Welcome!

The Nevada Opioid Center of Excellence (NOCE) is dedicated to developing and sharing evidence-based training and offering technical assistance to professionals and community members alike. Whether you're a care provider or a concerned community member, NOCE provides resources to support those affected by opioid use.

Today's presentation was made possible in whole or in part by the Nevada Department of Health and Human Services (DHHS) Director's Office through the Fund for a Resilient Nevada, established in Nevada Revised Statutes 433.712 through 433.744. The opinions, findings, conclusions, and recommendations expressed in our courses are those of the author(s) and do not necessarily represent the official views of the Nevada Opioid Center of Excellence or its funders.

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Understanding the Basics of Neonatal Abstinence Syndrome

Andria Peterson, Pharm D

Objectives

1) Define neonatal opioid withdrawal syndrome (NOWS)

2) Understand screening tools for identifying NOWs

3) Understand the signs & symptoms of NOWs

4) Identify & understand pharmacologic treatment options for NOWS

5) Identify & understand non-pharmacologic treatment options for NOWS

6) Understand the role of the caregiver in the treatment of NOWS

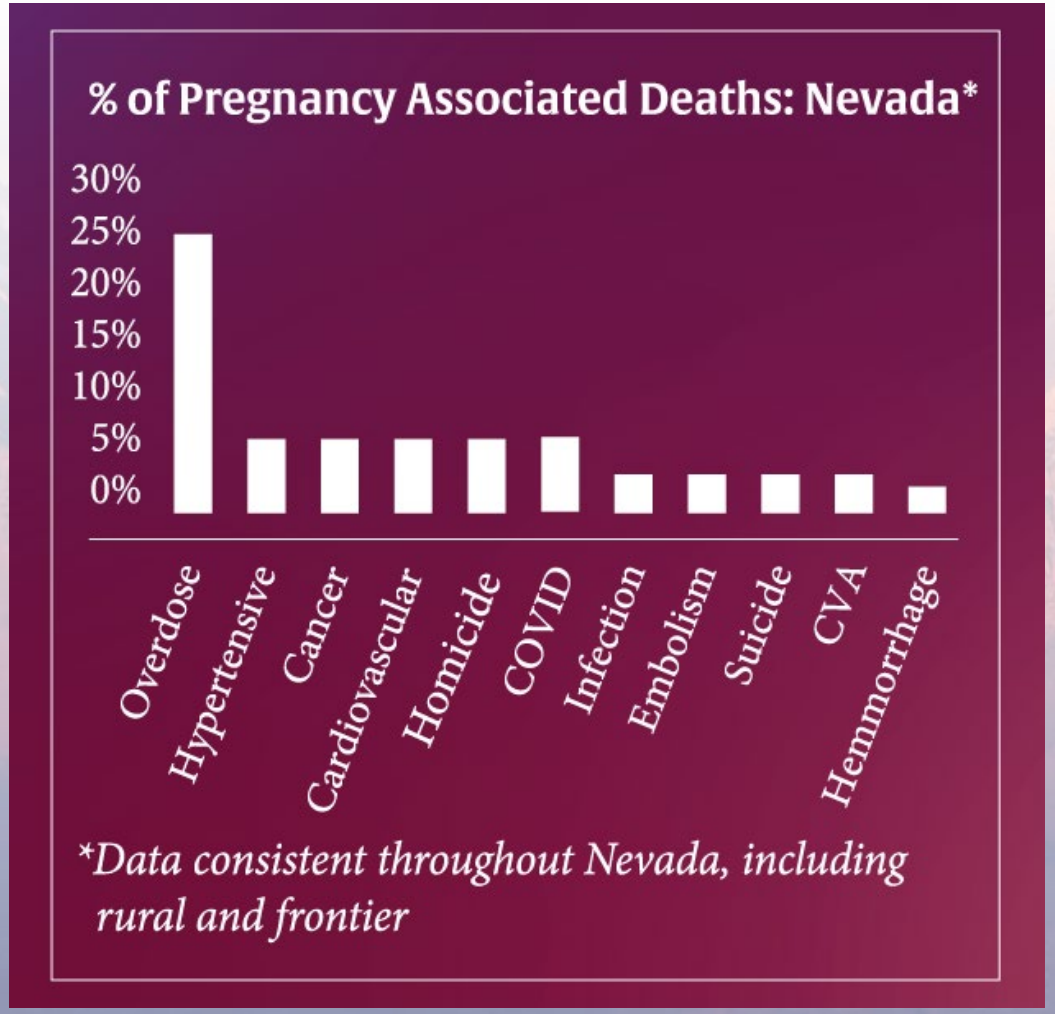
Relevance of this topic...

Problem/Associated Effect

- *Problem*
  - Drug-induced deaths are the leading cause of death for reproductive-age women in the U.S.
    - Surpasses motor vehicle accidents, gun violence & homicide
- *Associated Effect*
  - NAS = Neonatal Abstinence Syndrome
    - Results from the sudden discontinuation of fetal exposure to substances that were used or abused during pregnancy

Centers for Disease Control and Prevention. Annual surveillance report of drug-related risks and outcomes—United States, 2017. In: Vol surveillance special report 1. Atlanta (GA): Centers for Disease Control and Prevention, U.S. Department of Health and Human Services; 2017. 18.
Smid MC, Stone NM, Baksh L, et al.Pregnancy-Associated Death in Utah. Obstetrics & Gynecology. 2019;133(6):1131–1140. doi: 10.1097/ AOG.0000000000003279. 1
ASTHO Experts, States consider neonatal abstinence syndrome prevention and treatment. February 4, 2020

Nevada Trends in Women of Childbearing Age



Maternal Mortality Review Committee

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Maternal Mortality & Overdose Rates

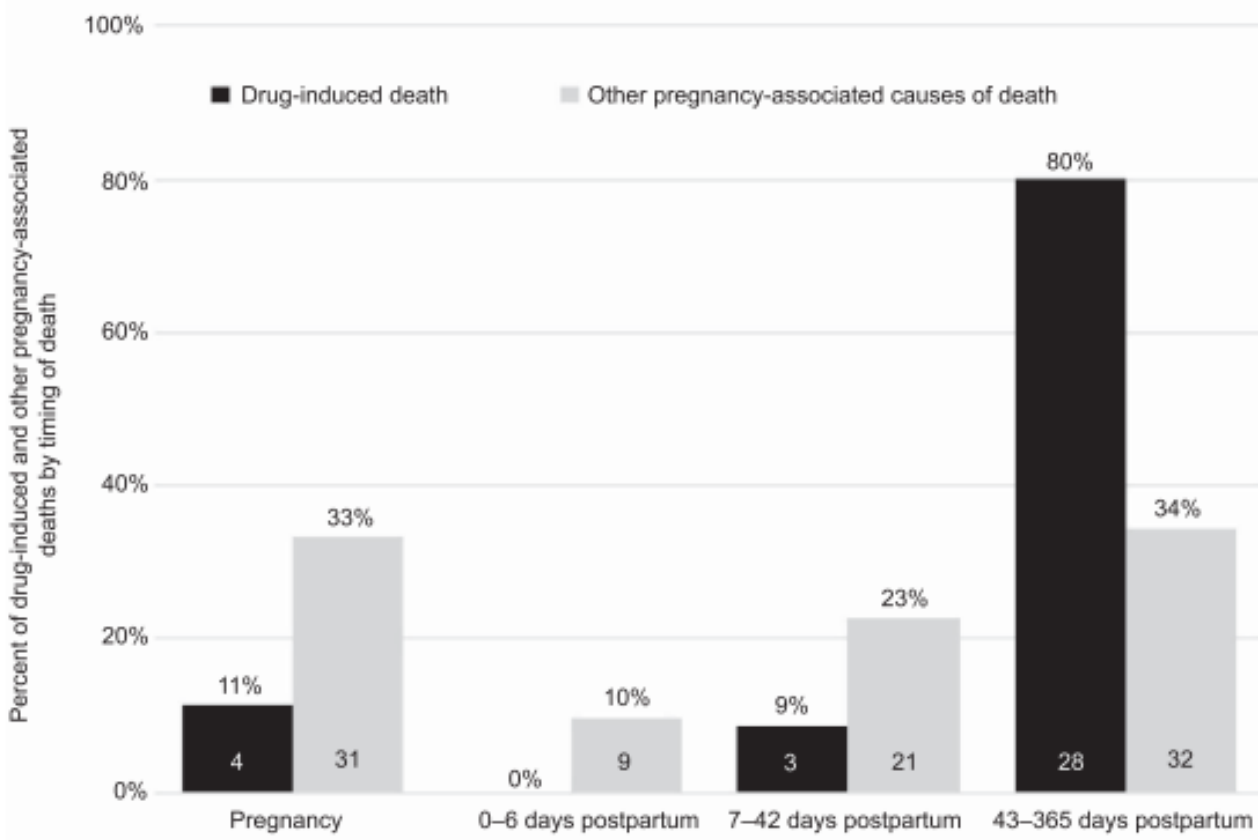

Fig. 1. Proportion of pregnancy-associated, drug-induced deaths vs all pregnancy-associated deaths, 2005–2014 (N=136).
Smid. Pregnancy-Associated Drug-Induced Deaths in Utah. Obstet Gynecol 2019.

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What is Neonatal Abstinence Syndrome (NAS)

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

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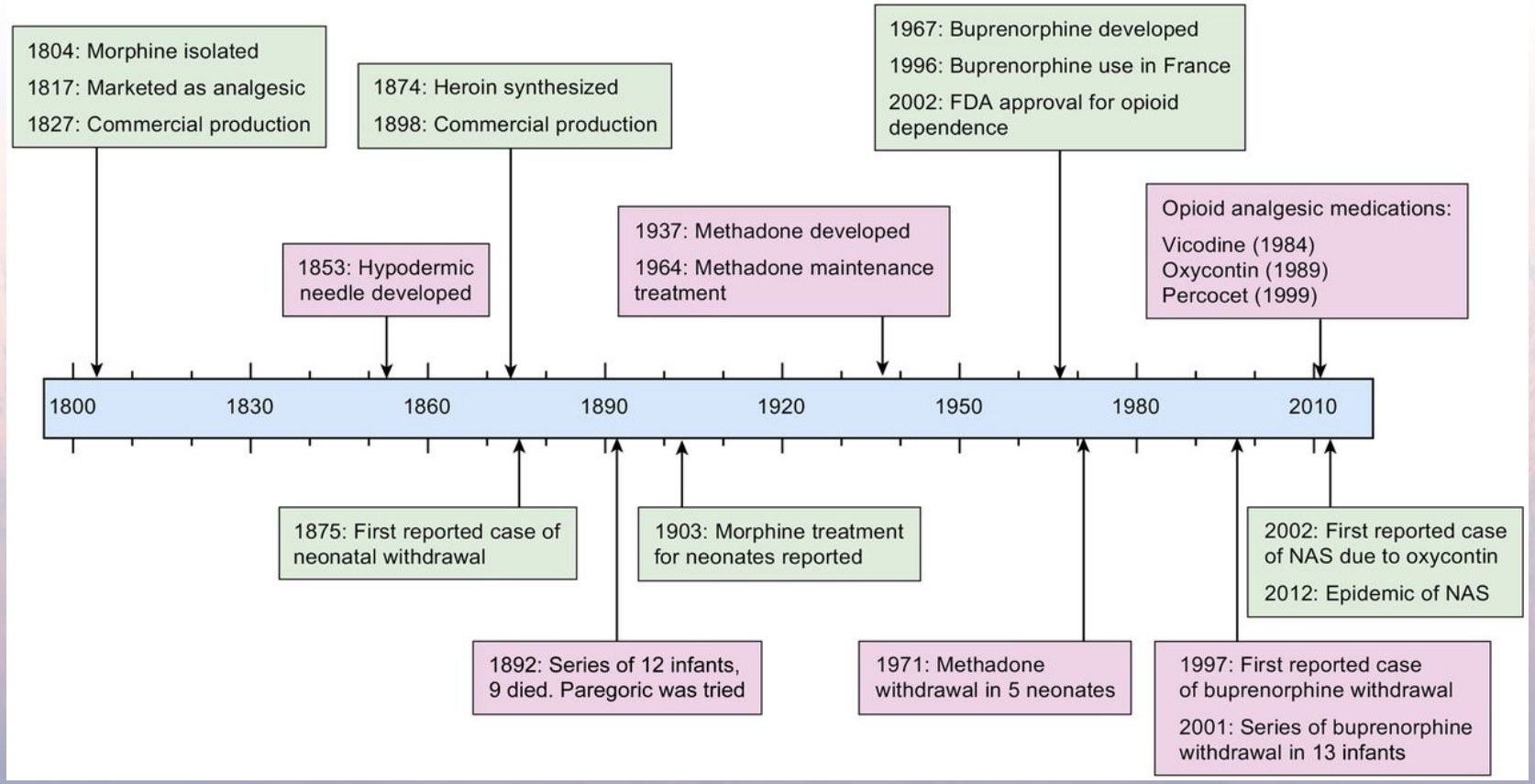
Impact of Medications of the Development of NAS



NAS vs NOWS

- *NAS = Neonatal Abstinence Syndrome*
  - Clinical diagnosis & consequence of abrupt discontinuation of chronic fetal exposure to substances that were used or abused by the mother during pregnancy

- *NOWS = Neonatal Opioid Withdrawal Syndrome*
  - Specific form of NAS
  - Withdrawal from opioids

Incidence of NAS/NOWS

- *Rates of NAS/NOWS have increased >300% in the past decade*
  - Associated with an average cost of > $200,000 per case
- *Nevada: Inpatient admissions have doubled since 2011*
- *Given the far-reaching impact of NAS, it is extremely important to monitor, diagnose & treat cases to lessen the impact*

Neonatal Abstinence Syndrome (NAS). March of Dimes. June 2019. https://www.marchofdimes.org/complications/neonatalabstinence-syndrome-(nas).aspx
28. Tolia VN, Patrick SW, Bennett MM, Murthy K, Sousa J, Smith PB, Clark RH, Spitzer AR. Increasing incidence of the neonatal abstinence syndrome in U.S. neonatal ICUs. N Engl J Med. 2015 May 28;372(22):2118-26. doi: 10.1056/NEJMsa1500439. Epub 2015 Apr 26. PMID: 25913111

Pathophysiology of NOWS

- *Mechanism of opioid withdrawal in neonates is poorly understood due to an immature central nervous system*
- *What do we know from adult medicine?*
  - Opioids, such as fentanyl, exert their action through effects on the following receptors:
    - Mu, delta & kappa
  - These receptors are located extensively throughout the peripheral nervous system & gastrointestinal system

Kocherlakota P. Neonatal abstinence syndrome. Pediatrics. 2014;134(2).

Pathophysiology of NOWS

- *Factors which lead to accumulation of opioids in the fetus:*
  - Easily cross placenta: Water soluble, lipophilic & low molecular weights
  - Transfer across placenta increases as gestation increases
  - Synthetic opioids cross the placenta more easily than semisynthetic
    - Synthetic = Demerol, fentanyl, dilaudid, methadone & buprenorphine
    - Semisynthetic = Oxymorphone, hydrocodone, oxycodone & hydromorphone

Kocherlakota P. Neonatal abstinence syndrome. Pediatrics. 2014;134(2).

Pathophysiology of NOWS

- *Effects of withdrawal manifest in these systems:*
  - Autonomic nervous system
  - Peripheral nervous system
  - Gastrointestinal nervous system

Neurologic Symptoms	Gastrointestinal Symptoms	Autonomic Symptoms
-Irritability -Increased wakefulness -High-pitched cry -Tremors -Increased muscle tone -Hyperactive reflexes -Yawning/sneezing -Seizures	-Vomiting/diarrhea -Dehydration -Poor weight gain -Poor feeding -Uncoordinated & constant sucking	-Diaphoresis -Nasal stuffiness -Fever -Mottling -Temperature instability -Elevations in respiratory rate & blood pressure

Kocherlakota P. Neonatal abstinence syndrome. Pediatrics. 2014;134(2).

When will an infant with NAS become symptomatic?

Onset/Duration & Frequency of NOWS

Drug	Onset	Frequency	Duration
Opioids			
-Heroin	24-48 hrs	40-80%	8-10 days
-Methadone	48-72 hrs	13-94%	>/= 30 days
-Buprenorphine	36-60 hrs	22-67%	>/= 28 days
-Prescription opioid medications	36-72 hrs	5-20%	10-30 days
Nonopioids			
-SSRIs	24-48 hrs	20-30%	2-6 days
-TCAs	24-48 hrs	20-50%	2-6 days
-Methamphetamine	24 hrs	2-49%	7-10 days
-Inhalants	24-48 hrs	48%	2-7 days

Kocherlakota P. Neonatal abstinence syndrome. Pediatrics. 2014;134(2).

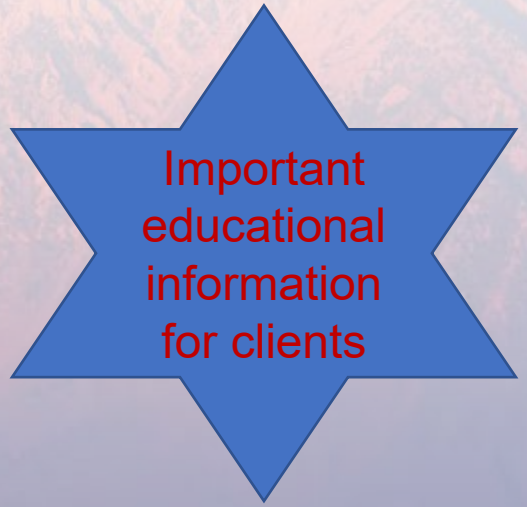
Onset/Duration & Frequency of NOWS

- *Medications used in the treatment of opioid use disorder can cause NOWS*
- *Buprenorphine is associated with a lower frequency of NOWS & shorter NICU stays*
- *Pregnant clients engaging in receiving medications for an opioid use disorder (MOUD) should be counseled about the risk for NOWS*
  - In-depth education should be provided on how to best support their infant following delivery

Reference Guide for Labor & Delivery Complicated by Substance Use: Inpatient guide: https://sobermomshealthybabies.org/plan-of-safe-care

Onset/Duration & Frequency of NOWS

- *Infants at risk of NOWS should be monitored for the following durations:*
  - Infants with suspected or confirmed exposure to opioids, such as fentanyl, should be observed for a minimum of **4 days (96 hours)**
  - Infants with suspected or confirmed exposure to methadone or polysubstances should be observed for a minimum of **5 days (120 hours)**



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How are infants screened for NAS/NOWS?

Infant Toxicology Screening

Matrix	Consent	Detection Period
Urine	-Exempt from maternal consent procedures	-Reflects recent exposure
Umbilical Cord Tissue	-Exempt from maternal consent procedures	-Detection focuses on ~20 weeks prior to birth
Meconium	-Exempt from maternal consent procedures	-Detection focuses on last 2 months in utero
Hair	-Exempt from maternal consent procedures	-Reflects exposure during 3rd trimester

Important educational information for clients

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Scoring scales used in the diagnosis of NAS/NOWS…

NAS/NOWS Scoring Scales

Scale Name	Description	References
Eat, Sleep, Console	-Three step process which evaluated if infant can eat ≥ 1 oz, can sleep for ≥ 1 hour and be consoled within 10 min	-Grossman et al, 2018
Finnegan Neonatal Abstinence Scoring System (Finnegan Scale)	-Dates from 1970s -First scale for NAS	-Original: Finnegan, Kron. Connaughton & Emich. 1975 -Most recent: Finnegan & Kaltenback, 1992
MOTHER NAS Scale (Modified Finnegan Scale)	-Contains 28 items, 19 used for scoring & medication decisions -Eliminates many symptoms listed in Finnegan Scale (myoclonic jerks, mottling, nasal flaring, watery stool) -Added 2 items: irritability & failure to thrive	-Jones et al, 2010
Lipsitz Tool (Neonatal Drug Withdrawal Scoring System)	-Has simple metrics with good sensitivity for identifying withdrawal	-Lipsitz, 1975
Neonatal Narcotic Withdrawal Index	-Evaluates NAS on 7-item scale -Assigns weights of 0-7 pts per item	-Green & Suffet, 1981
Neonatal Withdrawal Inventory	-Provides a sequence of care procedures -Uses an 8-point scale for withdrawal evaluation	-Zahorodny et al, 1998
Withdrawal Assessment Tool (WAT-1)	-Assesses signs of opioid & benzodiazepine withdrawal	-Franck, Harris, Soetenga. Amling & Curley, 2008 -Kaltenback & Jones, 2016

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NAS/NOWS Scoring Scales

- *Finnegan Neonatal Abstinence Scoring System (FNASS)*
  - Common method for scoring NAS where medication is given to the infant when hard cutoff values to the scoring system are exceeded

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Modified Finnegan Neonatal Abstinence Score Sheet[1]

System	Signs and Symptoms	Score	AM						PM						Comments
Central Nervous System Disturbances	Excessive high-pitched (or other) cry < 5 mins	2													
	Continuous high-pitched (or other) cry > 5 mins	3													
	Sleeps < 1 hour after feeding	3													
	Sleeps < 2 hours after feeding	2													
	Sleeps < 3 hours after feeding	1													
	Hyperactive Moro reflex	2													
	Markedly hyperactive Moro reflex	3													
	Mild tremors when disturbed	1													
	Moderate-severe tremors when disturbed	2													
	Mild tremors when undisturbed	3													
	Moderate-severe tremors when undisturbed	4													
	Increased muscle tone	1													
	Excoriation (chin, knees, elbow, toes, nose)	1													
	Myoclonic jerks (twitching/jerking of limbs)	3													
	Generalised convulsions	5													
Metabolic/ Vasomotor/ Respiratory Disturbances	Sweating	1													
	Hyperthermia 37.2-38.3C	1													
	Hyperthermia > 38.4C	2													
	Frequent yawning (> 3-4 times/ scoring interval)	1													
	Mottling	1													
	Nasal stuffiness	1													
	Sneezing (> 3-4 times/scoring interval)	1													
	Nasal flaring	2													
	Respiratory rate > 60/min	1													
	Respiratory rate > 60/min with retractions	2													
Gastrointestinal Disturbances	Excessive sucking	1													
	Poor feeding (infrequent/uncoordinated suck)	2													
	Regurgitation (≥ 2 times during/post feeding)	2													
	Projectile vomiting	3													
	Loose stools (curds/seedy appearance)	2													
	Watery stools (water ring on nappy around stool)	3													
	Total Score														
	Date/Time														
	Initials of Scorer														

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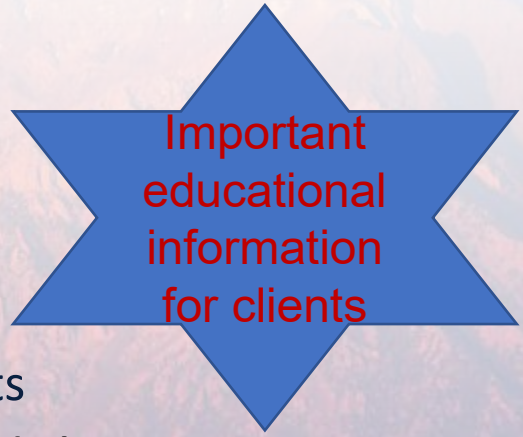
NAS/NOWS Scoring Scales

- *Eat, Sleep Console (ESC)*
  - Evidence-based approach gaining popularity that is used instead of, or in conjunction with, the FNASS method
    - Based on essential infant functioning
    - Promotes keeping the parent/caregiver & infant dyad together
    - Promotes parent/caregiver involvement & education
    - Promotes use of nonpharmacologic treatment as first-line
    - Has been shown to decrease LOS, exposure to medication & hospital costs
  - Pregnant women & caregivers should receive education prior to delivery



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Eat, Sleep, Console

EAT	
Neonate Tolerating Feeds?	Yes
SLEEP	
Did the Neonate Sleep for > 1 Hour After Being Fed?	Yes
CONSOLE	
Neonate Consolable Within 10 Minutes?	Yes
Total Score	
ESC Score	0
Parental/ Caregiver Presence	
Parental/ Caregiver Present Since Last Assessment?	No
Treatment Management	
Recommend a Team Huddle?	No
Team Huddle Decision	
Non-Pharm Interventions	
Skin to Skin Holding with Parents/ Caregivers?	
Holding/ Rocking for Comfort?	
Clustered Care to Avoid Frequent Disruption?	
Dim Lights?	
Quiet Voices?	
Pacifiers?	
Swaddling?	
White Noise Machine?	
Feeding when Hungry?	
Swaddle Bath?	
Mamaroo Swing?	
Other Interventions?	

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CommonSpirit Eat, Sleep Console Playbook at, Sleep Console Playbook

How is NAS/NOWS treated?

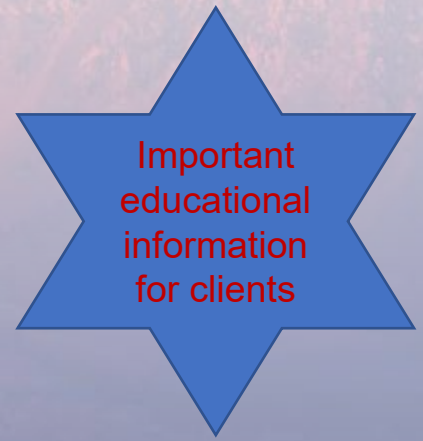
American Academy of Pediatrics

"The Prevention and alleviation of pain in neonates is important, not only because it is ethical, but also because exposure to repeated painful stimuli early in life is known to have short-term and long-term adverse sequelae."

AAP Committee on fetus and newborn and section of anesthesiology and pain medicine. Prevention and management of procedural pain in the neonate: An update. Pediatrics. 2016;137(2):e154271.

Non-Pharmacologic Management

- *Non-pharmacologic approaches*
  - Rooming-in: Parents/caregivers as the primary care providers
  - Low stimulation environment: Reduce lights, noise, exams
  - Infant soothing: Swaddling, swaying, pacifiers, skin-to-skin contact
  - Feeding on demand
  - Diaper dermatitis: Provide barrier cream & proactive prevention of skin breakdown from day one



Kocherlakota P. Neonatal abstinence syndrome. Pediatrics. 2014;134(2

Pharmacologic Management

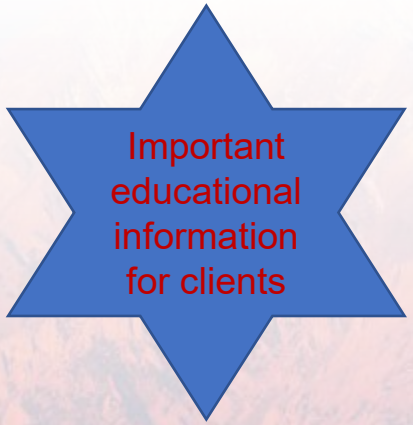
- *Pharmacologic options*
  - Morphine
  - Methadone
  - Buprenorphine
  - Phenobarbital
  - Clonidine

Clinical Pearl- There is **NO** difference in the treatment of NOWS for infants exposed to fentanyl

Kocherlakota P. Neonatal abstinence syndrome. Pediatrics. 2014;134(2).

Treatment of NAS/NOWS

- *Clinical Pearls*
  - The baby should be treated like a baby
  - The mom should be treated like a mom
  - Remind moms- “your baby knows your voice”
  - By nurturing the mom, you’re nurturing the baby
  - Mom’s care of the baby is the treatment for baby
  - Parents are the treatment for the baby, and the baby is treatment for the parents
  - Hugs before drugs
  - Job description of a baby: Eat, Sleep and be able to be Consoled



Hosp Pediatr. 2018 Jan;8(1):51-52. doi: 10.1542/hpeds.2017-0216

Summary of Treatment Goals

Summary

- *No universally recognized or standardized regimens exist*
- *Protocol-based treatment has proven to reduce length of opioid treatment duration & length of stay*
- *Hospital systems should have a reliable system for the following:*
  - Identification of the at-risk infant & family
  - Evaluation of the exposed infant & family
  - Treatment of the exposed infant & family
  - Discharge of the exposed infant & family

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Summary

- *Primary goal of treatment is to maintain the parent/infant dyad together, as much as possible*
- *Focus on providing baby-centered, function-based, non-pharmacologic care, with the parent as the primary caregiver*
  - Appears to be more effective in reducing length of treatment & hospital stay

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Summary

Tools For a Successful Program		
Location	**Team Members**	**Approach**
Ideally, treatment should take place in a non-NICU space (postpartum, pediatrics, etc.)	Physician Nurse Pharmacist Social Worker Child Life Specialist Speech Therapist Occupational Therapist Physical Therapist Dietician Lactation Consultant	Nonpharmacologic interventions should be considered first line treatment: -Rooming-in -Low stimulation to environment -Infant soothing -Breastfeeding -Feeding on demand -Prevention of diaper dermatitis

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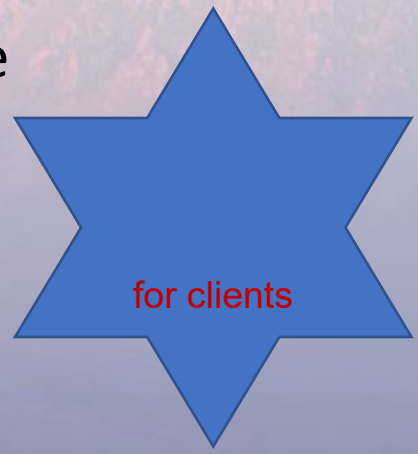
What about breastfeeding infants diagnosed with NAS/NOWS?

Breastfeeding the Infant Diagnosed with NAS/NOWS

- *Stable women receiving treatment for opioid use disorder should be encouraged to breastfeed*
- *Maternal situations where breastfeeding is NOT recommended:*
  - Mother has a pattern of regular illicit drug use close to delivery
  - Mother is not willing to engage in substance use disorder treatment
  - Positive maternal toxicology for recent alcohol use or substances not prescribed for a medical condition
  - Mother demonstrates behaviors indicative of active substance use



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When can an infant diagnosed with NAS be discharged?

Infant Discharge Checklist	Is Infant Reach for Discharge?
Infant weaned off medication (if applicable) and observed for 24-48 hours after weaning, following a hospital protocol.	☐
Infant is successfully feeding.	☐
Caregivers received education about recognition of infant signs of NAS/NOWS and have contact information of medical personnel to call with concerns.	☐
Caregivers have received education about techniques to soothe the infant and ways to recognize and respond to dysregulation.	☐
Caregivers are responsive to the infant's needs in a safe and responsive way.	☐
Caregivers have been educated on the Safe to Sleep campaign, and the infant has its own place to sleep to reduce the risk of SIDS. (Infants with NAS/NOWS are at an increased risk for sleep-related deaths)	☐
Caregivers have received education about follow-up plans.	☐

How can you help your client prepare for delivery?

Preparation for Delivery

- *Educate clients on how to interact with their health care providers during their inpatient stay to continue their current MOUD treatment*
  - This is in addition to whatever is prescribed/needed for breakthrough pain
- *Encourage clients to consider reproductive planning options following delivery*
- *Provide education on the importance of a healthy home environment*

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Preparation for Delivery

- *Encourage & empower clients to be involved in the care of their infant*
  - Mom's care of the baby is the treatment for baby
  - Parents are the treatment for the baby, and the baby is treatment for the parents
- *Provide education & information on the possibility of NAS/NOWS & how it is managed*
- *Tell clients to expect potential CPS involvement & a CARA plan of care*
  - Provide education that their involvement is not punitive
    - Assesses for safety of the infant & offers services for the client, infant & family

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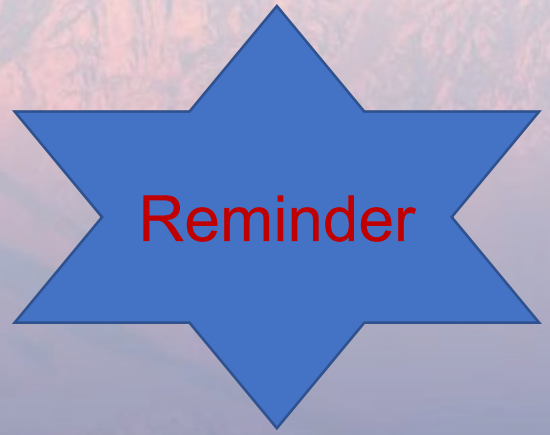
Preparation for Delivery

- *Reinforce non-pharmacologic options for the management of NAS/NOWS*
  - Rooming-in: Parents/caregivers as the primary care providers
  - Low stimulation environment: Reduce lights, noise, exams
  - Infant soothing: Swaddling, swaying, pacifiers, skin-to-skin contact
  - Feeding on demand
  - Diaper dermatitis: Provide barrier cream & proactive prevention of skin breakdown from day one



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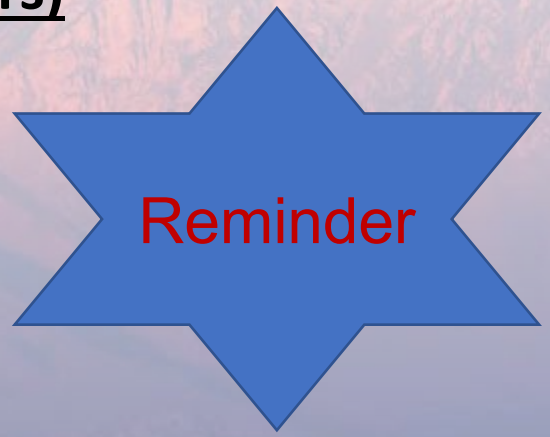
Preparation for Delivery

- *Educate clients on the need to work with their inpatient health care providers to monitor the infant for the recommended durations of time for NAS/NOWS*
  - Infants with suspected or confirmed exposure to opioids, such as fentanyl, should be observed for a minimum of **4 days (96 hours)**
  - Infants with suspected or confirmed exposure to methadone or polysubstances should be observed for a minimum of **5 days (120 hours)**



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Questions...

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