectile vomiting - one or more episode(s) occur during or immediately after a feeding
**Loose stools / diarrhea**

- Score 2 if loose (curds/seedy appearance)
  – May or may not be explosive
- Score 3 if watery stools (water ring on diaper around stool) are observed
- Check the diaper after the exam is completed if irritated bottom noted

**Consider Treatment**

If scores are:
- \( \geq 8 \) for 3 consecutive scores
- \( \geq 12 \) for 2 consecutive scores

**Pharmacologic Treatment**

- Morphine - shorter half life, thus easier to see response
- Start at 0.05mg/kg every 3 hours
- Start to wean if average scores <8
- Wean by 10% daily
- Consider using Tylenol
- Consider using Mylicon (simethicone)
- Non-Pharmalogical interventions

**Goal**

- Score of <8
  – Allows for appropriate drug weaning
- Discharge
  – Score <8 off medications for 24-72 hours

**Nursing Interventions:**

**Comfort measures**

- Excessive or high-pitched crying
  - Reduce environmental stimuli
  - Hold firmly and close to the body
  - Gentle rocking, talking/singing/humming
  - Use of infant swing

**Excessive or high-pitched crying**
Sleeplessness

- Wrap or swaddle baby
- Minimal handling
- Skin to skin
- Use swing
- Feed baby on demand

Myoclonic Jerks, Tremors, Jitteriness, Irritability

- Prepare everything prior to disturbing the baby to minimize handling
- Slow movements
- Reduced lighting
- Reduced noise levels
- Soft music
- Massage
- Relaxation baths

Excoriation

- Tegaderm® to knees and elbows
- Clean skin regularly
- Dry clothing and bedding to prevent skin infection

Hyperthermia

- Ensure adequate hydration
- Reduce environmental temperature
- Avoid heavy bedding
- Dress or swaddle in loose light fabrics
- Skin to skin contact with mother

Nasal Stuffiness / Excessive Nasal Secretions

- Use gentle suction if nasal secretions cause obstruction to ensure adequate respiratory function

Excessive Sucking

- Apply mittens if trauma to fingers.
- Offer pacifier for nonnutritive sucking.
Poor Feeding

- Feed on demand
- Reduce environmental stimuli during feeding
- Frequent small feeds with rest between sucking
- Assess coordination of suck/swallow reflex—support cheeks and jaw if necessary
- If insufficient fluid intake notify Medical Staff
- May need hypercaloric formula

Regurgitation / vomiting

- Burp frequently when baby stops sucking & at end of feeding

Loose/watery stools

- Frequent diaper changes
- Use barrier creams
- Occasional skin exposure to allow bottom to dry

- Achieving reliable scores using the Modified Finnegan Neonatal Scoring Tool can be done by:
  - Establishing set descriptions of the criterion scored
  - Education of staff
  - Consider reassessing inter-rater reliability among staff

Thank you!