Substance Use Disorder in Pregnancy & Neonatal Abstinence Syndrome

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Abbreviations

- OUD = Opioid Use Disorder
- SUD = Substance Use Disorder
- NAS = Neonatal Abstinence Syndrome
- NOWS = Neonatal Opioid Withdrawal Syndrome
- HC = Head Circumference
- SGA = Small for Gestational Age
- IUGR = Intrauterine Growth Restriction
  - Diagnosis when an unborn baby is not growing at a normal rate inside the womb leading to that baby being smaller than he/she should be.
    - Puts the baby at risk for health problems during pregnancy, delivery & after birth
Pregnancy is a Time for Change!

• Pregnancy offers a unique opportunity for intervention
  – Women are more willing to seek care & remain in treatment

Healthy Mom = Healthy Baby
Opioid use disorder during pregnancy...
Opioid Use During Pregnancy

- Drug-induced deaths are now the leading cause of death for reproductive-age women in the U.S.
- Rates of opioid use disorder (OUD) in pregnant & postpartum women have also increased
  - 1.7 per 1,000 delivery admissions in 1998 to 3.9 per 1,000 in 2011
  - > 40% of pregnant women enrolled in Medicaid receive a prescription for opioids
**Opioid Use During Pregnancy**

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage of Opioid use during Pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>US-MEDICAID</td>
<td>21.6</td>
</tr>
<tr>
<td>US-COMMERCIAL</td>
<td>14.4</td>
</tr>
<tr>
<td>CANADA</td>
<td>5.6</td>
</tr>
<tr>
<td>NORWAY</td>
<td>2.9</td>
</tr>
<tr>
<td>SCOTLAND</td>
<td>2.1</td>
</tr>
</tbody>
</table>

ACOG Committee Opinion, November 711, August 2017
Nevada: Initiation and Engagement in Treatment for Pregnant Women

Pregnant Women DIAGNOSED with SUD
Pregnant Women REFERRED for Substance Abuse Treatment
Pregnant Women who ENGAGED in Substance Abuse Treatment

<table>
<thead>
<tr>
<th>Year</th>
<th>DIAGNOSED</th>
<th>REFERRED</th>
<th>ENGAGED</th>
</tr>
</thead>
<tbody>
<tr>
<td>CY2014</td>
<td>1659</td>
<td>223</td>
<td>99</td>
</tr>
<tr>
<td>CY2015</td>
<td>2059</td>
<td>338</td>
<td>124</td>
</tr>
<tr>
<td>CY2016</td>
<td>2370</td>
<td>410</td>
<td>122</td>
</tr>
</tbody>
</table>

Source: query as of 8/31/2018
Prepared by Office of Analytics-DCFS Branch
The effects of opioid use disorder on maternal mortality....
Maternal Mortality Rates: USA vs. Developed Nations

- U.S.A. (26.4)
- U.K. (9.2)
- Portugal (9)
- Germany (9)
- France (7.8)
- Canada (7.3)
- Netherlands (6.7)
- Spain (5.6)
- Australia (5.5)
- Ireland (4.7)
- Sweden (4.4)
- Italy (4.2)
- Denmark (4.2)
- Finland (3.8)

www.cdc.gov, accessed 8/25/2020
Impact on Clinical Outcomes

Figure 2. Comparison of clinical outcomes among delivery stays with and without an SUD diagnosis, 2016

- Preterm delivery
- Severe pre-eclampsia/eclampsia
- Obstetric hemorrhage/placenta accreta
- Placental abruption

Presence and Type of SUD

<table>
<thead>
<tr>
<th>Presence of SUD</th>
<th>Preterm delivery</th>
<th>Severe pre-eclampsia/eclampsia</th>
<th>Obstetric hemorrhage/placenta accreta</th>
<th>Placental abruption</th>
</tr>
</thead>
<tbody>
<tr>
<td>No SUD diagnosis</td>
<td>98.9</td>
<td>28.9</td>
<td>10.2</td>
<td></td>
</tr>
<tr>
<td>Any SUD diagnosis</td>
<td>206.8</td>
<td>41.9</td>
<td>33.7</td>
<td></td>
</tr>
<tr>
<td>Opioids</td>
<td>229.1</td>
<td>38.4</td>
<td>36.8</td>
<td></td>
</tr>
<tr>
<td>Cocaine</td>
<td>349.3</td>
<td>58.7</td>
<td>69.3</td>
<td>295.9</td>
</tr>
<tr>
<td>Other stimulants</td>
<td>80.1</td>
<td>53.6</td>
<td>60.2</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviation: SUD, substance use disorder

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2016
Maternal Mortality and Overdose Rates

Fig. 1. Proportion of pregnancy-associated, drug-induced deaths vs all pregnancy-associated deaths, 2005–2014 (N=136).
Treatment options for maternal opioid use disorder....
# Maternal Treatment Options

<table>
<thead>
<tr>
<th><strong>Methadone</strong></th>
<th><strong>Buprenorphine</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Full opioid agonist</td>
<td>- Partial opioid agonist/antagonist</td>
</tr>
<tr>
<td>- Requires daily visits to a federally certified opioid treatment program</td>
<td>- May be prescribed in office setting</td>
</tr>
<tr>
<td>- Greater risk of overdose than Buprenorphine</td>
<td>- Less risk of overdose than Buprenorphine</td>
</tr>
<tr>
<td>- Higher incidence, more severe symptoms &amp; longer duration of NAS/NOWS</td>
<td>- Generally less incidence, milder symptoms &amp; shorter duration of NAS/NOWS</td>
</tr>
</tbody>
</table>

Buprenorphine vs. Methadone

- 3 different prospective studies have shown lower NAS rates for infants delivered to mothers receiving Buprenorphine

<table>
<thead>
<tr>
<th>Study</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methadone versus buprenorphine in pregnant</td>
<td>Mean duration of treatment for NAS was longer for methadone vs. buprenorphine</td>
</tr>
<tr>
<td>addicts</td>
<td>(5.3 vs 4.8 days p = 0.766)</td>
</tr>
<tr>
<td>PROMISE Trial</td>
<td>Length of hospitalization was longer for neonates exposed to methadone vs. buprenorphine (8.1 vs 6.8 days, P=0.021)</td>
</tr>
<tr>
<td>MOTHER Trial</td>
<td>Neonates exposed to buprenorphine required significantly less morphine. (1.1 vs 10.4mg, p&lt;0.0091)</td>
</tr>
<tr>
<td></td>
<td>Neonates exposed to buprenorphine had a significantly shorter duration of NAS treatment. (4.1 vs 9.9 days, p&lt;0.003)</td>
</tr>
<tr>
<td></td>
<td>Neonates exposed to buprenorphine had a significantly shorter hospital stay. (10.0 vs 17.5days, p&lt;0.009)</td>
</tr>
</tbody>
</table>
### Buprenorphine vs. Methadone Cost Effectiveness

<table>
<thead>
<tr>
<th>Condition</th>
<th>Methadone</th>
<th>Buprenorphine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonatal Abstinence Syndrome (NAS)</td>
<td>9,080</td>
<td>5,263</td>
</tr>
<tr>
<td>Preterm Birth (&lt; 37 weeks)</td>
<td>3,490</td>
<td>1,917</td>
</tr>
<tr>
<td>IUGR</td>
<td>927</td>
<td>564</td>
</tr>
<tr>
<td>CP</td>
<td>167</td>
<td>100</td>
</tr>
<tr>
<td>IUFD</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Discontinued Treatment</td>
<td>3,600</td>
<td>5,625</td>
</tr>
<tr>
<td>Mother-Baby Dyad QALYs</td>
<td>1,109,800</td>
<td>1,120,600</td>
</tr>
<tr>
<td>Cost (in millions)</td>
<td>$1,207</td>
<td>$924</td>
</tr>
</tbody>
</table>

Per 20,000 patients treated buprenorphine results in
- 3187 less cases of NAS
- 1573 less cases of Preterm Births
- 362 less cases of growth restriction

Cost Savings of $283 million dollars
Saves $23,000 per pt for 7 months of treatment

In-utero effects on the fetus....
Opioid Exposure and the Brain

• Clinical studies in children & newborns
  – In utero exposure to opioids shows white matter microstructure changes on MRI
  – Decreased brain volumes (areas of effect are similar to animal studies)
  – Methadone exposure shows similar changes in neonatal brains
  – Correlates with studies showing decreased head circumference in infants with neonatal abstinence syndrome (NAS)

Effects on the newborn......
Study shows fetuses exposed to Methadone during pregnancy had significantly smaller head size compared to fetuses not exposed to opioids.

Towers; Hyatt; AJOG 2018 Neonatal Head Circumference in newborns with NAS vs controls
https://www.ajog.org/article/S0002-9378(17)31739-8/fulltext
Neonatal Abstinence Syndrome (NAS)
What is NAS/NOWS?

- Prescription misuse & illicit drug use during pregnancy
- NAS - Neonatal Abstinence Syndrome
  - Withdrawal symptoms in Infants born to mothers who used drugs during pregnancy
- NOWS - Neonatal Opioid Withdrawal Syndrome
  - Specific form of NAS
  - 50-80% of opioid exposed infants develop NOWS

# Symptoms of NAS

- Effects of withdrawal manifest in the following ways in infants:

<table>
<thead>
<tr>
<th>Neurologic Symptoms</th>
<th>Gastrointestinal Symptoms</th>
<th>Autonomic Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irritability</td>
<td>Vomiting/diarrhea</td>
<td>Sweating</td>
</tr>
<tr>
<td>Increased wakefulness</td>
<td>Dehydration</td>
<td>Nasal stuffiness</td>
</tr>
<tr>
<td>High-pitched cry</td>
<td>Poor weight gain</td>
<td>Fever</td>
</tr>
<tr>
<td>Tremors</td>
<td>Poor feeding</td>
<td>Temperature instability</td>
</tr>
<tr>
<td>Increased muscle tone (stiffness)</td>
<td>Uncoordinated &amp; constant sucking</td>
<td>Elevations in respiratory rate &amp; blood pressure</td>
</tr>
<tr>
<td>Yawning/sneezing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seizures</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How do we treat Neonatal Abstinence Syndrome (NAS)?
## Treatment of NAS

### Non-Pharmacologic
- Breastfeeding
- Skin-to-skin Contact
- Rooming-in
- Swaddling
- Pacifier use
- Quiet/dark environment

### Pharmacologic
- Morphine
- Buprenorphine
- Clonidine
- Phenobarbital
- Clonidine

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Start these conversations prior to delivery!!

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What is the scope of NAS in the United States?
National Scope of NAS

• CDC:
  – Rate of hospital births for NAS increased from 1.5 to 6 per 1,000 hospital births from 1999 to 2013
    • 300% increase

• Patrick, et al:
  – Rate of NICU admissions for NAS increased from 1.2 cases to 5.8 per 1,000 hospital births from 2000 to 2012
    • ~400% increase

NAS NICU Admissions 2004-2013
Total N = 674,845 NICU Infants

Rate of NICU admissions for NAS increased from 7 to 27 cases per 1,000 admissions from 2004 to 2013

Tolia; Patrick; NEJM 2015 https://www.ncbi.nlm.nih.gov/pubmed/25913111
What is the cost of NAS?
Cost of NAS

2009
- $732 Million hosp cost
- 3.4 per 1000 hosp births

2012
- $1.5 Billion
- 5.8 per 1000 births
- 81% of costs - Medicaid

2014
- 6.7% of all neonatal costs by Medicaid

Patrick; Davis, 2015 J perinatology https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4520760/
What is the scope of NAS in Nevada?
## Prevalence of NAS in Nevada

<table>
<thead>
<tr>
<th>Year</th>
<th>Patients</th>
<th>NAS Patients</th>
<th>Nevada NAS Rate</th>
<th>Mednax NAS Rate</th>
<th>Nevada LOS</th>
<th>Mednax LOS</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>3739</td>
<td>145</td>
<td>3.9%*</td>
<td>2.7%</td>
<td>24.2</td>
<td>22.1</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>2015</td>
<td>3940</td>
<td>215</td>
<td>5.5%*</td>
<td>3.2%</td>
<td>20.8</td>
<td>20.9</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>2016</td>
<td>3959</td>
<td>209</td>
<td>5.3%*</td>
<td>3%</td>
<td>20</td>
<td>22.5</td>
<td>&lt; 0.001*</td>
</tr>
</tbody>
</table>

**Only includes infants treated with medication**

***Does NOT include infants who were not started on mediations or not admitted to the NICU***
Neonatal Abstinence Syndrome, Nevada Residents, 2010-2018

Source: query as of 8/31/2018
Prepared by Office of Analytics-DCFS Branch
What is the scope of NAS in our community?
Prevalence of NAS in Southern Nevada

<table>
<thead>
<tr>
<th>St. Rose Dominican Hospitals 2015-2016</th>
</tr>
</thead>
</table>

**Women in treatment:**
- 51% of mothers in treatment were (+) for a controlled/illicit substance
- 77% of infants born to a mother in treatment were positive for a controlled/illicit substance

**All infants treated for NAS:**
- 62% of infants treated for NAS were (+) for an illicit substance
- 60% of infants treated for NAS were (+) for a controlled substance
- 70% of infants treated for NAS were (+) for > 1 substance (polysubstance use)

**Prenatal Care/Discharge**
- 22% of women had no prenatal care
- 34% of infants were discharged to someone other than their parents
Statewide Child Protective Services (CPS) Reports with an Allegation of Substance Exposed Infants
Calendar Year 2015 - 2017

Unique Count of Reports
Count of Reports Investigated
Count & Percent of Investigations Substantiated

Source: query as of 8/31/2018
Prepared by Office of Analytics-DCFS Branch
Take-Home Points

• More pregnant women appear to be seeking treatment
  – Compliance is poor

• Polysubstance use is high

• Nevada NAS rates are nearly double national rates
  – 3 consecutive years show this

• CPS & foster care burden is high
How does NAS impact our community?
Pregnancy/Delivery Costs

• High risk pregnancy
  – Poor fetal growth = Lower birth weight
  – One study estimated OUD pregnancy-related hospitalizations cost an additional $30 million dollars annually

• Hospital cost contributed by NAS
  – $316 million in 2012, not including ongoing costs for follow-up care
    • Average mean charge $93,400 for NAS baby vs $3500 for healthy newborn

• Estimated total hospital costs over a 10 year period
  – $2.5 Billion from 2004-2014
Long-Term Effects of NAS

• Long-term developmental outcomes related to NAS are limited
• Lifelong Impact- social, emotional, physical and mental health challenges that last into adulthood
  – School failure, alcohol and drug use
  – Increased chance for health conditions: obesity, heart disease, etc
• Estimated Additional Liability:
  – >$150,000/pt for ongoing medical care, education, social services
What did we do to reduce the impact of this epidemic?
EMPOWERED Pathway

Empowering Mothers for Positive Outcomes With Education, Recovery, and Early Development

Screen for opioid usage

Positive
- Refer to EMPOWERED coordinator

Negative
- Declines to participate

Educational resources & services

Agrees to participate

Screen for mental health referral/treatment

Community support
- Group Peer Support (GPS)
- WIC
- Lactation Support
- Parenting Classes
- Education on NAS

Delivery of infant

NAS developmental assessment center
- 3 mos: PT/OT/ST assessment
- 6 mos: Neonatologist assessment
- 12 mos: Neonatologist + PT/OT/ST assessment

Resources

Community Support
- Support Groups
- Baby Cuddlers
- Baby’s Bounty
- St. Rose WIC
- Lactation Support
- NV Health Link

Educational Classes
- Baby Basics
- Birth Center Tours
- Boot Camp for New Dads
- Breastfeeding Classes
- Infant CPR
- Prepared Childbirth

Developmental Assessment Center
- Assessment
- Evaluation

If you are looking for additional assistance or information, please call 702.492.8593.
Contributions to the Community from the EMPOWERED Program...
Dignity Health EMPOWERED Program Update
(June 2018 – September 2019)

- 135 patient encounters

### Resources Provided by EMPOWERED

- Referrals for MAT: 42%
- Referrals for prenatal care: 44%
- Referrals to a pediatrician: 4%
- Referrals for pain management: 7%
- WIC: 17%
- Assistance with employment: 5%
- Assistance with transportation: 84%
- Assistance with housing: 26%
- All clients receive referrals to appropriate St. Rose Wellness Center infant & parenting classes
Barriers to Care Identified by the EMPOWERED Program

• Care coordination
• Loss of services with newly identified pregnancy
  – Pain management
  – Psychiatric care
• Mental health support
  – Inpatient admission process
  – Inadequate provider network
• Housing
• Transportation
Case Studies...
Financial impact of the EMPOWERED program.....
EMPOWERED: Financial Impact

NAS Baby Payor Mix

Medicaid
84%
EMPOWERED: Financial Impact
What can I do to help my state?
Action Items

- **Universal screening** for substance abuse for every woman of childbearing age with a validated verbal screening tool
  - Early screening allows more time for an effective intervention
  - Universal screening minimizes potential for bias
    - Drug addiction affects all racial, ethnic & social groups
    - Universal screening minimizes potential for implicit bias
      - Evidence suggests that hospital staff are more likely to perceive black women as being higher risk of using drugs, even though white women have similar rates
      - Evidence also suggests that black women are more likely to face punitive consequences
      - Screening should occur with an empathic, compassionate, non-judgmental approach that lets the woman know all women are asked the same questions
  - Appropriate use of toxicology testing
Action Items

• Break down barriers to care
  – Reduce stigma
  – Knowledge gaps among providers
  – Gaps in care coordination & communication
  – Address inadequate capacities that exist to meet treatment & recovery needs of pregnant/parenting women

• Identify infants at risk for NAS
  – Maintain the mother-baby dyad, whenever possible

• Utilize trauma informed care

• Ensure that linkage to home visitation programs or that other home supports are in place
Legislative Policy Ideas

• Mandatory Education for Physicians in Screening, Brief Intervention and Referral to Treatment (SBIRT)
  – In 2017, Utah passed legislation for mandatory education in SBIRT, but gave physicians ample time to be able to obtain it. SBIRT is now billable and Project ECHO is doing CEUs for this.

• CARA Plan of Safe Discharge to Pediatrician
  – Currently, the Nevada CARA plan of safe discharge is only distributed to CPS, but it would help to give pediatricians the ability to obtain it and follow babies closely for their safety and for developmental delays

• Other Areas of Interest
  – CPS/Courts, Transportation and phones for Medicaid patients
Thank you!