NEONATAL ABSTINENCE SYNDROME

TACKLING A NATIONAL EPIDEMIC ONE BABY AT A TIME

Tricia Romesberg, DNP, MSN, ARNP, CNNP
November 3, 2017

NEONATAL ABSTINENCE SYNDROME (NAS)

NAS is a result of the sudden discontinuation of fetal exposure to substances (Opioids, CNS stimulants, CNS depressants, Hallucinogens, and/or Antidepressants) that were used or abused by the mother during pregnancy.

Central Nervous System
Irritability/Restlessness
Tremors
High-pitched cry
Hyperreflexia
Sleep disturbance
Yawning
Seizures

Autonomic Nervous System
Fever
Excessive sweating
Mottling
Tachypnea
Nasal congestion/Sneezing

Gastrointestinal System
Poor feeding
Excessive sucking
Suck-swallow incoordination
Vomiting/Diarrhea
Poor weight gain
Dehydration

Nemours.

OPIOIDS

- Buprenorphine (Buprenex)
- Codeine (Tylenol #3)
- Fentanyl (Sublimaze)
- Hydrocodone (Hycet, Hysingla ER, Lorcet, Lortab, Norco, Vicodin, Vicodin ES, Zohydro ER
- Hydromorphone (Diluadid)
- Meperidine (Demerol)
- Methadone (Dolophine)
- Morphine
- Naloxone (Evzio, Narcan, Suboxone)
- Naltrexone (ReVia)
- Oxycodone (Oxaydo, OxyCONTIN, OxyIR, Percocet, Percolone, Roxicodone, Xtampza ER)
- Pentazoncine (Talwin)
- Tramadol (Ultracet, Ultram)

- Heroin

Nemours.

POLYSUBSTANCE USE

Infants may also be affected from other drugs taken during pregnancy such as:

- Alcohol
- Amphetamines
- Barbiturates
- Benzodiazepines
- Cocaine
- LSD
- Marijuana
- Methamphetamines
- Nicotine
- and others

Nemours.

INCIDENCE

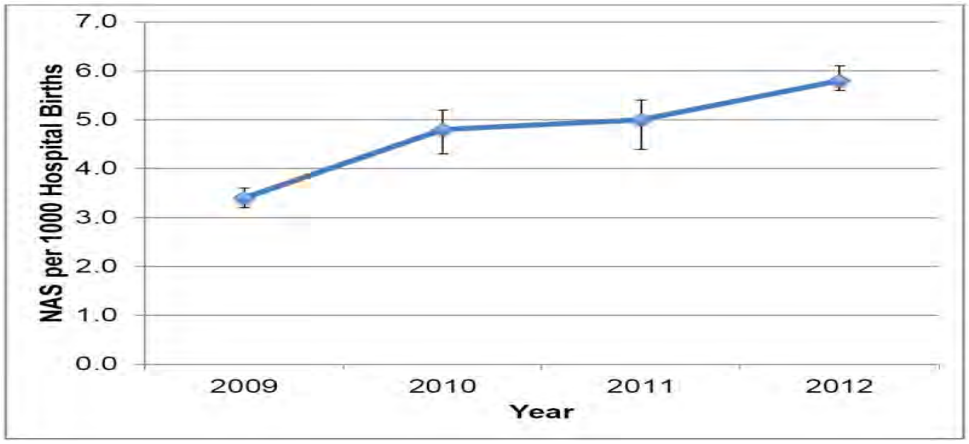
Healthcare Cost and Utilization Project (HCUP), 1999-2013
- State Inpatient Databases for 28 states

- NAS increased 300% from 1.5 per 1,000 births to 6.0 per 1,000 births

- Florida (per 1,000 births)
  - 2000: 0.4
  - 2005: 0.9
  - 2010: 4.9
  - 2013: 6.3

Nemours.

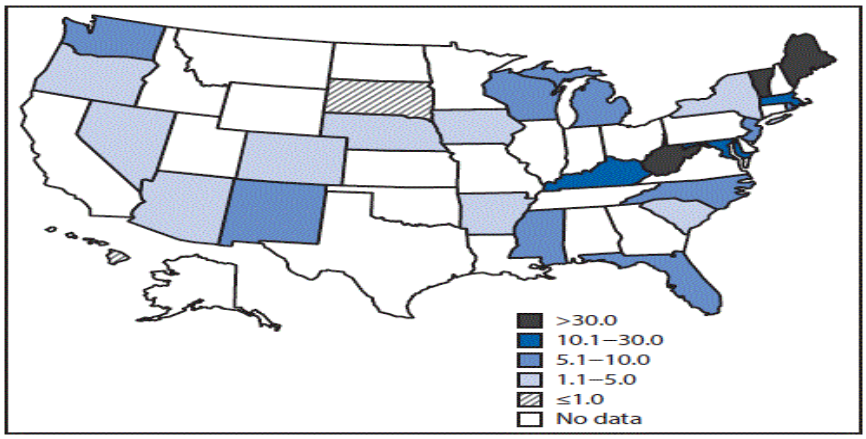
INCIDENCE OF NAS IN THE UNITED STATES



Patrick SW, Davis MM, Lehmann CU, et al. J Perinatol. 2015 Aug;35(8):650-5.

Nemours.

NAS INCIDENCE RATES IN 25 STATES, 2012-2013



Ko JY, Patrick SW, Tong VT, et al. MMWR Morb Mortal WklyRep. 2016;65:799–802.

Nemours.

THE COST OF TREATING NAS

- 30%, 68%, and 91% of NAS infants required pharmacologic treatment in separate studies
- Mean hospital charge: $93,400 per infant
- Total cost: $1.5 billion
  - Medicaid is the most common payer ($1.2 billion)

Strauss ME, Andresko M, Stryker JC, et al. Am J Obstet Gynecol. 1974 Dec 1;120(7):895-900.
Ebner N, Rohrmeister K, Winklbaur B, et al. Drug Alcohol Depend. 2007 Mar 16;87(2-3):131-8.
Patrick SW, Davis MM, Lehmann CU, et al. J Perinatol. 2015 Aug;35(8):650-5.
Kuschel C. Semin Fetal Neonatal Med. 2007 Apr;12(2):127-33.
Greig E, Ash A, Douiri A.Arch Gynecol Obstet.2012 Oct;286(4):843-51.

Nemours.

UPSTREAM AND DOWNSTREAM

- The Spectrum of Prevention
  - Primary: efforts to reduce the incidence of in-utero opioid exposure
  - Secondary: efforts to treat known in-utero exposure using evidence-based interventions to reduce disease severity
  - Tertiary: efforts to promote family wellness and long-term health outcomes for children with a known in-utero opioid exposure

Nemours.

PRENATAL MANAGEMENT

- For pregnant women with opioid use disorder, medication-assisted therapy with Buprenorphine or Methadone has been associated with improved maternal outcomes.
- Access appropriate expertise if considering tapering opioids during pregnancy because of possible risk to the patient and fetus (e.g., spontaneous abortion and premature labor) if the patient goes into withdrawal.
- Arrange for delivery at a facility prepared to evaluate and treat symptoms of NAS.

Dowell D, Haegerich TM, Chou R. MMWR Recomm Rep. 2016;65(No. RR-1):1–49.

Nemours.

PRIMARY PREVENTION OPPORTUNITIES

- Increased access to effective contraception both pre-pregnancy and post-delivery, including support for long-acting reversible contraception (LARC).
- Prenatal Screening
  - Pregnant women with a history of substance use prior to pregnancy
  - Pregnant adolescents
  - Clinics with women of color or lower socioeconomic groups
- Intrapartum Screening
  - No prenatal care
  - Placental abruption

Finer LB, Zolna MR. N Engl J Med.2016;374:843-852.
Heil SH, Jones HE, Arria A, et al. J Subst Abuse Treat. 2011 Mar;40(2):199-202.

Nemours.

TOXICOLOGY CONFIRMATION

Urine and meconium analysis:
- noninvasive
- inexpensive
- reproducible
- a fully automated procedure

Positive results are helpful for confirmation of symptoms, but are not used for guiding daily clinical management.

Positive results are useful when filing a report with Department of Children and Families (DCF), and may present strong evidence for future custody issues.

NAS EDUCATION

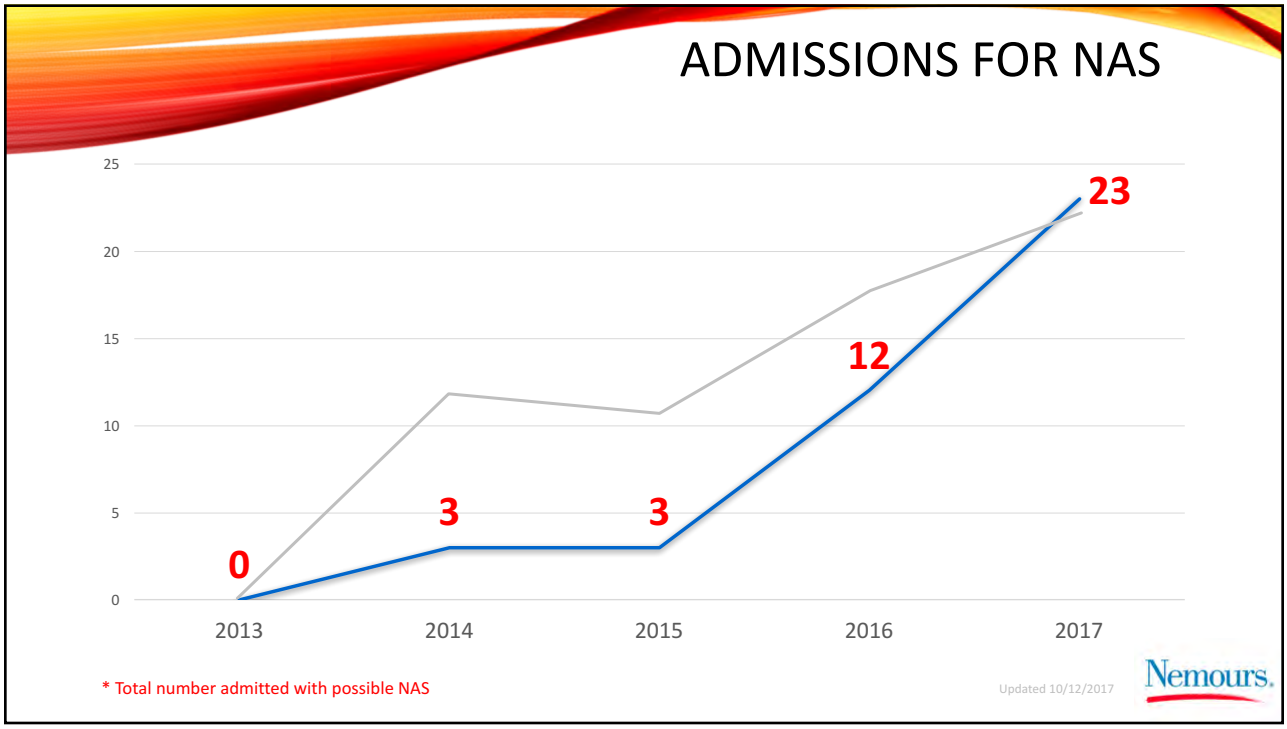
- If you are pregnant or thinking about becoming pregnant, **DON'T USE DRUGS**.
- **USE BIRTH CONTROL** if you are using drugs that may harm your baby.
- If you become pregnant and are using drugs, **TALK TO YOUR HEALTH CARE PROVIDER** about the safest way to stop using drugs while you are pregnant.

Nemours.

OPPORTUNITIES FOR IMPROVEMENT

- Prevention and education
- Public health principles
  - Screening
  - Stigmatization
- State and Federal regulations
  - Criminality
- System and Policy change
  - Coding
  - Tracking
- Coordinate efforts
  - Institutional, county, state, federal
- Standardization of care
- Compassion fatigue

Nemours.


ADMISSIONS FOR NAS
25
20
15
10
5
0
2013
2014
2015
2016
2017
0
3
3
12
23
* Total number admitted with possible NAS
Updated 10/12/2017
Nemours.

VARIABILITY OF NAS MANAGEMENT

- NAS now accounts for 50% of NICU hospital days in some hospitals.
- There is significant inter-and intra-hospital variation in treatment and outcomes for NAS.
- Recent studies of U.S. children's hospitals indicate:
  - Two-fold differences in risk-adjusted length of stay
- Large international quality improvement collaborative of 199 hospitals
  - 44.8% had a policy to standardize scoring
  - 48.6% had a policy on breastfeeding a substance-exposed infant
  - 68.0% had a policy on pharmacologic treatment of NAS

Patrick SW, Kaplan HC, Passarella M, et al. JPerinatol. 2014 Nov;34(11):867-72.
Patrick SW, Schumacher RE, Horbar JD, et al. Pediatrics. 2016 May;137(5).

Nemours.

EVIDENCE BASED MANAGEMENT

Use of a stringent protocol to treat NAS, regardless of the initial opioid chosen, reduces the duration of opioid exposure and length of hospital stay.

Hall, E. S. (2014). A multicenter cohort study of treatments and hospital outcomes in neonatal abstinence syndrome. *Pediatrics, 134* (2), e527.

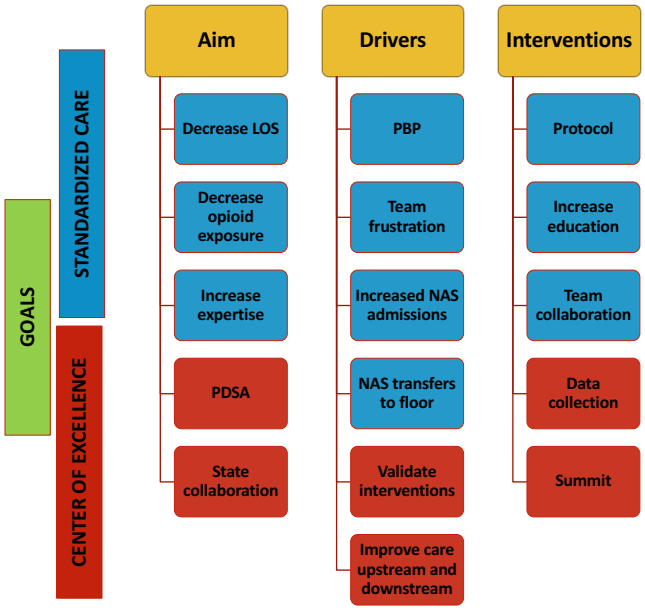
Nemours.

INTERDISCIPLINARY TEAM

- Neonatology
- Nursing
- NNP/PAs
- Pharmacy
- Education
- Lactation
- Social Work

Nemours.

Nemours Children's Hospital NAS QI Initiative



Nemours.

UNIVERSAL TRAINING PROGRAM

- Vermont Oxford Network NAS collaborative, 2013–2015
  - Participating hospitals, care standardized by protocol or policy development
  - Shortened length of treatment from 16 days to 15 days (p=0.02)
  - Shortened length of stay from 21 days to 19 days (p=0.002)

VON Vermont Oxford NETWORK

Hall ES, Wexelblatt SL, Crowley M, et al. Pediatrics. 2014 Aug;134(2):e527-34.
Patrick SW, Schumacher RE, Horbar JD, et al. Pediatrics. 2016 May;137(5).

Nemours.

STANDARDIZED CARE AT NCH

To provide consistent management and standardization of care for infants with confirmed or suspected NAS by managing symptoms throughout the process of withdrawal, and subsequently reducing the duration of opioid exposure and length of hospital stay.

Nemours Children's Hospital will manage infants with NAS by non-pharmacologic and pharmacologic recommendations identified as the standard of care by the American Academy of Pediatrics and with approval of the NAS Committee.

Nemours.

STANDARDIZED CARE AT NCH

- NAS Protocol
  - Guidelines
    - Screening, symptoms, scoring, non-pharmacologic measures, feeding, pharmacologic treatment, transfer criteria, discharge criteria, and DCF reporting guidelines
  - Definitions
  - References
- Order-set
- Benchmarking

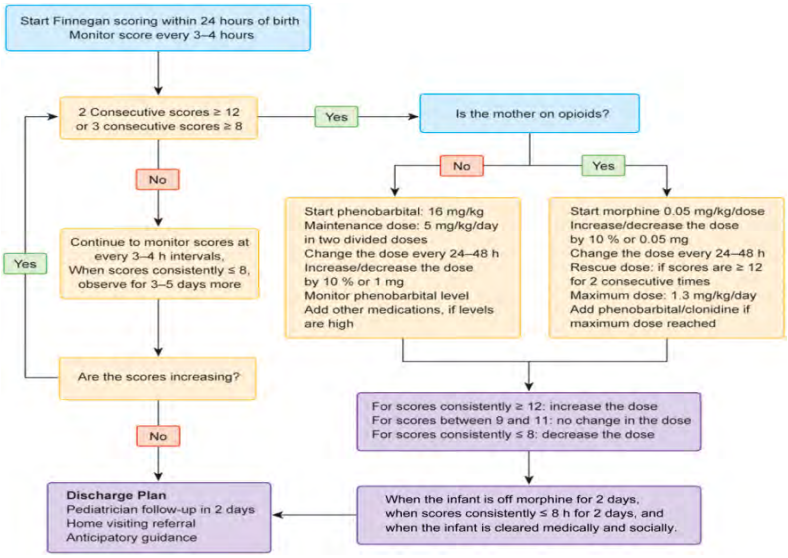
Nemours.

TREATMENT

- Finnegan Scoring Tool
  - The tool most commonly used to objectify symptoms with a scoring system.
- Pharmacologic Treatment
  - Morphine
  - Phenobarbital
- Non Pharmacologic Measures
  - Minimizing sound and light
  - Holding, rocking, swaddling, cuddler priority
  - Management of skin integrity
  - Physical and occupational therapy, developmental follow-up
- Feeding and Growing
  - Formula, breastmilk
  - Encouraging feeding tolerance and appropriate growth

Nemours.

AAP MANAGEMENT PLAN FOR NAS



Kocherlakota, P. (2014). Neonatal Abstinence Syndrome. *Pediatrics. 134*, e552. DOI: 10.1542/peds.2013-3524.

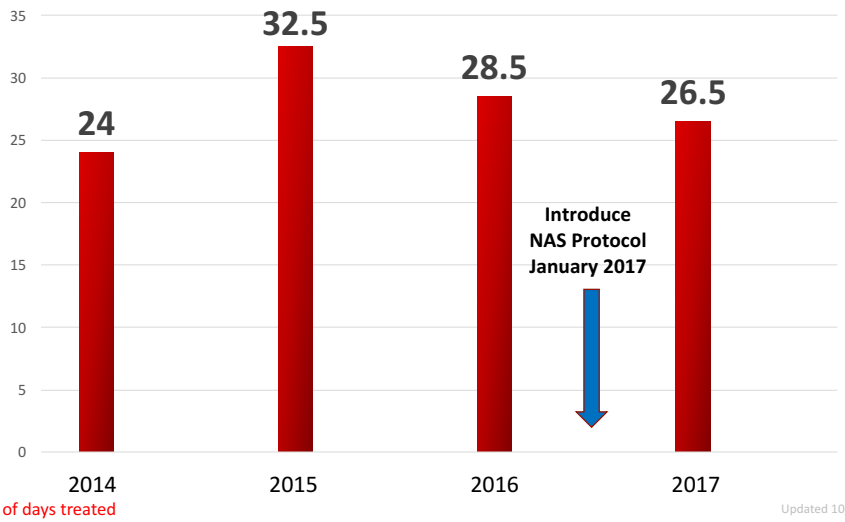
Nemours.

DISCHARGE CRITERIA

- The infant has not received Morphine for 48 hours;
- scores are consistently <8 for 48 hours; *and*,
- the infant is cleared medically and socially.

Nemours.

AVERAGE LOS FOR NAS



* Total number of days treated

Updated 10/12/2017

Nemours.

Thank you.

Nemours. Children's Hospital

Tricia L. Romesberg, DNP, MSN, ARNP, CNNP
Neonatal Nurse Practitioner

Nemours Children's Hospital
13535 Nemours Parkway
Orlando, FL 32827
Work Cell: (407) 470-8313
Personal Cell: (505) 301-8845