Billings Clinic

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Neonatal Abstinence Syndrome

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Disclosures

- None

Objectives

- Define NAS and NOWS
- Understand Prevalence of NAS/NOWS
- Identify Clinical Presentation of NAS/NOWS
- Discuss Both Nonpharmacologic & Pharmacologic Management of NAS/NOWS
- Implement Best Practices for Discharge and Follow-up of Newborn with NAS/NOWS

Define NAS/NOWS

- NAS – Neonatal Abstinence Syndrome
- NOWS – Neonatal Opioid Withdrawal Syndrome
- Both terms used interchangeably
- More recently NOWS used for infants born to opioid-using mothers
- More recently NAS used for infants born to polysubstance-using mothers

Define NAS/NOWS

- Clinical diagnosis
- Consequence of abrupt discontinuation of a chronic fetal exposure to substances used during pregnancy
- Multisystem disorder
  - Central and autonomic nervous systems
  - Gastrointestinal tract

Define NAS/NOWS

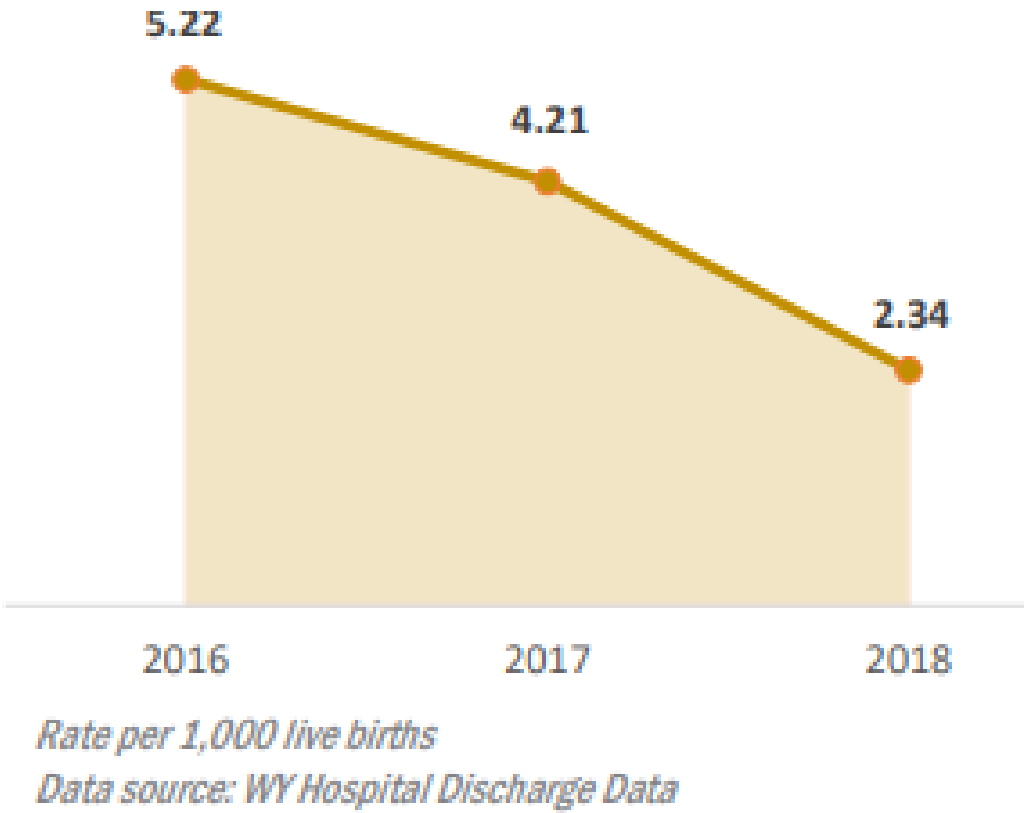
- For the purposes of this lecture, I will use NAS exclusively to refer to any infant born to a mother using one or multiple substances legally or illegally during her pregnancy that has withdrawal symptoms.

Prevalence of NAS

- Seven newborns for every 1,000 newborns are diagnosed with NAS in the US
- 80 newborns per day

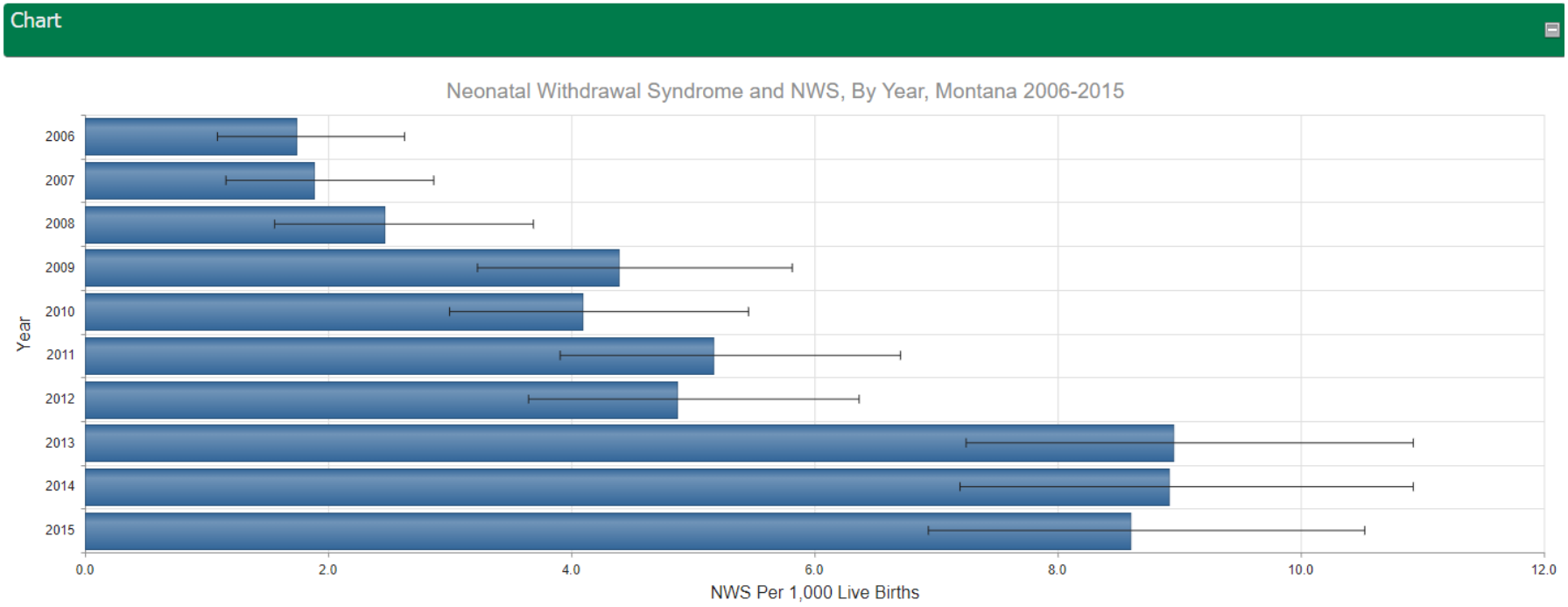
https://www.cdc.gov/pregnancy/opioids/data.html. Center for Disease Control and Prevention

Prevalence of NAS Wyoming



DHHR Wyoming. https://health.wyo.gov/wp-content/uploads/2020/01/NAS-brief-v5.pdf

Prevalence of NAS Montana



Montana Public Health Information System. http://ibis.mt.gov/indicator/view/DrugNAS.Rate.Year.html

Clinical Presentation of NAS

- Signs vary by drug use
- Severity of withdrawal may not correlate with dose or duration of exposure
- Narcotics provide the earliest studies and clearest picture
- Spectrum includes morphine, heroin, methadone, prescription opioids, antidepressants, anxiolytics and/or other substances

Narcotics/Barbiturates

- Opioid involvement from birth to 10-14 days
- Barbiturates delayed from 4 days to 4 months
- Involved systems commonly involved
  - Central Nervous System
  - Gastrointestinal
  - Autonomic Nervous System
- Other lesser involved systems
  - Respiratory
  - Integumentary

Opioids (CNS)

- Hypertonia
- Tremors
- Hyperreflexia
- Irritability
- Restlessness
- High-pitched cry
- Sleep disturbances
- Occasionally seizures

Velez M, Jansson LM. The Opioid dependent mother and newborn dyad: non-pharmacologic care. J Addict Med 2008; 2:113.

Opioids (Autonomic)

- Sweating
- Low-grade fever
- Nasal stuffiness
- Sneezing
- Yawning
- Skin mottling

Velez M, Jansson LM. The Opioid dependent mother and newborn dyad: non-pharmacologic care. J Addict Med 2008; 2:113.

Opioids (GI)

- Diarrhea
- Vomiting
- Poor feeding
- Poor swallowing
- Failure to thrive

Velez M, Jansson LM. The Opioid dependent mother and newborn dyad: non-pharmacologic care. J Addict Med 2008; 2:113.

Pathophysiology of opioids

- Not well known
- Opiate drugs easily transfer across the placenta
- Transmission increases as gestation increases
- Withdrawal may worsen based on ease of crossing the blood-brain barrier and prolonged half-life

Kocherlakota P. Neonatal abstinence syndrome. Pediatrics 2014; 134:e547.

Pathophysiology of opioids

- Complex biological phenomenon
- Most complex in neonates vs adults
  - Immature neurologic development
  - Impaired neurologic processing
  - Complex materno-feto-placental pharmacokinetics

Kocherlakota P. Neonatal abstinence syndrome. Pediatrics 2014; 134:e547.

Pathophysiology of opioids

- Opioid activity in locus coeruleus of the pons
  - Sensitive to opioid status
- Lack of opioids leads to increased production of norepinephrine
- Ventral tegmental area of the midbrain simultaneously releases less dopamine
- Decreased serotonin release in dorsal raphe nucleus which causes sleep disturbances

Kocherlakota P. Neonatal abstinence syndrome. Pediatrics 2014; 134:e547.

Pathophysiology of opioids

- Increased production of other neurotransmitters such as acetylcholine
- May active HPA axis leading to increased corticotrophin release

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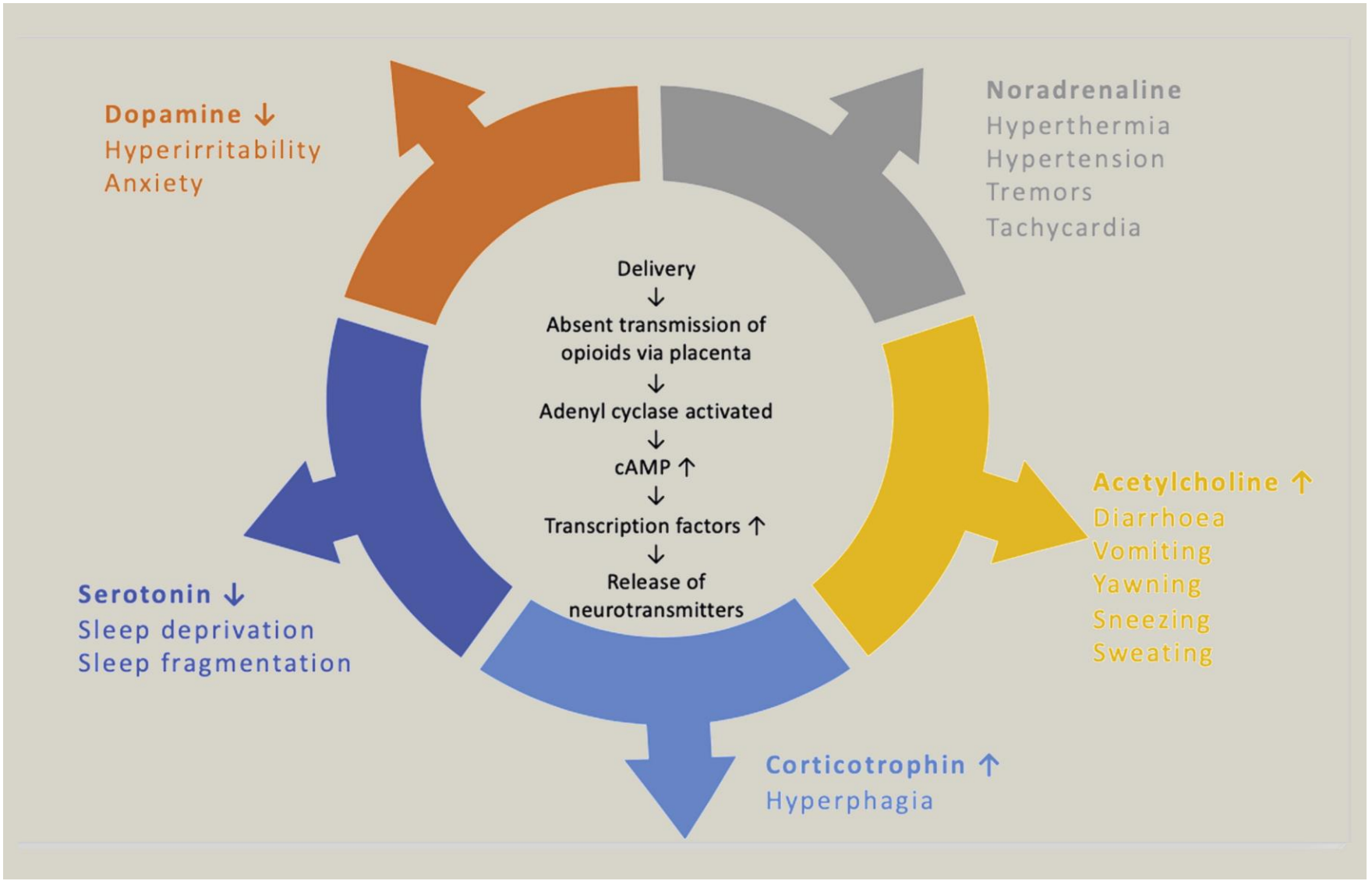
Dopamine ↓
Hyperirritability
Anxiety
Noradrenaline
Hyperthermia
Hypertension
Tremors
Tachycardia
Delivery
↓
Absent transmission of opioids via placenta
↓
Adenyl cyclase activated
↓
cAMP ↑
↓
Transcription factors ↑
↓
Release of neurotransmitters
Acetylcholine ↑
Diarrhoea
Vomiting
Yawning
Sneezing
Sweating
Serotonin ↓
Sleep deprivation
Sleep fragmentation
Corticotrophin ↑
Hyperphagia

Stimulants

- Methamphetamine and cocaine
- Less likely to need pharmacologic treatment
- May represent direct effect of stimulant itself
  - Tremors
  - High-pitched cry
  - Irritability
  - Excess suck
  - Hyperalert
  - Apnea
  - Tachypnea
- Higher rate of prematurity, IUGR, and asphyxia
- Complicated by polydrug use

Depressants/Sedatives

- EtOH withdrawal begins 3-12 hours after delivery
- Can see physical findings of FASD
- Severity of NAS much lower
- Sedative-hypnotics present a few days after birth

SSRIs

- Up to 33% of infant affected
- Signs include tremors, increased muscle tone, sleep disruption, GI disturbance, and high-pitched crying
- Symptoms usually self-limited and lasts 2-4 days

Toxicology confirmation

- Necessary to identify the substance
- Meconium
  - Most sensitive than urine testing
  - Window of detection from 20 weeks
- Urine
  - More popular
  - Window of detection a few days
- Cord or hair samples
  - Require reference lab

Patrick SW, Barfield WD, Poindexter BB, COMMITTEE ON FETUS AND NEWBORN, COMMITTEE ON SUBSTANCE USE AND PREVENTION. Neonatal Opioid Withdrawal Syndrome. Pediatrics 2020; 146.

Reporting

- Case Management
- State-specific laws
- https://www.childwelfare.gov/pubPDFs/parentalsubstanceuse.pdf

Reporting

Parental Substance Use as Child Abuse

To find statute information for a particular State, go to https://www.childwelfare.gov/topics/systemwide/laws-policies/state/.

Management Approach

- Multidisciplinary approach
- Goals
  - Promote infant and parental regulation
  - Minimize signs of NAS

Abstinence Scoring Systems

- Finnegan scoring system
  - 20 signs in neurologic, respiratory and GI categories
  - 1-7 mild symptoms
  - 8 or more severe symptoms
- Neonatal Withdrawal Scoring System
- Ostrea criteria
- Neonatal Withdrawal Inventory
- Riley Infant Pain Scale

Abstinence Scoring Systems

- Quantifying the severity of NAS helps determine need for pharmacologic therapy
- Scoring assists in monitoring, titrating, and terminating therapy
- Best after feeds, at 3-4 hours intervals, while infant is awake
- Useful for term infant, but not for preterm infants

Nonpharmacological Care

- Sufficient in cases of mild withdrawal
- Gentile handling, demand feedings, swaddling, and ambient noise control
- Swaddling lessens stimulation and decreases crying time
- Minimal stimulation includes dim light and low noise
- Frequent feedings and high-calorie formula or breast milk

Nonpharmacological Care

- Eat Sleep Console assessment evaluates
  - Ability to take 1 oz or more per feeding
  - Sleep undisturbed for 1 hour or more
  - Be consoled in under 10 minutes
- Emphasizes maternal involvement and decreases length of stay and use of opioid therapy
- Further study for safety and effectiveness are needed

Parlaman J, Deodhar P, Sanders V, et al. Improving Care for Infants With Neonatal Abstinence Syndrome: A Multicenter, Community Hospital-Based Study. Hosp Pediatr 2019; 9:608.

Pharmacological Care

- No uniformly accepted pharmacologic intervention or standardized treatment
- Medication required when
  - Supportive therapy fails
  - Withdrawal scores remain high
  - Serious signs are observed, such as seizures
  - Severe dehydration such as diarrhea or vomiting
- Delays in treatment associated with higher morbidity and longer hospital stays

Pharmacological Care

- Opioid antagonists, naloxone, contraindicated due to seizure risk
- Paregoric or tincture of opium have toxic chemicals and high alcohol content
- Sedative have prolonged half-life and associated complications

Pharmacological Care

- Morphine most common preferred medication
- Decreases incidence of seizures, improves feeding, eliminates diarrhea, decreases agitation, and can control severe symptoms
- Prolongs hospital stay
- Treatment must be provided every 3-4 hours
- Quickly escalate for rising scores with a gradual wean

Pharmacological Care

- Methadone alternative to morphine
- Administered twice per day
- Dose can be increased or decreased depending on severity score
- Buprenorphine newer option starting to be used – high 30% alcohol content

Pharmacological Care

- Adjunctive therapies
- Clonidine
  - Adjunctive therapy for opioid therapy for NAS
  - Decreases length of stay
- Phenobarbital
  - Decreases length of stay
  - No safety profile and alcohol content is a concern

Discharge and Follow Up

- Withdrawal signs are diminished, infant is feeding well, sleeping well, and gaining weight
- Evaluate
  - Parental functioning and mental health
  - Support for substance use disorder treatment
  - Home environment and support systems
- Follow up within 48 hours to establish care
  - Possible ophthalmologic eval for strabismus, nystagmus and refractory errors
  - Neurodevelopmental assessment

References

- Velez M, Jansson LM. The Opioid dependent mother and newborn dyad: non-pharmacologic care. J Addict Med 2008; 2:113.

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Questions


powerless
somatic
vulnerable
curious
weak
innocent
sensitive
dependent
innocent
playful
overwhelmed
overwhelmed
defenseless
helpless
needy
curious
small
weak
sensate
helpless
small
open
sensitive
playful
vulnerable
energetic
dependent
intense
needy
powerless