Opioid use in pregnancy and Neonatal Abstinence Syndrome

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Objectives

1. Understand the **magnitude, medicine and scope** of **neonatal abstinence syndrome**.

2. Obtain insights from **Ohio’s statewide Neonatal/Perinatal Collaborative** work using QI methodology to improve NAS care.

3. Learn **concrete, data driven public health measures** and **best practice approaches** to the immense challenge of substance use in pregnancy.
Opioid Epidemic; Pregnant Moms and Babies 2000-2009

- 2000-2009 4 fold increase in OPR prescriptions.
- *Enough prescription opioids were prescribed in 2010 to medicate every American adult around-the-clock for a month.*
- US infants diagnosed with NAS increased x3
- *By 2009, 1 infant per hour accounting for $720 million*

Ohio Data:

Figure 5. Number of Unintentional Overdose Involving Selected Drugs, by Year, Ohio, 2000-2015

* Prescription opioids not including fentanyl; fentanyl was not captured in the data prior to 2007 as denoted by the dashed line.

Source: Ohio Department of Health, Bureau of Vital Statistics; Analysis Conducted by ODH Injury Prevention Program.

Multiple drugs are usually involved in overdose deaths. Individual deaths may be reported in more than one category.
At delivery...

Abrupt adjustment to

• Extrauterine life AND
• A drug-free environment

Withdrawal
What is Neonatal Abstinence Syndrome

- The clinical findings associated with opioid withdrawal has been termed the neonatal abstinence syndrome (NAS).
- Nearly all exposed infants will display some symptoms, but only a subset require treatment.

Opioid receptors concentrated in CNS and GI tract.

NAS affects baby’s ability to be alert, sleep, eat, communicate cues.
<table>
<thead>
<tr>
<th>Neurological Excitability</th>
<th>Autonomic Instability</th>
<th>GI Dysfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperirritability</td>
<td>Apnea</td>
<td>Diarrhea → electrolyte disturbances, dehydration, perianal skin excoriation</td>
</tr>
<tr>
<td>High-pitched inconsolable crying</td>
<td>Bradycardia</td>
<td>Hyperphagia (may require up to 150 kcal/kg/d)</td>
</tr>
<tr>
<td>Agitation/Restlessness</td>
<td>Tachypnea</td>
<td>Regurgitation</td>
</tr>
<tr>
<td>Exoriations</td>
<td>Nasal flaring</td>
<td>Vomiting</td>
</tr>
<tr>
<td>Difficulty sleeping</td>
<td>Nasal stuffiness</td>
<td>Poor feeding</td>
</tr>
<tr>
<td>Tremors</td>
<td>Temperature instability</td>
<td>Poor weight gain/FTT</td>
</tr>
<tr>
<td>Exaggerated Moro reflex</td>
<td>Sweating</td>
<td></td>
</tr>
<tr>
<td>Hypertonia</td>
<td>Sneezing</td>
<td></td>
</tr>
<tr>
<td>Excessive motor activity</td>
<td>Mottling</td>
<td></td>
</tr>
<tr>
<td>Myoclonic jerks</td>
<td>Yawning</td>
<td></td>
</tr>
<tr>
<td>Uncontrolled, constant sucking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seizures (2-11%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Clinical Timeline

<table>
<thead>
<tr>
<th>SUBSTANCE</th>
<th>ONSET (hours)</th>
<th>DURATION (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heroin</td>
<td>24-48</td>
<td>8-10</td>
</tr>
<tr>
<td>Methadone</td>
<td>48-72</td>
<td>Up to 30+</td>
</tr>
<tr>
<td>Buprenorphine</td>
<td>36-60</td>
<td>Up to 28</td>
</tr>
<tr>
<td>Prescription opioids</td>
<td>36-72</td>
<td>10-30</td>
</tr>
<tr>
<td>Polypharmacy</td>
<td>??</td>
<td>??</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>??</td>
<td>??</td>
</tr>
</tbody>
</table>
Discharge at 48 hrs???

- AAP (2014 and 2017)
- WHO (2014)
- Known fetal exposure: 4-7 days!
- 1 in 5 has onset after 48 hrs

- Withdrawal at home...
  - Poor feeding
  - Vomiting and diarrhea
  - Extreme irritability
  - Sleep challenges
  - DEHYDRATION
  - SEIZURES
  - RISK FOR CHILD ABUSE
A Big Road Runs Through It
This map examines the discharge rates for neonatal abstinence syndrome (NAS; ICD-9 779.5) per 1,000 live births in Ohio by county of patient residence. On average, there were 3.0 discharges for NAS per 1,000 live births statewide between 2005 and 2009. Counties with the highest rates of NAS discharges were Athens (9.0), Lawrence (8.6), Pickaway and Ross (both 7.7). NAS discharge rates for five counties were at or close to zero during this time.

Note: Alcohol, Drug Addiction and Mental Health Services (ADAMHS) Boards have black borders, and counties have white borders. Borders are black in cases where ADAMHS boards and counties have the same borders.

Data Source:
Data adapted by OhioMHAS from the Ohio Hospital Association & the Ohio Department of Health
Map produced March 2014
Discharge Rates for Neonatal Abstinence Syndrome per 1,000 Live Births

Five-year Weighted Average from 2006 to 2010

Legend
- ADAMHS Board

Rate per 1,000
- 0.0 - 2.5
- 2.6 - 5.8
- 5.9 - 11.0
- 11.1 - 14.1

Map Information:
This map examines the discharge rates for neonatal abstinence syndrome (NAS; ICD-9 779.5) per 1,000 live births in Ohio by county of patient residence. On average, there were 3.9 discharges for NAS per 1,000 live births statewide between 2006 and 2010. Counties with the highest rates of NAS discharges were Pickaway (14.1), Athens (10.9) and Ross (9.5). NAS discharge rates for five counties were at or close to zero during this time.

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Map produced March 2014
Discharge Rates for Neonatal Abstinence Syndrome per 1,000 Live Births

Five-year Weighted Average from 2007 to 2011

Legend
- ADAMHS Board

Rate per 1,000
- 0.0 - 2.5
- 2.6 - 5.8
- 5.9 - 11.0
- 11.1 - 24.5

Map Information:
This map examines the discharge rates for neonatal abstinence syndrome (NAS; ICD-9 779.5) per 1,000 live births in Ohio by county of patient residence. On average, there were 5.3 discharges for NAS per 1,000 live births statewide between 2007 and 2011. Counties with the highest rates of NAS discharges were Scioto (24.5), Pickaway (18.4) and Pike (18.3). NAS discharge rates for four counties were at or close to zero during this time.

Note: Alcohol, Drug Addiction and Mental Health Services (ADAMHS) Boards have black borders, and counties have white borders. Borders are black in cases where ADAMHS boards and counties have the same borders.

Data Source:
Data adapted by ODM/ODS from the Ohio Hospital Association & the Ohio Department of Health
Map produced March 2014
Discharge Rates for Neonatal Abstinence Syndrome per 1,000 Live Births

Five-year Weighted Average from 2008 to 2012

Legend
- ADAMHS Board

Rate per 1,000:
- 0.0 - 2.5
- 2.6 - 5.8
- 5.9 - 11.0
- 11.1 - 52.6

Map Information:
This map examines the discharge rates for neonatal abstinence syndrome (NAS, ICD-9 779.5) per 1,000 live births in Ohio by county of patient residence. On average, there were 6.9 discharges for NAS per 1,000 live births statewide between 2008 and 2012. Counties with the highest rates of NAS discharges were Scioto (52.6), Lawrence (40.8) and Pike (38.9), Carroll (0.7), Holmes (0.5) and Auglaize (0.0) counties had the lowest rates of NAS discharges.

Note: Alcohol, Drug Addiction and Mental Health Services (ADAMHS) Boards have black borders, and counties have white borders. Borders are black in cases where ADAMHS boards and counties have the same borders.

Data Source:
Data adapted by OhioMHAS from the Ohio Hospital Association & the Ohio Department of Health
Map produced March 2014
Projects: OCHA & OPQC

• Six children’s hospitals and their affiliates
  • (20 total hospitals)
• 994 infants
• Included only infants that required pharmacological treatment for NAS

• January 2014-June 2016
• 54 sites:
  • 26 Level II NICU’s
  • 26 Level II Special Care Nurseries
  • 2 Normal Newborn Nurseries
• 6131 infants in the database
• Includes infants that receive both non-pharmacological AND pharmacological treatment
Improve Consistency in Modified Finnegan Scoring

Key Driver:
Attain high reliability in NAS scoring by nursing staff

Intervention:
Fulltime RN staff at Level 2 and 3 hospitals to complete D’Apolito NAS scoring training video and achieve 90% reliability.

• All sites use same tool

• Train RN staff to 90% reliability in scoring using D’Apolito Training System

• OPQC has sent out DVD’s to each site
**Pharmacological Bundle**

**Key Driver:**

- Standardize NAS Treatment Protocol

  - Initiate Rx If NAS score > 8 twice.
  - Stabilization/ Escalation Phase
  - Begin wean when stable for 48hrs
  - Discharge home after 48hrs (Morphine) to 72hrs (Methadone)
Impact of Ohio OCHA Weaning Protocol

- 2012-2014 with 199 centers.
- N=3458 infants with NAS
Non-Pharmacological Bundle

Key Driver:

Optimize Non-Pharmacologic Rx Bundle

Intervention

• Swaddling, low stimulation.
• Encourage kangaroo care
• Feed on demand-
  • MBM if appropriate
  • Lactose free
  • 22 cal formula
METHODS OF SCREENING/TESTING

- Maternal Interview Screen
- Maternal Urine Drug Test
- Infant Urine Drug Test
- Meconium Toxicology Test
- Umbilical Cord Toxicology Test

Screen vs. Test
Risk based screen

- In 2012 Mercy Hospital Anderson cared for:
  - 1,868 neonates born to 1,874 women
  - 96% were Caucasian,
  - 52% were married, and
  - 51% had private insurance

**Table 1.** Maternal risk-based screen used at Mercy Anderson Hospital before universal testing

- Documented, suspected, or acknowledged maternal history of drug use
- Insufficient prenatal care, defined as starting care after 12 weeks gestation
- Placental abruption
- Admission from a justice center
- Positive for HIV
- Positive for hepatitis B surface antigen
- Positive for hepatitis C virus
- Maternal history of gonorrhea or syphilis
Universal Testing Pilot

- We evaluated the efficacy of a universal testing protocol for all mothers in a community hospital setting that experienced a three-fold increase in neonatal abstinence syndrome (NAS)

Universal Testing, OH/KY

- 18 hospitals in our region now doing universal testing (2015)

- Being able to start nonpharmacological bundle earlier, may lead to a decrease in percentage of infants requiring medications for NAS.
Cincinnati Region: Drug Exposure Rate per 1,000 births (8.5 fold increase)
Data from delivery hospitals ICD9/ICD10 codes

Any drug exposure per 1,000 births Cincinnati Region

- 2009: 10.4
- 2010: 15.8
- 2011: 24.5
- 2012: 34.5
- 2013: 53.2
- 2014: 69.0
- 2015: 63.3
- 2016: 88.3
LOS and DOT for NAS infants CCHMC Perinatal Institute
Breastfeeding and Substance Use
Breastfeeding and Substance Use

- AAP committee recommends all mothers in methadone/buprenorphine treatment be allowed to breast-feed regardless of dose.

- Data suggests a protective effect on the rate of NAS. (May be non-pharm bundle effect)

- HCV and HBV not contraindication for breast feeding

- HIV contraindications in developed countries

AAP: Committee on Drug. Pediatrics 2001 and 2013
Mother or infant with a positive toxicology:
- THC only: Educate and encourage to stop usage. OK to feed HM
- Opioids only: Consult with Attending
- Poly drugs: No

Verify dose with prescribing physician:
- Yes: OK to feed HM
- No: No HM

Prescribed opioids for pain?
- Yes: Consult with Attending
- No: No HM
Criminal Justice Approaches to Substance Use in Pregnancy

“Prosecution and punishment of pregnant women who use illicit substances, have no proven benefits for infant health.”

Formally affirmed by:

- American Academy of Pediatrics
- American Association of Family Practice
- American College of OB/GYN
- American Nurses Association
- American Medical Association
- American Psychiatric Association
- National Perinatal Association
- American Society of Addiction Medicine
- March of Dimes
- American Public Health Organization

Patrick, SW and AAP Committee on Substance Use and Prevention, Pediatrics, 139(3), 2017.
Ohio parents arrested after 8-year-old son overdosed on heroin, police say

By Amy B Wang February 20
Ohio parents arrested after 8-year-old found with heroin in system https://t.co/E4sXV4EwXE pic.twitter.com/6qSp8SCm2x

— WPXI (@WPXI) February 18, 2017
Parents overdose in their 7-month-old baby's Children's Hospital room
Primary Prevention

Improved Identification and Access to Treatment

Criminal Justice Approach
Primary Prevention

1) Provider education re: abuse
2) Bolstering PDMP’s
3) Proper disposal
4) Empower law enforcement around illegal prescribing.

- Unintended pregnancy: 31-45% vs 85-90% in SUD women
- LARC!!!!!
Identification/Treatment/Criminal Justice

- Opioid agonist therapy
  - Medication assisted treatment
- Coordinated effort with transparency and communication
- Funding for EI, DHR