

Neonatal Nursing Education Brief: The Long-Term Outcomes of Infants with Neonatal Abstinence Syndrome

<https://www.seattlechildrens.org/healthcare-professionals/education/continuing-medical-nursing-education/neonatal-nursing-education-briefs/>

The incidence of opioid drug use in the US is increasing. The incidence of Neonatal Abstinence Syndrome is also increasing. Many infants who experience drug withdrawal require admission to the NICU and lengthy periods of treatment. The long term outcomes for these infants require ongoing support and are important to understand and address.

Drug withdrawal, NAS, NICU, opioid addiction, long-term outcomes

The Long-Term Outcomes of Infants with Neonatal Abstinence Syndrome

Purpose and Goal: CNEP # 2094

- Understand the effects of maternal opioid use on the neonate.
- Learn about the long-term outcomes for infants exposed to opioids.

None of the planners, faculty or content specialists has any conflict of interest or will be presenting any off-label product use. This presentation has no commercial support or sponsorship, nor is it co-sponsored.

Requirements for successful completion:

- Successfully complete the post-test
- Complete the evaluation form

Date

- November 2018 – November 2020

Learning Objectives

- Describe the characteristics of neonatal abstinence syndrome (NAS).
- Describe the long-term effects of in utero opioid exposure on the neonate.

Introduction

- The incidence of opioid use has increased
 - Maternal opioid use has increased
 - Illicit drug use
 - Prescription drug use
 - Fetal drug exposure has increased
- The incidence of NAS has also increased
- Every hour in the US, an infant is born with NAS
 - >10,000 babies are born with NAS every year
- Infants with NAS may require long-term support

Neonatal Abstinence Syndrome

- NAS is a variable and complex disorder
- It is seen in infants exposed to opioids in utero
 - Heroin

- Fentanyl
- Morphine
- Codeine
- Methadone
- Buprenorphine
- Hydromorphone
- It can also be seen with other substances
 - SSRIs
 - Nicotine
 - Benzodiazepines
- NAS describes a spectrum of signs and symptoms
 - Symptoms of behavioral disorganization
 - State control and attention
 - Motor and tone control
 - Sensory integration
 - Autonomic functioning
- 75-90% of exposed babies develop NAS
- The number of babies requiring treatment
 - Varies between 42-94%
 - ~27/1000 NICU admissions
 - Median length of stay 13-19 days

Clinical Manifestations of NAS

- The onset of NAS is widely variable
- The presentation can also be widely variable
 - The variability is poorly understood
- This is likely due to several factors
 - Maternal exposures
 - Substances used
 - Polysubstance use
 - Psychotropic drug use
 - Timing of exposures
 - Frequency and dose of drugs

- Maternal factors
 - Stress
 - Nutrition
 - Infections
- Placental opioid metabolism
- Genetics and Epigenetics
- Infant factors
 - Infections
 - Preterm birth
 - Metabolic rate
- Environmental factors
 - Physical environment

Clinical Presentation of NAS

- The characteristic signs of NAS include:
 - Tremors
 - Irritability
 - Tachypnea
 - High-pitched cry
 - Sleep disturbances
 - Hyperactive reflexes
 - Hypertonic muscle tone
 - Skin excoriation
 - Feeding difficulties
 - Gastrointestinal disturbances
 - Vomiting
 - Loose stools
 - Autonomic dysfunction
 - Sweating
 - Sneezing
 - Mottling
 - Fever
 - Nasal stuffiness
 - Yawning

- Failure to thrive
- Other findings in NAS include:
 - Small for gestational age
 - Respiratory complications
 - Abnormal EEG changes
 - Reported in >30%
 - Seizure activity
 - Reported in 2-11%

Long-Term Outcomes in NAS

- Long-term studies are challenging
 - Chronic stress
 - Family instability
 - Mistrust of healthcare
 - Inconsistent caregiving
 - Out-of-home placements
- There is evidence NAS has a long-term impact
- Several studies report long-term outcomes
 - Behavioral problems are common
 - Developmental problems are common
- Specific long-term problems include:
 - Otitis media
 - Vision problems
 - Motor development problems
 - Behavioral and cognitive problems
 - Child abuse and neglect
 - Risk of future drug use
 - Risk of SIDS or SUID
- Infants raised by drug using caregivers
 - Have poor outcomes
- Infants raised by non-drug using caregivers
 - Have improved outcomes

- Environmental risks magnify weaknesses caused by exposure
- Referral for early intervention and support is important

Specific Long-Term Problems

- Otitis media problems
 - Otitis media is common with methadone
 - Severe or chronic otitis media:
 - Hearing disabilities
 - Developmental disabilities
 - Learning disabilities
 - Recurrent otitis media:
 - Hearing loss
 - Language delays
- Vision problems
 - There is growing evidence about impairment
 - Vision problem include:
 - Strabismus
 - Nystagmus
 - Reduced acuity
 - Refractive errors
 - Cerebral impairment
 - Overall visual development is delayed
- Motor problems
 - There is inconsistent evidence about development
 - Methadone exposed infants tend to develop normally
 - Buprenorphine exposed infants tend to be delayed
 - Significant motor skills delay
 - Impulsivity
 - Hyperactivity
 - Significant memory skills delay
 - Short attention spans

- Behavioral and cognitive problems
 - Heroin exposed infants have poor development
 - Poor cognitive skills
 - Poor perceptual skills
 - Poor memory skills
 - Methadone exposed infants have ongoing problems
 - Hyperactivity
 - Poor verbal skills
 - Poor memory skills
 - Poor perceptual skills
 - Buprenorphine exposed infants have similar problems
 - Hyperactivity
 - Poor memory skills
- Child abuse and neglect
 - Adverse childhood experiences can cause:
 - Obesity
 - Cardiovascular disease
 - Psychiatric illnesses
 - Genetic, social and environmental factors
 - Complex interplay of outcomes
 - Complex interpersonal trauma is common
 - Lack of responsiveness to infant
 - Unrealistic expectations of infant
 - Increased maternal aggression
 - Increased physical punishment
 - Intergenerational transmission
 - Intergenerational trauma is commonly seen
 - Distorted thought patterns
 - Poor parenting interactions
 - Poor self-esteem and sense of worth
 - Heightened sensitivity to drug triggers
 - The incidence of child abuse is tripled
 - With psychiatric illnesses

- With drug using caregivers
 - With environmental stressors
- Child Protective Services considers drug use
 - A primary factor in child abuse
 - A primary factor in child neglect
- Risk of future drug use
 - Studies show higher rate of drug use
 - With tobacco exposure
 - With marijuana exposure
 - Studies have not shown these effects with opioids
 - Large longitudinal research studies are needed
- Risk of SIDS or SUID
 - A few studies have shown an increase in SIDS
 - All SIDS deaths reported tobacco using mothers
 - More studies are needed before inferring an association

Summary

- Maternal opioid use is an increasing problem
- More infants are being born exposed to opioids
- More infants are requiring hospitalization and treatment
- The short-term effects of NAS are well documented
- The long-term effects are becoming more well known
- Early intervention and environmental stability are important
 - Parent education and support is crucial
 - Ongoing intervention can optimize outcomes

References

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Vassoler, F.M., Byrnes, E.M. and Pierce, R.C. 2014. The Impact of Exposure to Addictive Drugs on Future Generations: Physiological and Behavioral Effects. *Neuropharmacology*, 76 (B), p. 269-275.

Jansson, L.M. 2016. Neonatal Abstinence Syndrome. Up-To-Date: <https://www.uptodate.com/contents/neonatal-abstinence-syndrome?source=machineLearning&search=nas%20outcomes&selectedTitle=4~13§ionRank=1&anchor=H16#H16>

Evaluation

* Required fields

Your information

*Your name

*Your email address

*Your Seattle Children's ID

*Your hospital

- Seattle Children's Hospital
- Providence Regional Medical Center Everett
- Overlake Medical Center
- St. Joseph Medical Center
- St. Francis Hospital
- Harrison Medical Center
- Other Medical Center or Hospital

Test

- The rate of maternal opioid use has not changed in 40 years.

- True
- False
- The risk of NAS is predicted by the type of in utero drug exposure.
 - True
 - False
- All infants exposed to opioids in utero will require treatment.
 - True
 - False
- Infants exposed to opioids in utero are not at risk for otitis media.
 - True
 - False
- Infants exposed to opioids in utero do not have long-term problems.
 - True
 - False
- Environmental stressors magnify the effects of in utero opioid exposure.
 - True
 - False

Evaluation

We hope you found this educational offering both interesting and informative. We'd like to hear from you and appreciate you taking the time to answer these evaluation questions.

*Were you able to complete this activity in the allotted time?

- Yes
- No

Were you informed of the following disclosures?

*Purpose of learning activity

- Yes
- No

*Requirements for successful completion of this CNE activity

- Yes
- No

*Presence or absence of conflict of interest of planning committee members

- Yes
- No

*Presence or absence of conflict of interest of content specialist(s)/author(s)/feedback person(s)

- Yes
- No

*Were your personal objectives successfully achieved?

- Yes
- Somewhat
- No

If not, why not?

*What one thing might you do differently in your practice after this session?

Please evaluate the brief:

*Presentation organized

- Excellent
- Very good
- Good
- Fair
- Poor

*Materials offered relevant content

- Excellent
- Very good
- Good
- Fair
- Poor

*Assistance provided as needed

- Excellent
- Very good
- Good
- Fair
- Poor
- Not applicable

*Overall strength of presentation

- Excellent
- Very good
- Good
- Fair
- Poor

Stated objectives achieved?

*Describe the characteristics of neonatal abstinence syndrome.

- Excellent
- Very good
- Good
- Fair
- Poor

*Describe the long-term outcomes for neonates exposed to opioids.

- Excellent
- Very good
- Good
- Fair
- Poor