Maternal Opioid Use Disorder and Neonatal Opioid Withdrawal Syndrome

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Opiate Summit Region VI
Learning Objectives

• Describe options for treatment of opioid dependence during pregnancy

• Understand diagnosis and management of neonatal opioid withdrawal syndrome

• Describe a family-centered model of care for women with substance abuse in pregnancy
Disclosures

• None

“I have five dollars that says you won’t give me a shot and we’ll sweep this little matter under the rug.”
A Clinical Case...

- Tanya is a 19 year old G1P0 who presents to OB Triage at 16 weeks gestational age in heroin withdrawal
- She wants to know if you can help her
- Wants “whatever is safest for baby”
- Wants to be able to keep and parent her baby
- Wants to breastfeed
What Do We Know About Substance Abuse in Women?

• A 2006 survey of U.S. females age 12 years or older
  – 41% used an illicit drug at some point in their lives
  – 6% use illicit drugs currently
  – 45% use alcohol (3% “heavily” and 15% “binge”)
  – 6% met criteria for substance abuse or dependence in the preceding year

• Most women in treatment report a history of trauma
  – Includes physical and sexual abuse
  – Approximately 25% have been diagnosed with PTSD

• Pattern of mental health problems in women is different than in men—often precedes the substance abuse problem
What Co-morbidities are Associated with Opioid Addiction?

- Polysubstance abuse is the rule, not the exception
- Associated use of alcohol and/or benzos greatly increases the risk of overdose
- Most overdose deaths occur at home and with others present
- Co-morbid nicotine addiction is 92% among opioid dependent people
- Lifetime prevalence of psychiatric disorders among opioid-dependent patients seeking treatment is 40-80%, mostly affective and PTSD
“I was raped 5 years ago, and I went through a very bad depression and everything. And I wanted to get messed up. I went to a friend’s house. They’re like, “Oh, these new pills are out,” and they were just a little blue pill. So cute, you know? It was tiny and blue. It was just to numb myself and what I was going through from being raped.”

(female methadone patient)
Who is Tanya?

- Her mother is an ex-heroin addict now on methadone
- Her father died from drug-related violence
- She started using prescription opiates at school parties at age 14
- With her escalating oxycodone use she had trouble paying for the pills
- She dropped out of school
- Her cousin told her how much cheaper heroin was
- At age 16, older men would give her heroin in exchange for sex
How Prevalent is Opioid Dependence in Pregnancy?

• Estimated 57,000 pregnancies exposed to opioid abuse each year
• Opiate use in pregnancy increased 1.19 to 5.63 per 1000 births from 2000-2009
• 27% of pregnant women in U.S. who reported illicit drug abuse in last 30 days named heroin or prescription narcotics
• Second only to marijuana use in pregnancy
• 2009 U.S. costs associated with tx of neonates exposed to opioids estimated at $70.6 million to $112.6 million

JAMA. 2012;307(18)
Antepartum maternal opiate use increased from 1.19 (95% CI, 1.01-1.35) to 5.63 (95% CI, 4.40-6.71) per 1000 hospital births per year (P <.001) from 2000 to 2009.
What are the Effects of Opioid Dependence on Pregnancy?

• No teratogenic or cytotoxic effects
• Withdrawal may increase risk of miscarriage/IUFD and preterm delivery
• Short-acting drugs result in rapid cycles of fetal opioid intoxication and withdrawal, which may be a cause of IUGR
• Historically, 70-95% of neonates of opioid-dependent women experience neonatal abstinence syndrome (NAS), however this is decreasing with use of buprenorphine, “rooming in” and breastfeeding
What are the Effects of Opioid Dependence on Pregnancy?

- Heroin use confers risk of infection
  - Endocarditis, abscesses
  - HIV
  - Hepatitis C
- Opioid abuse associated with
  - Poor nutritional status
  - Inadequate prenatal care
  - Living in a violent environment
  - Sexually transmitted infections
  - Poor pregnancy outcomes
- Pregnant opioid users face extreme stigma from family, medical providers, society
What are Special Issues in the Care of Opioid-exposed Neonates?

• Neonatal abstinence syndrome
  – Autonomic dysfunction
  – Irritability
  – Poor feeding
  – Diarrhea
  – Weight loss
  – Seizures

• NAS can occur after in utero exposure to
  – Methadone
  – Buprenorphine
  – Short-acting opioids: heroin, oxycodone, morphine, etc.

• NAS is usually treated with an opioid wean: morphine or methadone are most commonly used
NAS and Maternal Methadone Use at University of New Mexico

- Study of 103 infants born at UNM at >34 weeks gestational age to mother on chronic methadone
- 73% needed pharmacologic treatment for NAS
- Mean age of initiation of medical treatment was 49.5 hours
- Mean number of days of treatment was 15.1 days
- No effect of maternal methadone dose on need for pharmacologic treatment of NAS

Leeman 2011 Journal of Maternal-Fetal and Neonatal Medicine
Tanya tries to get help...

- At age 18 she is strongly addicted to heroin, injecting three to four times a day
- She wants to get clean and looks for help
- A friend gives her some Suboxone from the street when she is in withdrawal, and it helps
- She looks for treatment options
I am more than my addiction.
Fighting for those I love,
fighting for my life.
What are the Options for Treatment of Opioid Addiction?

- Abstinence-based therapy
  - Counseling
  - Peer support
  - Social services
  - Contingency management

- Opioid antagonist therapy: blocks action of opioids, precipitates withdrawal if opioid dependence
  - Naloxone— injected or given intranasally, duration less than 30 minutes
  - Naltrexone—given orally, longer duration of action

- Opioid replacement therapy
  - Methadone
  - Buprenorphine
Back to Tanya...

- Started on oxycodone in high school and moved on to heroin
- Has used Suboxone from street sources
- Acknowledges daily marijuana and 5 cigarettes a day
- UDM positive for opiates, THC, and methamphetamines
- Lives with family in rural northern New Mexico
Maternal Treatment Options

• Medication Assisted Treatment
  - Methadone
  - Buprenorphine daily sublingual
  - Buprenorphine implant and IM naltrexone
    (Vivitrol) not well studied in pregnancy

• Inpatient /residential vs outpatient
Wouldn’t it be Best to get Women Off Opiates During Pregnancy?

- Most opioid dependent women are not able to remain drug-free throughout pregnancy
- Opioid antagonist therapy is contraindicated during pregnancy
- Many women will not seek prenatal care if enforced abstinence is the approach
- Methadone maintenance therapy during pregnancy has been the gold standard since 1990s
Experts Say Detoxing While Pregnant Can Be Safe

(CNN) Due to the ongoing opioid crisis plaguing the nation, the American Congress of Obstetricians and Gynecologists said Wednesday that an approach to treating babies born with addiction that was once thought to be harmful should now be considered.
For pregnant women with an opioid use disorder, opioid agonist pharmacotherapy is the recommended therapy and is preferable to medically supervised withdrawal because withdrawal is associated with high relapse rates, which lead to worse outcomes. More research is needed to assess the safety (particularly regarding maternal relapse), efficacy, and long-term outcomes of medically supervised withdrawal.
If a woman does not accept treatment with an opioid agonist, or treatment is unavailable, medically supervised withdrawal can be considered under the care of a physician experienced in perinatal addiction treatment and with informed consent; however, to be successful, it often requires prolonged inpatient care and intensive outpatient behavioral health follow up.
What are the Risks of Opioid Detox in Pregnancy?

• Anecdotal evidence for:
  – Increased fetal loss during 1\textsuperscript{st} trimester
  – Increased fetal distress during 3\textsuperscript{rd} trimester

• Stronger evidence for relapse to substance of choice, inability to remain abstinent

Pagliaro et al, Prin Addiction Med, p 1252
Maternal Opioid Detoxification Studies

• Stewart AJOG 2013 demonstrated 56% success rate in 95 women over 6 years. Unable to determine size of total opioid addicted population

• Bell AJOG 2016 studied 301 detoxified women including 108 rapidly detoxified during incarceration. No fetal deaths during acute detox but two later IUFDs at 18, 34 weeks

• McCarthy and Terplan 2016 in letter to AJOG question ethics of acute detox due to assumption of adverse effects on fetal brain and extreme maternal discomfort
What Benefits Do Opioid Replacement Therapy Offer?

• Decreases transmission of hepatitis C, HIV, other infections
• Decreases activities associated w/ obtaining street drugs: theft, assault, sex-for-drugs, incarceration
• Facilitates return to normal activities: parenting, healthier partner relationships, employment, recreation, etc.
• Decreases risk of overdose death
• Simple drug detoxification shows limited long term effectiveness
What is Different About Buprenorphine?

• Buprenorphine can be prescribed by physicians who have undergone special training and received special DEA license
• Ceiling effect means less risk of overdose death
• Use in primary care settings
  – Greatly increases availability of opioid replacement therapy
  – Helps establish primary care homes for patients with many health needs
  – Decreases the stigma associated with therapy
  – Decreases contact w/ individuals the patient associates w/ opioid abuse
What is Different About Subutex Compared to Suboxone?

- It is sold in the U.S. as **Suboxone, Zubsolv, or Bunavail**, which are a combination of buprenorphine and naloxone (Narcan), or as **Subutex**, which is buprenorphine alone.
- The naloxone is not active when Suboxone is dissolved under the tongue, as directed.
- If the tablet is crushed and injected, the naloxone causes rapid opioid withdrawal.
- This reduces the value of the drug for abuse (though it certainly has a street value....)

What is Different About Subutex Compared to Suboxone?
What are Potential Advantages of Buprenorphine Compared to Methadone in Pregnancy?

- Women who are addicted to prescription narcotics may refuse to go to a “methadone clinic” but accept buprenorphine.
- Accessible for non-urban women who may either have local physician or can travel weekly or less to urban site.
- Perception among patients that it is easier to wean off of postpartum.
- Decreased incidence/severity of neonatal abstinence syndrome.
- Less risk of overdose death from drug interactions with benzodiazepines and alcohol compared with methadone.
How is Buprenorphine Used/Initiated in Pregnancy?

• Induction from active opioid dependence requires patient to be in moderate withdrawal
• Induction is managed in hospital if fetus is near viability (22+ weeks GA)
• When moderate withdrawal is noted based on COWS score
  – 4mg SL buprenorphine is given
  – If sx’s are not worse in 1 hour, another 4mg dose is given, followed by another 4mg dose in 2 hours
  – Additional doses are given if withdrawal symptoms and/or cravings
• Typical daily dose is 12-24mg
MOTHER Project = Maternal Opioid Treatment: Human Experimental Research

• 2005-2008, comparing safety and efficacy of methadone and buprenorphine in pregnancy
• Randomized controlled trial: double-blind, double-dummy, flexible-dosing, parallel groups
• 175 opioid-dependent pregnant women
MOTHER Project Study Findings--Neonatal

No significant differences between buprenorphine and methadone-exposed newborns re.

- Percentage requiring tx for NAS
- Peak NAS score
- Birth weight/length/head circumference
- Gestational age at delivery
- Apgars

But... buprenorphine-exposed neonates

- Required **89% less morphine** (mean totals of 1.1 mg vs. 10.4 mg)
- Spent **43% less time in hospital** (10.0 vs. 17.5 days)
- Spent **58% less time receiving morphine** (4.1 vs. 9.9 days)
Prenatal Considerations

- Opiate replacement therapy improves outcomes for mom and babies

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<thead>
<tr>
<th>Box 1: Methadone vs Buprenorphine in Neonatal Withdrawal</th>
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<td><strong>Methadone</strong></td>
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<td>Possible faster time to withdrawal(^{34})</td>
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<td>Increased severity with benzodiazepenes(^{39})</td>
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Tanya starts buprenorphine...

- Gets dating ultrasound, prenatal labs, LFTs, and Hep C antibody testing in OB Triage
- Signs buprenorphine consent form
- Admitted for 24h since she arrived in acute withdrawal from heroin (outpatient initiation was another option)
- Titrated up to 16 mg and withdrawal resolved
- Sent home with a prescription to last until her prenatal appointment in 5 days
Tanya Approaches Delivery

• She wants more information about NOWS
• She is wondering about breastfeeding
• Her closest hospital has a small birth center model maternity care unit
• Should she deliver in Albuquerque where there is a NICU?
How Can We Help Women With Opioid Addiction Prepare for Birth?

- Encourage breastfeeding when appropriate
- Readdress the 96h observation and NAS treatment
- Discuss rooming-in option
- Encourage selection of birth control method prior to discharge if interested
- Discuss labor pain issues
Is Breastfeeding Acceptable in Chronic Maternal Opiate Use?

• Considered safe in women using prescribed doses of postpartum opiates for cesarean/perineal laceration pain

• Chronic use of short acting opiates, including heroin and high doses of prescription opioids, viewed as contraindication

• How about breastfeeding on methadone or buprenorphine?
UNM Guidelines for Breastfeeding on Methadone or Buprenorphine

- Must be HIV negative
- No active polysubstance abuse
- Hepatitis C okay if no bleeding from nipples
- Need to be in a monitored program
- Plan to monitor infant if rapid wean occurs
- Prenatal breastfeeding evaluation at Milagro clinic
- Consistent with guidelines of Academy of Breastfeeding Medicine
Prenatal Considerations

- Risks of opiate and illicit drug use in pregnancy
  - Growth restriction
  - Placental abruption
  - Miscarriage
  - Preterm birth
  - HIV, Hep C exposure
  - Mental illness
  - Domestic violence
  - No major teratogenicity (except alcohol)
Prenatal Considerations

• Risk factors warranting maternal/ infant screening
  – Late or no prenatal care
  – History of unexplained fetal demise or recurrent pregnancy losses
  – Placental abruption
  – Unexplained intrauterine growth restriction
  – Unexplained maternal hypertension
  – Precipitous labor
What Can We Do to Help Women Overcome Barriers to Treatment?

• Ask all women about tobacco, alcohol, and other substance abuse in pregnancy
• Consider using a specific screening tool to increase sensitivity (4 P’s, T-ACE, etc.)
• When a woman is reluctant to provide a urine sample for drug testing, focus on developing a trusting relationship
Albuquerque Citywide Hospital Guidelines for Maternal Urine Drug Screening

- Guidelines in place for obtaining history of alcohol and drug use
- Not intended for women in drug treatment
  - History of use in pregnancy verified
  - Sequential toxicology data available
- Toxicology testing during labor
  - History of substance abuse in this pregnancy
  - Preterm labor (Not premature onset of contractions)
  - Placental abruption
  - Behavior consistent with acute intoxication
Screening Methods

• Maternal urine
  – Cocaine- 6-8 hours
  – Opiates- days
  – Cannabinoids- weeks to months

• Infant urine
  – Cocaine- 48-72 hours
  – Alcohol- 6-16 hours
  – Opiates- days
  – Cannabinoids- weeks to months

• Meconium
  – All substances as early as second trimester
  – Takes 7-10 days to report

• Umbilical cord, hair for research only currently

NAS Epidemiology

- NAS 6 per 1000 births in 2013 in US
  - >1 baby born per hour
- In New Mexico 8.5 per 1000 births in 2013, rising at 1.5% per year
- Average hospital admit cost >$50,000
- Average hospital transfer cost $5000-$7000 per baby
- In literature NAS treatment rate 50% with in utero subutex or methadone exposure

JAMA. 2012;307(18)
Background

• New Mexico Data 2012
  – Second highest drug overdose death rate in nation
    • Highest in Rio Arriba County
    • Highest from Rx opiates and heroin
  – Rate of past month illicit drug use in adults ages 18-25 was 24% (Bernalillo county 32%, US 21%)
  – Data for pregnancy difficult to find
    • Decreases by trimester in national reports
NAS at UNM

• 25-30% on methadone with 60-70% NAS treatment
• 70-75% on buprenorphine with 30% NAS treatment
• In literature NAS treatment rate 50% with in utero buprenorphine or methadone exposure

Neonatal abstinence syndrome increased from 1.20 (95% CI, 1.04-1.37) to 3.39 (95% CI, 3.12-3.67) per 1000 hospital births per year (P <.001) from 2000 to 2009
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Rate of Neonatal Abstinence Syndrome per 1,000 live births, Rio Arriba County, New Mexico, and U.S.

Sources:
US: Weighted national estimates from HCUP Nationwide Inpatient Sample (NIS), 2000, Agency for Healthcare Research and Quality (AHRQ), based on data collected by individual States and provided to AHRQ by the States. Total number of weighted discharges in the U.S. based on HCUP NIS = 36,417,565.
New Mexico and Rio Arriba: 2012 Hospital Inpatient Discharge Data (HIDD).
Neonatal Abstinence Syndrome (NAS)

- Exposure to illicit or prescription drug
- Passes via placenta to baby
- Dependency to drug (mom and baby)
- Withdrawal symptoms occur shortly after birth

Updated by: Neil K. Kaneshiro, MD, MHA, Clinical Assistant Professor of Pediatrics, University of Washington School of Medicine. Also reviewed by David Zieve, MD, MHA, Medical Director, A.D.A.M., Inc 1/29/2010
Neonatal Abstinence Syndrome

• Withdrawal syndrome in infants chronically exposed to maternal substance abuse
• Described with opiates, cocaine, amphetamines, barbiturates, benzodiazepines and even tobacco
• Opiates are the most common substance implicated in NAS in US hospitals
Neonatal Abstinence Syndrome

- Behavioral and physiological signs
- Gastrointestinal problems: emesis, diarrhea, poor feeding
- Autonomic over-reactivity: yawning, rhinorhea, tachycardia
- Cerebral irritation: irritable, hypertonic and leads to seizures if not treated
- Poor weight gain due to combination of increased caloric needs and poor feeding
Presentation

- CNS
  - High-pitched cry
  - Irritability
  - Exaggerated primitive reflexes
  - Hyperactive deep tendon reflexes
  - Increased tone
  - Altered sleep-wake cycles
  - Tremors
  - Seizures
Presentation

• GI
  – Vomiting
  – Loose stools
  – Poor feeding
  – Uncoordinated, hyperoral suck
  – Failure to thrive

• Autonomic
  – Sweating
  – Sneezing
  – Temperature instability
  – Nasal stuffiness
  – Yawning

• Can’t eat, can’t sleep, can’t soothe
NAS Example

Evaluation

• Scoring with Finnegan’s
  – Developed in 1975
  – Average normal newborn of 2, with 95\textsuperscript{th} percentile of 7
  – No studies on efficacy, comparing methods
Differential Diagnosis

- Sepsis
- Hypoglycemia
- Hypocalcemia
- Hyperthyroidism
- Intracranial hemorrhage
- SSRI exposure
- Hypoxic ischemic encephalopathy

## Neonatal Abstinence Scoring System

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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sleeps &lt;1 Hour After Feeding</td>
<td>3</td>
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<td></td>
<td>Sleeps &lt;2 Hours After Feeding</td>
<td>2</td>
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<tr>
<td></td>
<td>Sleeps &lt;3 Hours After Feeding</td>
<td>1</td>
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<tr>
<td></td>
<td>Hyperactive Moro Reflex</td>
<td>2</td>
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<tr>
<td></td>
<td>Markedly Hyperactive Moro Reflex</td>
<td>3</td>
<td></td>
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<tr>
<td></td>
<td>Mild Tremors Disturbed</td>
<td>1</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Moderate-Severe Tremors Disturbed</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mild Tremors Undisturbed</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderate-Severe Tremors Undisturbed</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Increased Muscle Tone</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Excoriation (Specific Area)</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Myoclonic Jerks</td>
<td>3</td>
<td></td>
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<tr>
<td></td>
<td>Generalized Convulsions</td>
<td>5</td>
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<tr>
<td>Metabolic/CNS/Motor/Gastrointestinal Disturbances</td>
<td>Sweating</td>
<td>1</td>
<td></td>
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<tr>
<td></td>
<td>Fever 100.4-101°F (38°-38.3°C)</td>
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<tr>
<td></td>
<td>Fever &gt; 101°F (38.3°C)</td>
<td>2</td>
<td></td>
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<tr>
<td></td>
<td>Frequent Yawning (&gt;3-4 times/interval)</td>
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<tr>
<td></td>
<td>Mottling</td>
<td>1</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Nasal Stufiness</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sneezing (&gt;3-4 times/interval)</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Nasal Flaring</td>
<td>2</td>
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</tr>
<tr>
<td></td>
<td>Respiratory Rate &gt;60/min</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Respiratory Rate &gt; 60/min with Retractions</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastrointestinal Disturbances</td>
<td>Excessive Sucking</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Poor Feeding</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regurgitation</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Projectile Vomiting</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loose Stools</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Watery Stools</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Score**

**Initials of Scorer**
Evaluation

• UNM approach:
  – Score within 2 hours of birth, then q2-4 hrs
  – Scoring by 2 nurses first time following caregiver switch
    • Inter-rater reliability needs to be 92-100%
  – Score >8 requires re-score after feeding
  – Non-pharmacologic interventions for scores <8
  – Initiate therapy when scores consistently >8 (depending on agent)
<table>
<thead>
<tr>
<th>More Emphasis on These Symptoms</th>
<th>Less Emphasis on These Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive crying</td>
<td>Tremors, disturbed</td>
</tr>
<tr>
<td>Poor sleep</td>
<td>Tremors, undisturbed</td>
</tr>
<tr>
<td>Poor wt gain</td>
<td>Exaggerated Moro reflex</td>
</tr>
<tr>
<td>Excessive wt loss</td>
<td>Increased tone</td>
</tr>
<tr>
<td>Poor feeding</td>
<td>Yawning</td>
</tr>
<tr>
<td>Emesis</td>
<td>Sneezing</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>Excoriations</td>
</tr>
<tr>
<td>Tachypnea</td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td></td>
</tr>
</tbody>
</table>
Non-pharmacologic Treatment

• Low stimuli
• Cluster care
• Physical therapy, massage
• Skin-to-skin
• Rooming-in
  – Decreases need for medication in baby
  – Less need for transfer, care remains local
  – Promotes bonding of family
  – Consider needs of mother (immediately postpartum, dosing at a methadone clinic, other children, etc.)
Non-pharmacologic Care by Domain for the Infant Affected by NAS

<table>
<thead>
<tr>
<th>Reactivity to sensory stimulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch</td>
</tr>
<tr>
<td>Visual</td>
</tr>
<tr>
<td>Sounds</td>
</tr>
<tr>
<td>Movement</td>
</tr>
<tr>
<td>Multiple sensitivity swaddling</td>
</tr>
<tr>
<td>gentle, slow</td>
</tr>
<tr>
<td>dim environment</td>
</tr>
<tr>
<td>speak quietly</td>
</tr>
<tr>
<td>hold, contain</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sleep/Wake control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assist with transition</td>
</tr>
<tr>
<td>Gentle handling</td>
</tr>
<tr>
<td>Appropriate stimulation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motor/Tone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-nutritive sucking</td>
</tr>
<tr>
<td>Containment, holding</td>
</tr>
<tr>
<td>Swaddling</td>
</tr>
<tr>
<td>Positioning aides</td>
</tr>
<tr>
<td>Rocking</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Autonomic Signs of Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promote rest</td>
</tr>
<tr>
<td>Adjust environment and stimuli</td>
</tr>
<tr>
<td>Identify triggers of physiologic</td>
</tr>
<tr>
<td>signs</td>
</tr>
<tr>
<td>Understand limits of tolerance</td>
</tr>
<tr>
<td>Gradual presentation of stimuli</td>
</tr>
<tr>
<td>Sensitivity to feedback signals</td>
</tr>
</tbody>
</table>
Breastfeeding

• Decreases need for medications in baby, duration of treatment, hospital length of stay
• Recommended by ACOG, AAP, AABFM if mom stable on medication assisted therapy
• Neither methadone or Subutex thought to be absorbed through breast milk to extent necessary to treat or prevent withdrawal
• Hepatitis C can breastfeed as long as no bleeding nipples
• UNM policy on THC: allow if recently quit as long as UDM remains negative in future
Judge: Breast-feed Ban in State Prison Violates Constitution
Young Women United (YWU) leads policy change, research, culture shift, and place-based organizing by and for women and people of color in New Mexico. YWU works to build communities where all people have access to the information, education, and resources to make real decisions about our own bodies and lives.

SB 42- Medicaid for Incarcerated Individuals mandates the Health and Human Services Department to cooperate with the New Mexico Corrections Department and county detention facilities to ensure that all inmates who are potentially eligible for Medicaid have their eligibility determined prior to leaving custody.

Together, with Crossroads for Women and Fathers Building Futures, YWU worked on legislation known as "Ban the Box" to gain greater access to employment in NM for people who have been in the criminal justice system. SB 78 did not pass, but YWU will continue advocating for this bill in the future.
Pharmacologic Treatment

- Purpose of treatment is to prevent seizures, promote growth, feeding, bonding
- Opiate monotherapy superior- Cochrane Review
- No data for one opiate over another
- Co-therapy
  - Very limited role
  - After initiation of opiates
  - Clonidine
  - Phenobarbital
Pharmacological treatment of NAS at UNM

- Methadone ”loading” protocol for infants of mothers on methadone or mothers still using heroin or other opiates
- Morphine “escalating protocol for infants of mothers on buprenorphine
- Based on modified Finnegan scoring system
- Clonidine adjunct for difficult cases
Methadone Treatment

- At UNM used for methadone or heroin primary exposure
- Initiated at Finnegan >8 or mean of 8 three consecutive times, or >12 two times
  - Initiation dose is 0.7mg/kg/24 hrs
  - Divided q4 to start
  - Oral route
  - Requires more calculation
  - Longer acting for transfer, longer wean
Morphine Treatment

- Used at UNM for buprenorphine exposure only, but changing
- Initiate at Finnegan >13, or 9-12 x2 within one hour
- Initial dose dependent on score
  - 0-8: none
  - 9-12: 0.04mg
  - 13-16: 0.08
  - 17-20: 0.12
  - 21-24: 0.16
  - >25: 0.20mg
- Dose is every 4 hours
- Oral route if able to take PO
- Easier to calculate, may wear off during transfer, shorter wean
## How About Buprenorphine for NAS?

<table>
<thead>
<tr>
<th>Outcome and Feeding Subgroup</th>
<th>Buprenorphine (N=33)</th>
<th>Morphine (N=30)</th>
<th>Difference (95% CI)*</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of infants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottle-feeding</td>
<td>21</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast-feeding</td>
<td>12</td>
<td>9</td>
<td></td>
<td></td>
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<tr>
<td><strong>Primary outcome</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median duration of treatment (range) — days</td>
<td>15 (3 to 67)</td>
<td>28 (13 to 67)</td>
<td>−13 (−21 to −7)</td>
<td>&lt;0.001†</td>
</tr>
<tr>
<td>Bottle-feeding</td>
<td>15 (3 to 67)</td>
<td>28 (13 to 67)</td>
<td>−13 (−23 to −6)</td>
<td></td>
</tr>
<tr>
<td>Breast-feeding</td>
<td>20 (3 to 55)</td>
<td>28 (16 to 52)</td>
<td>−8 (−30 to 2)</td>
<td></td>
</tr>
<tr>
<td><strong>Secondary outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median length of hospital stay (range) — days</td>
<td>21 (7 to 71)</td>
<td>33 (18 to 70)</td>
<td>−12 (−22 to −7)</td>
<td>&lt;0.001†</td>
</tr>
<tr>
<td>Bottle-feeding</td>
<td>21 (7 to 71)</td>
<td>33 (18 to 70)</td>
<td>−12 (−23 to −7)</td>
<td></td>
</tr>
<tr>
<td>Breast-feeding</td>
<td>26 (7 to 58)</td>
<td>32 (20 to 58)</td>
<td>−8 (−29 to 2)</td>
<td></td>
</tr>
</tbody>
</table>
## Expense of NAS

**Table 3. Mean Hospital Charges and Length of Stay for Neonatal Abstinence Syndrome vs All Other US Births**

<table>
<thead>
<tr>
<th></th>
<th>Mean (95% CI)</th>
<th>2000</th>
<th>2003</th>
<th>2006</th>
<th>2009</th>
<th>P for Trend</th>
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<tbody>
<tr>
<td><strong>Neonatal Abstinence Syndrome</strong></td>
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<tr>
<td>Unweighted sample, No.</td>
<td></td>
<td>2920</td>
<td>3761</td>
<td>5200</td>
<td>9674</td>
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</tr>
<tr>
<td>Length of stay, d</td>
<td></td>
<td>15.8 (14.2-17.3)</td>
<td>15.9 (14.5-17.3)</td>
<td>15.3 (14.6-16.0)</td>
<td>16.4 (15.8-17.1)</td>
<td>.06</td>
</tr>
<tr>
<td>Hospital charges, 2009 US $</td>
<td></td>
<td>39 400 (33 400-45 400)</td>
<td>47 900 (40 800-55 100)</td>
<td>44 600 (40 400-48 900)</td>
<td>53 400 (49 000-57 700)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>All Other US Births</strong></td>
<td></td>
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<td></td>
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<tr>
<td>Unweighted sample, No.</td>
<td></td>
<td>784 191</td>
<td>890 582</td>
<td>1 000 203</td>
<td>1 113 123</td>
<td></td>
</tr>
<tr>
<td>Length of stay, d</td>
<td></td>
<td>3.1 (3.0-3.1)</td>
<td>3.2 (3.1-3.2)</td>
<td>3.2 (3.2-3.3)</td>
<td>3.3 (3.3-3.4)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Hospital charges, 2009 US $</td>
<td></td>
<td>6600 (5800-7300)</td>
<td>7300 (6900-7600)</td>
<td>8200 (7800-8600)</td>
<td>9500 (9000-9900)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
Benefit of Structured NAS Treatment Guidelines

- Cohort study of 547 pharmacologically treated infants: 417 treated with protocols and 417 without
- Duration of opioid treatment 17.7 vs. 32.1 days (p<.0001)
- Hospital stay 22.7 vs. 32.1 days (p=.004)
NAS Paradigm 1980 to 2010/2018

• Mothers using Methadone for Medication Assisted treatment
• Care in NICU-highly stimulating
• 50—90% babies needing pharmacological treatment
• Treatment based don Finnegan Scoring system
• Wide range of length of treatment /stay
• Breastfeeding rare
• Average $50,000 stay
• Transport from community hospital  $8000-10000
Fishbone Diagram

Overuse of opioid treatment

- Prenatal
  - Lack of education
  - Parental expectations
  - Embarrassment

- L&D Hospitalization
  - NAS scoring variability
  - Begin 96 hour stay
  - Maintaining confidentiality
  - Obtaining consent
  - Maternal drug screening
  - MD resistance
  - Prenatal records not available
  - Awkward conversation

- Social Services
  - Social services consults
  - RN education about NAS
  - Awkward conversations
  - Maintaining confidentiality
  - Obtaining consent
  - MD resistance
  - Prenatal records not available
  - Awkward conversation

- Peds Hospitalization
  - NAS scoring
  - 96 hour stay minimum
  - Difficult family behavior
  - Difficult family behavior
  - Difficult family behavior

- Admission
  - May stay up to 6 weeks
  - Family expectations
  - Family support involvement
  - Lack of use of non pharmacological treatments
  - Lack of infant centered scoring
  - MD interpretation of scores
Leverage Points

Decreased use of opioid treatment

- Lack of education
  - Parental expectation
  - Embarrassment

- Maternal drug screening questions
  - Awkward conversation
  - Obtaining consent
  - Prenatal records not available

- Admissions

- L&D Hospitalization
  - NAS scoring
  - Infant drug screening
  - Begin 96 hour stay
  - Maintaining confidentiality

- Social Services
  - Social services consults
  - CYFD involvement
  - Security

- Peds Hospitalization
  - NAS scoring
  - Simplified Eat/Sleep/Console approach
  - May stay up to 6 weeks
  - Family expectations/involvement
  - Family support
  - Lack of non-pharmacological treatments

- MD resistance
- No resources or family support
<table>
<thead>
<tr>
<th>Interventions</th>
<th>Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardized nonpharmacologic care on the inpatient unit</td>
<td>February 2010</td>
</tr>
<tr>
<td>Transfer from WBN to the inpatient unit</td>
<td>February 2011</td>
</tr>
<tr>
<td>Development of a novel approach to assessment</td>
<td>January 2014</td>
</tr>
<tr>
<td>Spread of change concepts to NICU</td>
<td>January 2014</td>
</tr>
<tr>
<td>Rapid morphine weans</td>
<td>June 2014</td>
</tr>
<tr>
<td>Prenatal counseling of parent</td>
<td>June 2014</td>
</tr>
<tr>
<td>Morphine given as needed</td>
<td>May 2015</td>
</tr>
<tr>
<td>Empowering messaging to parents</td>
<td>May 2015</td>
</tr>
</tbody>
</table>

Percent Treated With Morphine

- % Treated with morphine
- Average
- UCL
- LCL

Mean = 96%

Standardized nonpharmacologic care

Mean = 73%

Direct transfer to inpatient unit

Mean = 28%

Rapid morphine wean

Prenatal counseling

Morphine as needed

Rapid morphine wean

Empowering messaging

Novel approach to assessment on inpatient unit

Spread to NICU team

Admit Date
Christus St. Vincent Regional Medical Center
ESC Project Team

Management Sponsor
Deb Wallace, RN Manager Peds and OB

Project Team
Core members:
Team leader: Jennifer Achilles, MD, Pediatric Hospitalist
Facilitator: Jennifer Castaneda-Lovato, RN CDPI

Consulting members:
Anne Kessler, MD Director Pediatric Hospitalist
Misha Harris, PNP Pediatric Nurse Practitioner
Jasmin Sander, Peds Nurse
Marcia Panagkos and Kathy Lewellin, Social Work
Melinda Montoya And Jasmina Demirovic, Pharmacist
Cassie Marquez, Cerner IT support
Catalina Roybal, Data Specialist
Mac Bowen, MD Family Practice
Eat Sleep Console PDSA cycle 3
Introduced August 2017

- Interventions focused on non pharmacologic therapies
- Simplified approach to assessment for infants
  - Eat - goal feeds OR 1 oz/feed OR BF well
  - Sleep - 1 hour undisturbed
  - Consolated - within 10 minutes
- Led to decreased ALOS and proportion of infants treated with morphine
- Decreased hospital costs
- No adverse events

Primary Metric 1: Proportion of Opiate-exposed Newborns Receiving Opiate Treatment Dropped by 29%
Primary Metric 2: For NAS Newborns Requiring Opiate Treatment, Cumulative Dose Decreased from Mean of 6.1 mg to 1.0 mg (p<0.0001)

*Note that 7 newborns receiving morphine had doses converted to equivalent methadone doses using a conversion ratio of 3.5/1 p<0.0001 f
For those NAS Newborns Who Did Receive Opiate Treatment, Average Number of Doses Decreased from 39 to 8 \((p<0.0001)\)
Effect on LOS Particularly Pronounced for those Infants Who Did Require Opiate Treatment, with a Decrease in Average LOS of 8.2 days (p=0.02)
Savings of About $2000 Per Exposed Infant ($8800 per exposed infant requiring opiate treatment)
Emerging Paradigm for Opiate Exposed Newborns

• Non pharmacological treatment of withdrawing babies is primary and most important intervention
• Rooming in /dyad care/skin to skin/quiet environment/breastfeeding/minimize stimulation
• Medication therapy is secondary and should be uncommon
• ESC or similar systems
• Use of short acting morphine and prn basis
• Advantages of care in community hospitals
What Else Can We Do to Help Women Overcome Barriers to Treatment?

• Comprehensive care provided at one site is cost-effective and produces better outcomes for both mother and child

• Screen for co-morbid conditions
  – depression, anxiety, and other mental health disorders
  – domestic violence and abuse
  – psychosocial support system

• Encourage partner involvement in prenatal care and addiction treatment—it is critical for success
NAS Across New Mexico

• Many women not identified or in treatment during pregnancy- uncommon where there are target programs
• Identification of NAS infants?
• Training in scoring systems?
• Capability to care for NAS infant needing pharmacological treatment?
• Plans for referral?
• Issues with transport
Rural Hospital and Babies at Risk for NOWS

• Hospitals need to assess their capabilities to provide pharmacological treatment but...
• All maternity care units must be able to try and identify mothers with opioid use disorder and exposed infants
• All maternity care units should have plan for initial NOWS medication treatment and transfer
4 P’s

• Have you ever used drugs or alcohol during this Pregnancy?
• Have you had a problem with drugs or alcohol in the Past?
• Does your Partner have a problem with drugs or alcohol?
• Do you consider one of your Parents to be an addict or alcoholic?
Readiness Checklist

• Create transfer protocols upon need for initiation of treatment
• Create policies on CYFD contact
• Create post hospitalization care plans for moms and babies
Readiness Checklist

• Multidisciplinary care
  – Maternity
  – Pediatrics
  – Anesthesia
  – Nursing
  – Social work
Features of Milagro Perinatal Substance Abuse Program at the University of New Mexico

• Integrated, multidisciplinary care
  – Prenatal visits at 3 different Family Medicine clinic locations
  – Maternal Fetal Medicine consultation
  – Substance abuse counseling—referrals and on-site
  – Buprenorphine management
  – Postpartum services, including contraception management, with emphasis on LARCs

• Continuity of care for prenatal care, delivery, postpartum

• Residential treatment available via Mariposa Program
  – Group apartments at county-run substance abuse program
  – Women and infants can stay up to 6 months postpartum
I am more than my addiction.
I am more than what you see.

Artwork by: Adelina Cruz & Al'Nair Lara - 2014.
Questions?