Narcotic Withdrawal Syndrome
Neonatal Abstinence Syndrome

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University of Kentucky
# Public Health Perspective

- Substance abuse: Public Health Problem and Social Morbidity
- NSDUH (National Survey on Drug Use and Health) 2007/2008 estimates

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<thead>
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<tbody>
<tr>
<td></td>
<td>Women (15-44y)</td>
<td>Pregnancy</td>
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<tr>
<td>Illicit drugs</td>
<td>9.6%</td>
<td>5.1%</td>
<td>201,806</td>
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<tr>
<td>Tobacco</td>
<td>28.1%</td>
<td>16.7%</td>
<td>709,933</td>
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<tr>
<td>Alcohol</td>
<td>52.1%</td>
<td>10.6%</td>
<td>450,616</td>
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</table>
Outline

- Scope of the problem of drug use in pregnancy
- Common drugs of abuse
- Approaches or methods for detection of drug exposure
- Signs of narcotic abstinence syndrome or drug withdrawal
- Goals in the approach to management of neonatal drug withdrawal
- Considerations in the pharmacologic treatment of narcotic abstinence syndrome
- Other issues in maternal-child interaction, including breastfeeding
Public Health Perspective

- Substance abuse: Public Health Problem
- Social Morbidity
- NSDUH (National Survey on Drug Use and Health) 2007/2008 estimates

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Illicit drugs</td>
<td>9.6%</td>
<td>5.1%</td>
<td>201,806</td>
</tr>
<tr>
<td>Marijuana</td>
<td>7.0%</td>
<td>3.8%</td>
<td>161,541</td>
</tr>
<tr>
<td>Cocaine</td>
<td>0.8%</td>
<td>0.4%</td>
<td>17,004</td>
</tr>
<tr>
<td>Pain relievers*</td>
<td>2.6%</td>
<td>0.7%</td>
<td>29,758</td>
</tr>
<tr>
<td>*1.6 million</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Drugs of Use or Abuse During Pregnancy

- Major Drugs of Abuse:
  - Opioids:
    - Agonists
    - Antagonists
    - Mixed agonist-antagonists
    - Semi-synthetic opioids
  - CNS stimulants
    - Amphetamines
    - Methamphetamine
    - Cocaine
    - Methylphenidate (Ritalin)
Drugs of Use or Abuse During Pregnancy

- **Major Drugs of Abuse:**
  - CNS depressants
    - Alcohol
    - Barbiturates
    - Benzodiazepines
    - Cannabinoids (marijuana, hashish)
  - Other sedative-hypnotics
    - Methaqualone (Quaalude)
    - Ethchlorvynol (Placidyl)
    - Glutethimide (Doriden)
    - Methyprylon (Noludar)
    - Ethinamate (Valmid)
    - Chloral hydrate
Drugs of Use or Abuse During Pregnancy

- **Major Drugs of Abuse:**
  - **Hallucinogens**
    - LSD
    - Phenylethylamine (mescaline)
    - Phenylisopropylamines (MDA, MMDA, MDEA, MDMA or 3,4-methylenedioxymethamphetamine or ecstasy)
  - **Inhalants**
    - Solvents and aerosols (glues, gasoline, paint thinner, cleaning solutions, nail polish remover, Freon)
  - **Nitrites**
  - Nitrous oxide
SPECIAL REPORT | PRESCRIPTION FOR PAIN

EASTERN KENTUCKY: PAINKILLER CAPITAL

INVESTIGATION REVEALS NARCOTICS FLOOD MOUNTAIN COUNTIES AT HIGHEST RATE IN NATION

Source: Drug Enforcement Administration
Hydrocodone
Average Number of Prescriptions Dispensed
By DEPP Investigative Region
Per 1,000 Resident Population
2003-2005

Lowest =
Highest =
Drugs of Use or Abuse During Pregnancy

Semi-synthetic opioids (Oxycodone)

- M-Oxy®
- OxyContin®
- OxyFast®
- OxyIR®
- Percolone®
- Roxicodone®
- OxyDose™
- OxyNorm™
- OxyRapid™

- Roxicodone®
- Intensol
- Endocet®
- Percocet®
- Roxicet®
- Roxilox™
- Tylox®
- Taxadone™
Drugs of Use or Abuse During Pregnancy

Semi-synthetic opioids (Hydrocodone)

Issues In Management of Infants Born to Substance Using Mothers

- Detection of drug use
- Variation in Manifestations (Term versus Preterm)
- Monitoring manifestations (withdrawal versus drug effects)
- Scoring system or scale
- The scores as basis to initiate therapy
Detection of Drug Exposure

- **Maternal Screening**
  - Admits to drug use
  - Urine screening during pregnancy
  - Maternal hair analysis

- **Neonatal Screening**
  - Baby urine drug screen
  - Meconium drug screen
  - Baby hair analysis
  - Umbilical cord analysis
Detection of Drug Exposure

- Unreliability of history
- Urine and or meconium screening may be negative in the presence of in-utero exposure
  - Negative neonatal urine if maternal use greater than 2 days before delivery
  - Negative meconium if maternal use before 20 weeks gestational age
Detection of Drug Exposure

- Diagnosis:
  - History
  - Suspicion based on risk factors
    - Gravida ≥ 3
    - No or late prenatal care
    - Child or children not living with mother
    - Other CPS involvement
    - Abruptio placentae/ Placenta previa
    - Physical injuries (ER visits)
    - History of pain, headaches, migraine, etc
    - STD’s, Risky lifestyles
    - Disorientation, expression during interviews
Prevalence of Use Among Drug Using Pregnant Women (%)

Drugs Used During Pregnancy

- Opiate
- Cocaine
- Benzodiazepine
- Amp/Meth
- PCP
- Marijuana
- Tobacco
- Alcohol
- Brbiturates

Percent

- 37.5
- 26.2
- 17.8
- 5.74
- 0.82
- 63.3
- 75
- 13.6
- 2.5
Opiate & Polydrug Use In Rural Population (n=183)
Detection of Drug Exposure

- **Diagnosis:**
  - Urine drug screen
  - Meconium drug screen: Need expanded opiate screen if looking for oxycodone, propoxyphene (Darvon) and methadone
  - Need to also add Buprenorphine+/-Naloxone
# Drug Exposure Screening at UK: By history and infant testing

<table>
<thead>
<tr>
<th>Drug</th>
<th>History</th>
<th>History + Urine/Meconium</th>
<th>Increase in Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opiate</td>
<td>166</td>
<td>183</td>
<td>10%</td>
</tr>
<tr>
<td>Cocaine</td>
<td>115</td>
<td>128</td>
<td>11.3%</td>
</tr>
<tr>
<td>Benzodiazepine</td>
<td>87</td>
<td>87</td>
<td>No change</td>
</tr>
<tr>
<td>PCP</td>
<td>3</td>
<td>4</td>
<td>33%</td>
</tr>
<tr>
<td>Amp/Meth</td>
<td>25</td>
<td>28</td>
<td>12%</td>
</tr>
<tr>
<td>Marijuana</td>
<td>292</td>
<td>309</td>
<td>5.8%</td>
</tr>
</tbody>
</table>
Drug Exposure: Preterm versus Term

- Preterm infants may exhibit later and less severe symptoms
  - Less immature CNS
  - Shorter duration of exposure

- Scores of withdrawal may be related to prematurity (e.g. respiratory signs, poor feeding, etc)
Withdrawal Versus Drug Effects

- CNS manifestations such as hypertonia, irritability, shrill cry, myoclonic jerks, seizures, especially in opiate exposure
- These manifestations may be noted with withdrawal
- Opiates, cocaine, and other drugs have also been demonstrated to affect brain development (prominent feature small head circumference).
Perinatal Opiate Exposure Brain Infarct

- Term, uneventful delivery
- Transferred to Tertiary Center because of seizures
- ? Perinatal Depression:
- MRI: Stroke/infarct
- Negative work-up for perinatal stroke
  - Clotting factors, Protein C and S, Anti-thrombin III and Anti-phospholipid levels were all within normal limits
  - Negative for TORCH
Withdrawal Versus Drug Effects

- CNS manifestations such as hypertonia, irritability, shrill cry, myoclonic jerks, seizures, especially in opiate exposure.
- These manifestations may be noted with withdrawal.
- Opiates, cocaine, and other drugs have also been demonstrated to affect brain development (prominent feature small head circumference).
Signs of Neonatal Narcotic Withdrawal

**Central Nervous System Signs**
- High-pitched cry
- Decreased sleeping time
- Hyperactivity
- Hyper-reflexia
- Tremors
- Hypertonia
- Myoclonic jerks
- Convulsions
- Irritability
Signs of Neonatal Narcotic Withdrawal

- **Gastrointestinal disturbances**
  - Excessive sucking
  - Poor feeding
  - Regurgitation
  - Projectile vomiting
  - Loose to watery stools

- **Metabolic/vaso-motor disturbances**
  - Sweating
  - Fever
  - Yawning
  - Mottling
Signs of Neonatal Narcotic Withdrawal

- **Respiratory disturbances**
  - Nasal stuffiness
  - Sneezing
  - Nasal flaring
  - Tachypnea
  - Retractions
Signs of Neonatal Narcotic Withdrawal

- **Other manifestations**
  - Abrasions or excoriations (knees, elbows, chin)
  - Fever
Neonatal Narcotic Withdrawal Syndrome

- **Onset of manifestations:**
  - Usually within 72 hours of birth
  - Birth to two weeks
  - Late presentation: 2-4 weeks
Neonatal Narcotic Withdrawal Syndrome

- Variable onset of manifestations depending on:
  - Drug used during pregnancy
  - Single drug versus polydrug use
  - Dosage
  - Timing of use before delivery
  - Anesthesia/analgesia (labor and delivery)
  - Fetal accumulation
  - Delayed excretion due to tissue binding
Neonatal Narcotic Withdrawal Syndrome

- Duration of withdrawal manifestations:
  - 6-8 days
  - Longer in some infants (3 – 6 months)

- Evaluation of abstinence/drug effects
  - Finnegan’s Abstinence Scoring System
  - Lipsitz modification of Finnegan
  - Brazelton’s Neurobehavioral Assessment Scales (NBAS)
  - NICU Network Neurobehavioral Scale (NNNS)
## Finnegans Scoring

<table>
<thead>
<tr>
<th>System: CNS Disturbances</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cry (excessive, continuous)</td>
<td>2 - 3</td>
</tr>
<tr>
<td>Sleep (&lt;1, 2, 3 hrs after feed)</td>
<td>3 - 2 - 1</td>
</tr>
<tr>
<td>Reflexes (overactive /very overactive Moro reflex)</td>
<td>2 - 3</td>
</tr>
<tr>
<td>Tremors (mild, disturbed / Moderate, disturbed / mild, undisturbed / mod –severe disturbed)</td>
<td>1 – 2 – 3- 4</td>
</tr>
<tr>
<td>Increased Muscle tone</td>
<td>2</td>
</tr>
<tr>
<td>Myoclonic jerks</td>
<td>3</td>
</tr>
<tr>
<td>Convulsions</td>
<td>5</td>
</tr>
<tr>
<td>Excoriations</td>
<td>1</td>
</tr>
</tbody>
</table>
## Finnegan Scoring

<table>
<thead>
<tr>
<th>Gastrointestinal Disturbances</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive Sucking</td>
<td>1</td>
</tr>
<tr>
<td>Poor Feeding</td>
<td>2</td>
</tr>
<tr>
<td>Regurgitation / projectile vomiting</td>
<td>2 - 3</td>
</tr>
<tr>
<td>Loose stools / watery stools</td>
<td>2 - 3</td>
</tr>
<tr>
<td><strong>Respiratory System manifestations</strong></td>
<td>2</td>
</tr>
<tr>
<td>Nasal Flaring</td>
<td>2</td>
</tr>
<tr>
<td>Respiratory rate &gt;60/min / RR &gt;60/min and retractions</td>
<td>1 - 2</td>
</tr>
</tbody>
</table>
## Finnegan Scoring

### Other Disturbances (Autonomic)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweating</td>
<td>1</td>
</tr>
<tr>
<td>Fever 37.3 – 38.3°C / =&gt;38.4°C</td>
<td>1-2</td>
</tr>
<tr>
<td>Frequent yawning (&gt;3-4 in 4 hr)</td>
<td>1</td>
</tr>
<tr>
<td>Mottling</td>
<td>1</td>
</tr>
<tr>
<td>Nasal stuffiness</td>
<td>2</td>
</tr>
<tr>
<td>Sneezing (&gt;3-4 in 4 hr)</td>
<td>1</td>
</tr>
</tbody>
</table>
Other Scoring Systems For Narcotic Abstinence Syndrome

- Neonatal Brazelton Neurobehavioral Scales (NBAS)
  - Habituation
  - Reflexes
  - Tone
  - Orientation
  - State Changes

- NNNS (NICHD) NICU Network Neurobehavioral Scale
  - Similar items as NBAS
  - Includes stress/abstinence signs
  - Adapted for use in high-risk populations including exposed children and preterm infants
Neonatal Abstinence Syndrome

- **Severity of CNS/ANS signs:**
  - Methadone exposure: higher prevalence of seizures
  - NAS manifestations about equally noted with maternal buprenorphine treatment
  - Low prevalence or absence of signs in cocaine exposure
  - Dose effect relationship (specifically tone abnormalities and cocaine exposure)
Neonatal Narcotic Withdrawal Syndrome and Maternal Methadone

<table>
<thead>
<tr>
<th>Indices</th>
<th>Maximum Dose mg/day</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>&lt;20</td>
<td>20-39</td>
<td>=&gt;40</td>
<td></td>
</tr>
<tr>
<td>N=25</td>
<td>N=20</td>
<td>N=20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treated</td>
<td>12%</td>
<td>44%</td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>LOS, days Median (range)</td>
<td>7 (4,9)</td>
<td>15 (7,32)</td>
<td>38 (29,45)</td>
<td></td>
</tr>
</tbody>
</table>

Neonatal Abstinence Syndrome and Maternal Methadone

- 36 eligible; 25 studied
- 12 required treatment
  - Median age of Rx: 35 hr (7-84 hrs)
  - Median duration of Rx: 15 days (11-28 days)
  - Mean maternal methadone dose: 47.5mg
  - Length of stay: 20 days (14-34)
  - Cord methadone concentration: 31ng/ml (17-70)
- 13 not treated
  - Length of stay: 6 days (4-10)
  - Mean maternal methadone dose: 65 mg
  - Cord methadone level: 88 ng/ml (0-130)

Neonatal Abstinence Syndrome

- **Supportive Treatment**
  - Swaddling
  - Small frequent feedings
  - High nutrient density formula
  - IV fluids
  - Decrease sensory stimulation
  - Monitor closely for other disease status
  - Monitor weight gain

- **Pharmacologic treatment**
Considerations When Initiating Pharmacologic Treatment

STATE OF AROUSAL

- Narcosis
- Abstinence Score
- Agitation

Clinical status

Intervention

Decreased activity: developing medical problems; early signs of over sedation

Very close monitoring of vital signs and state of arousal

Abstinence Score

0

1 - 3

4 - 7

8 - 10

11 - 13

14 - 16

17

Point of optimal behavior and neurologic state

Need for conservative measures

Need for increasing dosage

Modified from Finnegan, 1985 in Current Therapy in Neonatal-Perinatal Medicine
Initiation of Pharmacologic Treatment

- Variation in threshold scores:
  - A score greater than 7
  - Three scores more than 8
  - A score above 9
  - A score above 10
  - A score greater than 12
Pharmacologic Treatment

- Must be individualized
- Based on severity
- Agents: morphine, paregoric, opium, clonidine, phenobarbital, chlorpromazine, diazepam, methadone
Neonatal Abstinence Syndrome (Pharmacologic Treatment)

- **Old Drugs:**
  - **Tincture of opium (10mg/mL).** Contains narcotic alkaloids including codeine and morphine: concentration of morphine may vary with each administration; diluted with ethanol.
  - **Paregoric or camphorated tincture of opium (contains anhydrous morphine, 0.4 mg/mL):** Use declined because of potential side effects (contains isoquinolone derivative (anti-spasmodic); toxic compounds such as camphor; ethanol 44-46%, anise oil, benzoic acid, with alcohol – benzyl alcohol (severe acidosis and hypotension), glycerin (pulmonary edema).
Neonatal Abstinence Syndrome (Pharmacologic Treatment)

- **Phenobarbital**: loading dose of 10 – 20mg/kg/24 hours Maintenance: 2-8mg/kg/day; taper by 10% to 20% per day. Monitor level 24-48 hours after initiation of therapy.

- **Clonidine**: non-narcotic that targets the $\alpha_2$ adrenergic hyperactivity; at low doses, stimulates presynaptic adrenergic receptors, thereby increasing the amount of norepinephrine released into the synapse and lowering firing rate of adrenergic neurons. 0.5 to 1.0 $\mu g/kg$ initial single dose and maintenance of 3 – 5 $\mu g/kg/day$ divided every 4 to 6 hours
Neonatal Abstinence Syndrome
(Pharmacologic Treatment)

• **Diazepam (Valium):** 1 – 2 mg/kg every 8 hours. Multiple concerns: poor sucking and increased sedation, late-onset seizures. Parenteral preparation contains benzyl alcohol and sodium benzoate which displaces bilirubin binding; contraindicated in jaundiced and preterm infants.

  - **Chlorpromazine:** controls CNS and GI signs; dosage of 0.55 mg/kg every 6 hours IM or PO; slow elimination with half-life of 3 days; injectable contains benzyl alcohol; other side effects: cerebellar dysfunction, decreased seizure threshold.
Neonatal Narcotic Withdrawal Syndrome (Pharmacologic Treatment)

- **Morphine:**
  - **Preparation:** Oral morphine solution (10mg/5ml) with added sterile water 5ml = (1 mg/ml) or 0.1 mg in 0.1ml (expires in 7 days).
  - **Dose:** 0.08 mg to 0.2 mg per dose every 3 - 4 h
Neonatal Narcotic Withdrawal Syndrome (Pharmacologic Treatment)

Algorithm for the UK NICU
Our Current Protocol
Opiate-Exposed Neonate

- Initiate behavioral care/intervention
  - Decrease sensory stimulation
  - Promote self-regulation
  - Environmental support
    - Swaddling; decrease vestibular movements; minimal light and sound stimulation
  - Nutritional support (may need higher caloric density feeds)
Opiate-Exposed Neonate

- Report of withdrawal manifestations
  - Finnegan scoring timed with feedings (q 3 or 4 hours)

- 2 or 3 consecutive Finnegan scores ≥24 Add pharmacological treatment to behavioral intervention
  - Morphine 0.4 mg/kg/day divide into Q 4 or Q 3 hours based on feeding schedule.

- Continue scoring after feedings and evaluate every 24 hours.
Opiate-Exposed Neonate

- After 24 hours scores total $\geq 24$ (3 consecutive scores) increase dose by 10% of original dose q 24 hours until stable (scores $< 24$ total from 3 consecutive scores).

- If after 24 hours of initial treatment scores equal $< 24$ total from 3 consecutive scores, continue dose for additional 48 hours; then decrease dose by 10% of maximum dose.

- If scores continue to be less than 24 from 3 consecutive scores for 48 hours, taper dose by 10% of maximum dose.

- Therefore weaning is done q 48 hours.
Opiate-Exposed Neonate

- Weaning is done q 48 hours.
- If rescue needed, add half of the weaning dose (half of the 10% of maximum dose or 5%), stabilize for 48 hours and use the 5% for weaning q 48 hours.
- If requiring greater than 1 mg/kg/day use another drug.
- If dose is less than 0.1 mg/kg/day, may discontinue morphine.
- May go home on morphine if infant is going home to safe environment.
Dynamics of Phenobarbital

Oral loading dose 20 mg/kg
Dose increase 10 mg/kg q 12 h
Maintenance doses: 4 - 6 mg/kg/day

Point where plasma levels sufficient to control NAS

Toxic plasma levels

"No control"  "Control"

AVE NAS
8 10 12 9 9 8 6 5 4

AGE
12 24 36 48 60 72 84 96 108 120 132 144 156 hours

Steady state

Ineffective Plasma Levels

AGE
12 24 36 48 60 72 84 96 108 120 132 144 156 hours

Steady state

Ineffective Plasma Levels

Oral loading dose 20 mg/kg
Dose increase 10 mg/kg q 12 h
Maintenance doses: 4 - 6 mg/kg/day
Neonatal Abstinence Syndrome

- Pharmacologic Treatment
  - Magic Butt Balm
    - Preparation A:
      - Desitin: 1 large tube
      - Maalox: 30 ml
      - Karaya powder
    - Preparation B:
      - Cholestyramine (QUESTRAN) 10% in Aquaphor
National Survey: Management of NAS

- 75/102 responded
- 41 (54.5%) have written policy on management
- 49 (65%) use Finnegan Scoring
  - Only 3 use Lipsitz tool
- Opioid exposure: 63% use Tincture of opium or morphine
- Polydrug exposure: 52% Tincture of opium or morphine
# National Survey: Management of NAS (Opioid Exposure)

<table>
<thead>
<tr>
<th>First Line</th>
<th>Added Second Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opioids – 47 (63%)</td>
<td>Phenobarbital (24), IV morphine (10), Methadone (8), Clonidine (3), Diazepam (2)</td>
</tr>
<tr>
<td>Methadone – 15 (20%)</td>
<td>Oral morphine (6) Phenobarbital (4), Tincture Opium (3), Clonidine (2)</td>
</tr>
<tr>
<td>Phenobarbital – 13 (17%)</td>
<td>Oral morphine (4), Methadone (4), Tincture of opium (3), Diazepam (2)</td>
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</tbody>
</table>
# National Survey: Management of NAS (Polydrug Exposure)

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<th>Added Second Line</th>
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</thead>
<tbody>
<tr>
<td>Opioids 39 (52%)</td>
<td>Phenobarbital (27), Methadone (3), Clonidine (2), Diazepam (1), Variable (6)</td>
</tr>
<tr>
<td>Phenobarbital 24 (32%)</td>
<td>Opioids (8) Diazepam (8), Methadone (4), Rarely seen (4)</td>
</tr>
<tr>
<td>Methadone 8 (10.6%)</td>
<td>Phenobarbital (4), Opioids (3), Diazepam (1)</td>
</tr>
</tbody>
</table>
Goals of Treatment and Management

- Minimize symptomatology (supportive & pharmacologic)
- Promote growth and weight gain
- Promote caretaker-child interaction
- Strategies directed to social issues
  - Improve short-term and long-term outcomes
  - Endangered children (child abuse/neglect)
  - Long-term behavioral problems
AAP Recommendations (1998)

- Screening should involve multiple forms, e.g., urine plus meconium
- NAS should be considered as a diagnosis in whom compatible signs develop; be aware of other potential diagnosis
- Withdrawal should be scored; consistent scoring enables consistent decisions to institute treatment and allows quantitative approach to increasing or decreasing dosing
AAP Recommendations (1998)

- Pharmacologic therapy of seizures is indicated; other causes must be evaluated
- Vomiting, diarrhea, or both associated with dehydration and poor weight gain, in the absence of other diagnosis, relative indications for treatment even if absent high withdrawal scores
- Drug selection - match the agent causing withdrawal (opium for opioid; phenobarbital for sedative-hypnotic)
AAP Recommendations (1998)

- Must be aware that severity of withdrawal signs has not been proven to be associated with differences in outcomes; Treatment of drug withdrawal may not alter the long-term outcome
- Naloxone contraindicated for opiate withdrawal
Prenatal Drug Exposure: Long-term Behavior Outcome

Externalizing Score

Year of Assessment

Parent

Teacher

- High
- Some
- None
Prenatal Drug Exposure: Long-term Behavior Outcome

- High prenatal cocaine exposure predicts externalizing behavior from the parent and teacher’s observation.
- Prenatal opiate exposure is associated with attention problems more evident as children are older.
- Other predictors of behavior problems:
  - Community violence
  - Caretaker depression
  - Postnatal tobacco and alcohol exposures

Bada et al. Neurotoxicology Teratology 2010
Breastfeeding and Maternal Drug Use

- AAP 2001: The Committee on Drugs strongly believes that nursing mothers should not ingest drugs of abuse, because they are hazardous to the nursing infant and to the health of the mother.
  - However, the dose restriction for methadone was eliminated (<20 mg since 1983, as compatible with breast feeding).
## Methadone and Breastfeeding

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>PP Days Collected</th>
<th>Dose, mg/d</th>
<th>BM/Plasma</th>
<th>Conc BM, μg/ml</th>
<th>mg/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kreek 1974</td>
<td>1</td>
<td>4-8</td>
<td>50</td>
<td>0.13</td>
<td>0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>Blinick</td>
<td>10</td>
<td>3-10</td>
<td>10-80</td>
<td>0.83</td>
<td>0.27</td>
<td></td>
</tr>
<tr>
<td>Kreek 1979</td>
<td>2</td>
<td>5-8</td>
<td>25,50</td>
<td>0.05-1.2</td>
<td>0.01-.12</td>
<td>0.06-.1</td>
</tr>
<tr>
<td>Pond</td>
<td>2</td>
<td>7,21</td>
<td></td>
<td>0.32, 0.61</td>
<td>0.01-.7</td>
<td>0.01-.03</td>
</tr>
<tr>
<td>Geraghty</td>
<td>2</td>
<td>11, 14</td>
<td>73</td>
<td>0.66, 1.22</td>
<td>.13, .17</td>
<td>.07, 09</td>
</tr>
<tr>
<td>Wojnar-Horton</td>
<td>12</td>
<td>3-26</td>
<td>20-80</td>
<td>0.44</td>
<td>0.12</td>
<td>17.4μg/kg/d</td>
</tr>
<tr>
<td>McCarthy</td>
<td>8</td>
<td>2-202</td>
<td>25-180</td>
<td>0.095</td>
<td>0.05</td>
<td></td>
</tr>
</tbody>
</table>
Methadone and Breastfeeding

- Amount of methadone in breast milk is very small and dependent on dose of methadone
- Inconclusive studies on short term and long term developmental effects of methadone received by infant
- Amount of methadone in breast milk may not be adequate to treat NAS
Methadone and Breastfeeding

- Ideally women who choose to breast feed – comprehensive treatment facilities
- Counseling needed regarding benefits and consequences during relapse
- Discourage those if unstable drug recovery, have HIV, engaged in prostitution, with Hepatitis C when nipples are cracked
- Review relative safety of other psychotropic medications (unknown safety profiles of SSRI, antidepressants, anti-psychotic meds)
- Watch for overmedication post-partum (higher methadone requirement during pregnancy).
**Methadone and Breastfeeding (Barriers)**

- The breastfed drug-exposed infant
  - Challenging because of NAS; may require treatment
  - Various complications noted in infants:
    - Irritability
    - State lability
    - Hypertonicity
    - Disorganized suck and swallow
    - Hypersensitivity
    - Nasal stuffiness interfering with sucking
Methadone and Breastfeeding (Barriers)

- Other barriers to breast feeding
  - Health care providers
    - Treating physicians uncomfortable with safety of methadone
    - Nursing staff uncomfortable with practice (What else may be in breast milk?)
Breastfeeding and Maternal Drug Use

- **AAP 2001:** The Committee on Drugs strongly believes that nursing mothers **should not** ingest drugs of abuse, because they are hazardous to the nursing infant and to the health of the mother.
  - Drugs of abuse for which adverse effects on the infant has been reported (Amphetamine, Cocaine, Heroin, Marijuana, Phencyclidine)

- **CDC:** Breastfeeding **is NOT advisable** if the following condition is true:
  - The infant whose mother is using or is dependent upon an illicit drug.
May need universal screening for in utero drug exposure

Mother will need management (address medical, drug rehabilitation, multiple social issues)

Non-judgmental approach

Baby will need monitoring and supportive treatment

Need for pharmacologic treatment will depend on type of drug exposure and manifestations of withdrawal

Promote child growth, health, and safety

Direct treatment or management to child and family
“The first hours and days of life are sensitive period for the mother when she is specially psychologically prepared to accept her infant as her own.” .....Lvoff et al. 2000

“The empowerment this brings may help inspire them – and us – to make the most of this sensitive window to start a new life with implications for generations to come.”

........Philipp et al. 2003