Partnership for a Drug-Free New Jersey
In Cooperation with the Governor's Council on Substance Use Disorder and the NJ Dept. of Human Services

OPIOID EDUCATION FOUNDATION OF AMERICA

OFFICE OF ALTERNATIVE & COMMUNITY RESPONSES

NJCARES.gov
New Jersey Coordinator for Addiction Responses and Enforcement Strategies

Opioids in Pregnancy & Neonatal Abstinence Syndrome

February 26, 2026

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In Cooperation with the Governor's Council on Substance Use Disorder and the NJ Dept. of Human Services

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Other members of the care team will receive a certificate of participation.

Additional Continuing Education Credit

EMT

This webinar has been approved by NJ OEMS for 1 EMT Elective CEU.

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Partnership for a Drug-Free New Jersey (BOC AP#: P12171) is approved by the Board of Certification, Inc. to provide continuing education to Athletic Trainers (ATs). This program is eligible for a maximum of one (1) Category A hours/CEUs.

Additional Information About Continuing Education

- You must apply to receive continuing education credit. It will not be sent to you just for attending this webinar.

- WHERE CAN YOU FIND THE LINK TO APPLY FOR CREDIT?
  - The last slide of this webinar
  - The chat at the end of the program
  - The follow-up email you will receive tomorrow

- The poll at the end of today's webinar IS NOT the evaluation for continuing education credit. The evaluation will be available through the link mentioned above.

- The links will be active for 30 days after today's event.

PA Planner Dean Barone discloses that he serves on the speakers bureaus of Ethicon and Johnson & Johnson. All other planners, faculty, and reviewers have no relevant financial relationships to disclose. All relevant financial relationships have been mitigated.

Featured Presenter

Salma Ali, MBBS, HSSC
Associate Professor, Department of Pediatrics
Rutgers New Jersey Medical School

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RUTGERS
THE STATE UNIVERSITY
OF NEW JERSEY

OPIOID EPIDEMIC & PREGNANCY
NEONATAL ABSTINENCE SYNDROME
NASTOP TREATMENT PROTOCOL

Salma Ali MD,
Division of Neonatology and Newborn Medicine
Associate Professor of Pediatrics
Rutgers-NJMS, Newark, NJ

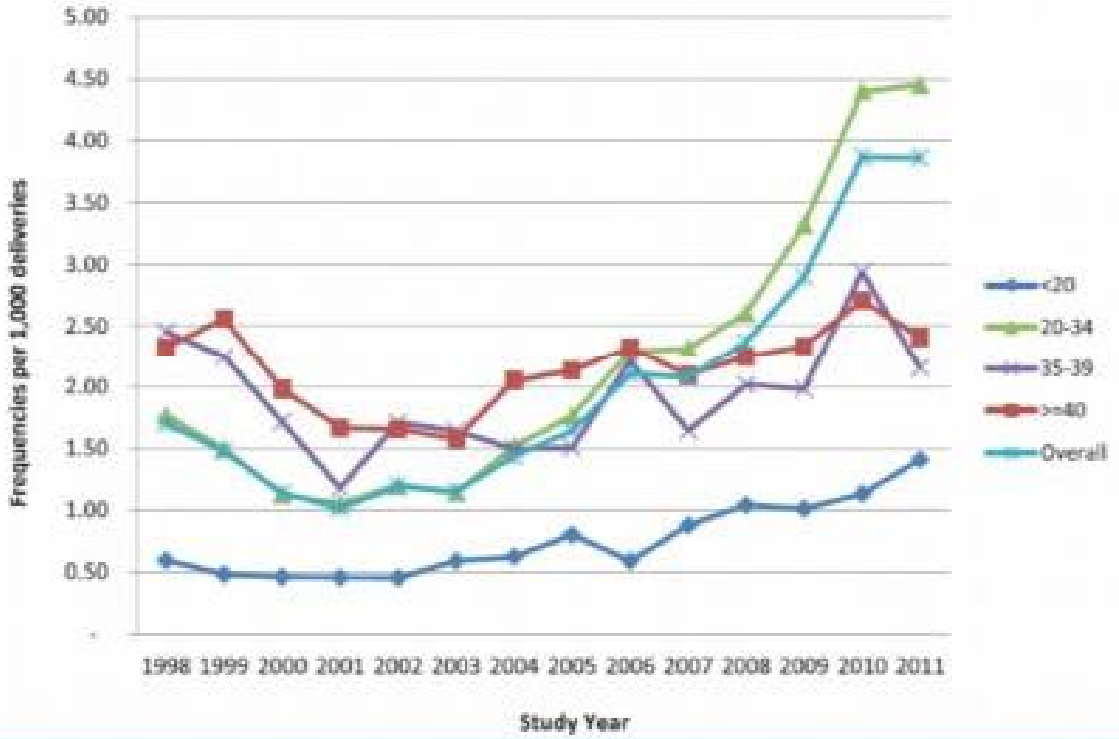
OBJECTIVES

- Impact of Opioid abuse Epidemic on pregnant population in USA.
- Neonatal Abstinence Syndrome epidemiology, demographics pathophysiology, clinical presentations and diagnosis.
- Pharmacologic and non-pharmacologic therapies.
  NASTOP program at Rutgers/NJMS/UHNJ.
- Follow up, outcome of the newborn infants with Neonatal Abstinence Syndrome.

- **Financial Disclosure:**

  None

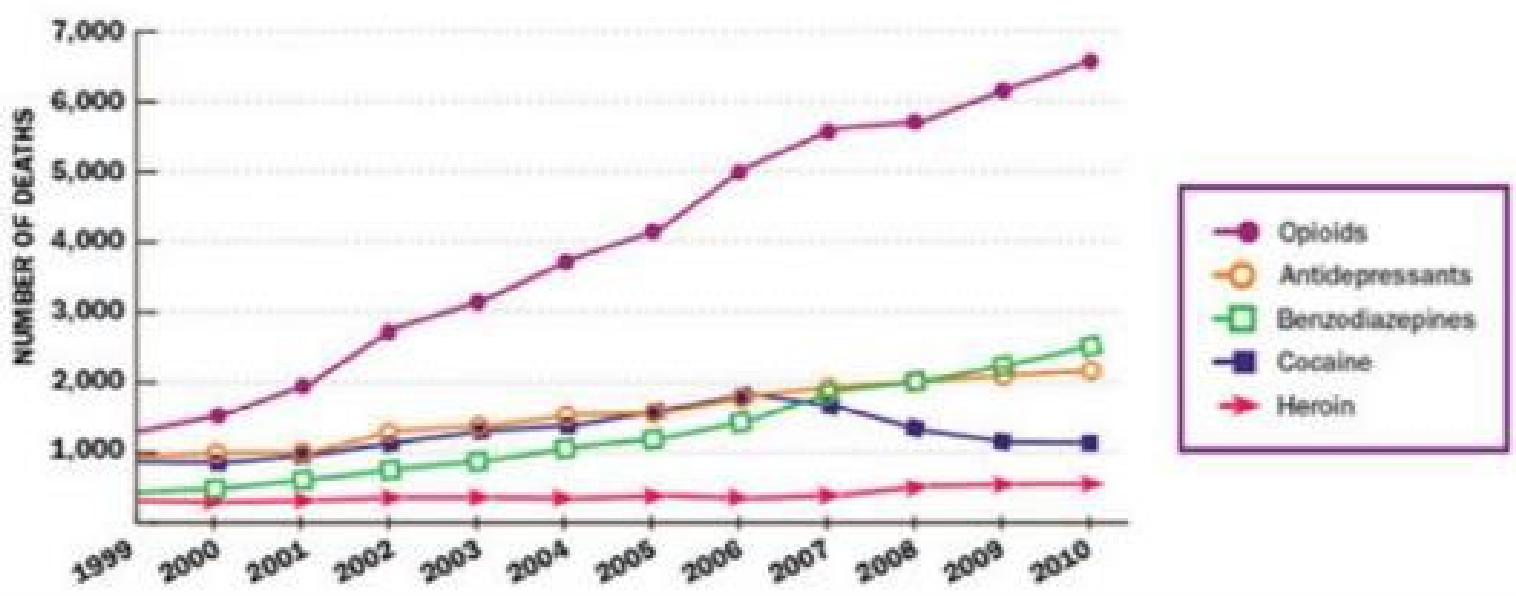
Opioid Abuse and Dependence Among Pregnant Women



Opioid abuse or dependence per 1,000 deliveries, overall and by age in the U.S., 1998–2011

Maeda A, Bateman BT, Clancy CR, et al. *Anesthesiology*. 2014 Dec;121(6):1158-65.

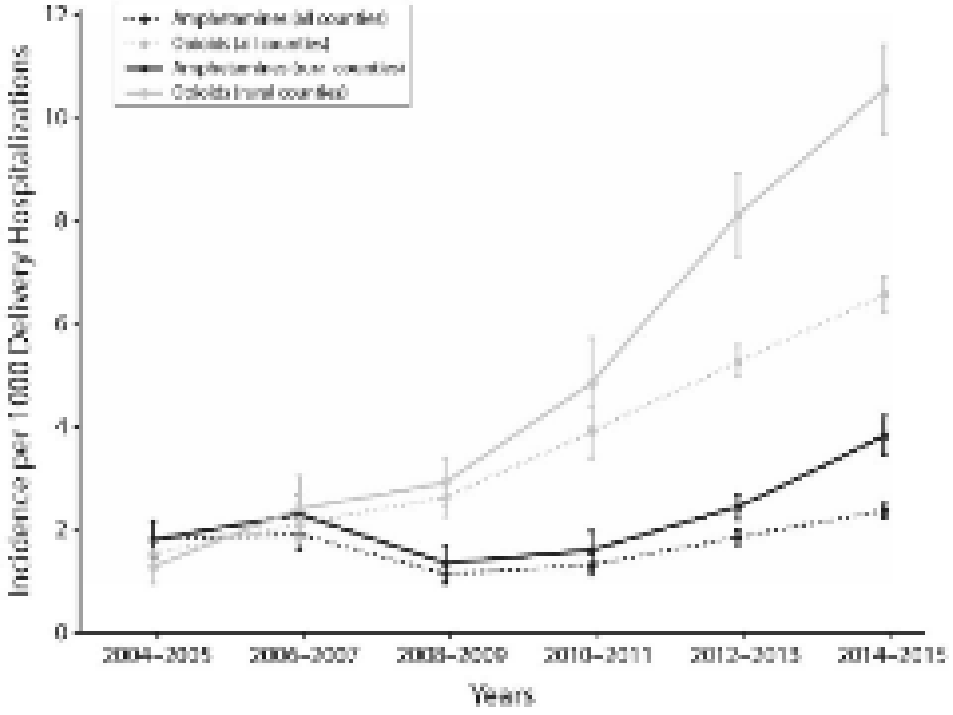
Drug Overdose Deaths Among Women



cdc.gov/vitalsigns/prescriptionpainkilleroverdoses/index.html

Drug Abuse Among Pregnant Women

INCIDENCE OF OPIOID AND AMPHETAMINE RELATED DELIVERIES (US, 2004-2015)



- Increased disproportionately across rural compared with urban counties in 3 of 4 census regions between 2008 to 2009 and 2014 to 2015
- Amphetamine-related deliveries were associated with higher incidence of **preeclampsia, preterm delivery, and severe maternal morbidity and mortality**

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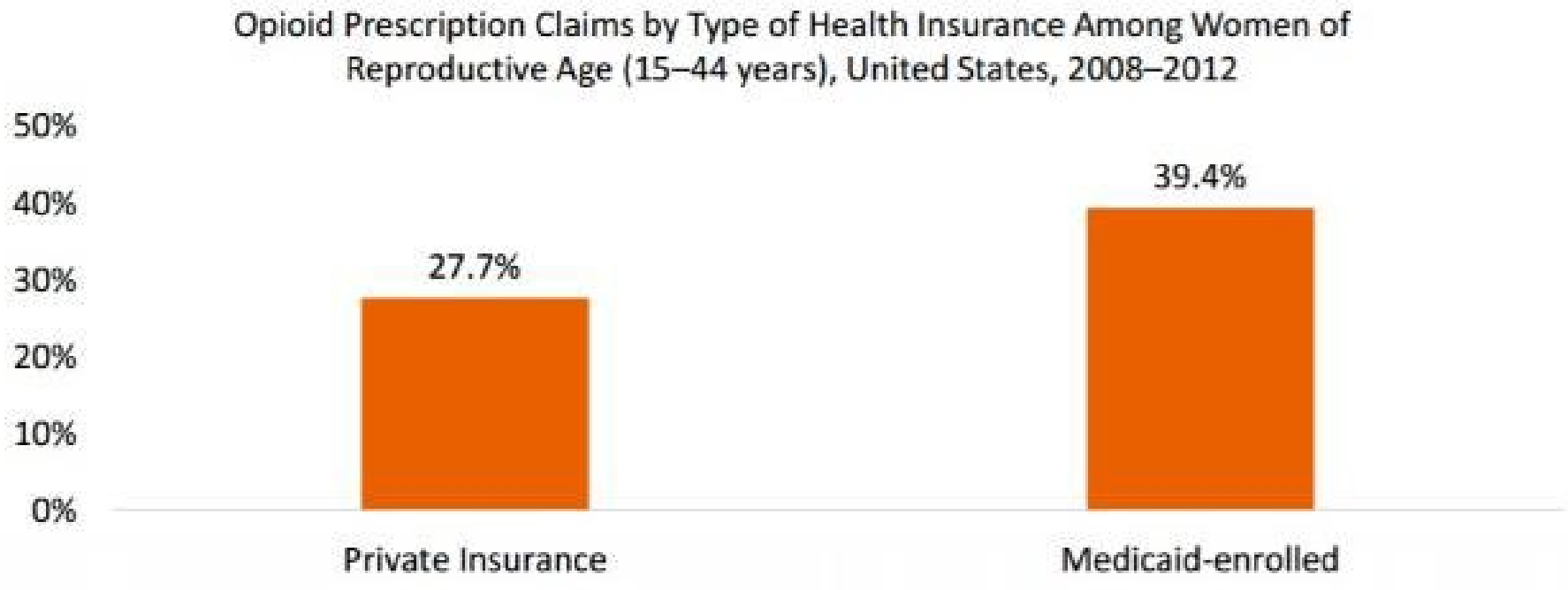
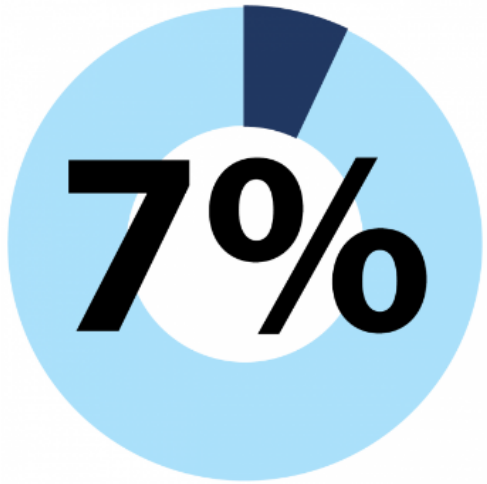
Admon et al, AJPH, 2019;109:148–154.

Prescribing of Opioids to Women of Reproductive Age



Ailes EC, Dawson AL, Lind JN, et al. *MMWR*. 2015 Jan 23;64(2):37-41.

Data from CDC's Pregnancy Risk Assessment Monitoring System (PRAMS) and two additional maternal and infant health surveys examined self-reported prescription opioid use during pregnancy.



of women reported using prescription opioids during pregnancy.

Among these women:

32 percent reported not being counseled by a healthcare provider about the potential effects of prescription opioid use on a baby.

One in five reported misuse of prescription opioids, defined as getting them from a non-healthcare source or using for a reason other than to relieve pain.

27 percent wanted to cut down or stop using.

Impacts of Maternal Substance Use

- Maternal mortality
- Poor obstetric outcomes
- Malnourishment
- Interpersonal violence
- Other health-related social needs

- Preterm birth
- Low birth weight
- A collection of withdrawal symptoms called neonatal abstinence syndrome (NAS)

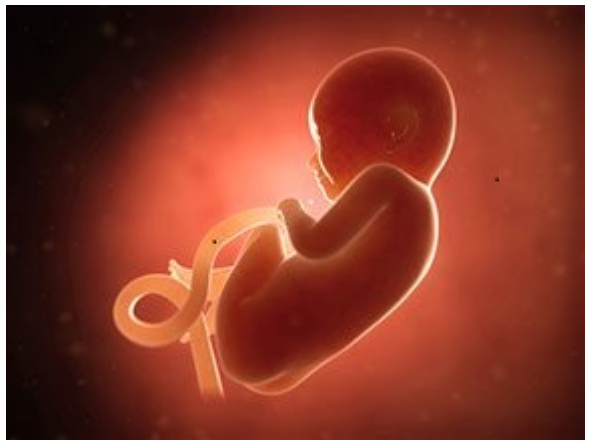
MATERNAL COMPLICATIONS

- Poor prenatal care
- Preterm delivery
- Spontaneous abortion
- Prenatal death
- Abruptio placentae
- PPROM
- Breech presentation
- Intrapartum analgesia
- STD's
- Extrauterine pregnancy
- Malnutrition
- IUGR
- Psychiatric problems
- PIH
- Outside delivery
- Uterine rupture
- Systemic complications

** arrhythmia, seizures, sudden death, multi organ failure, hypertension, ischemic visceral damage.

NEONATAL COMPLICATIONS

- Prematurity
- Perinatal depression
- Growth retardation
- Infection
- Ischemic organ injury
- Hypertension
- Arrhythmia
- Seizures
- SIDS
- Poor state control
- Congenital anomaly
- At risk for future abuse and neglect
- **NAS**



Neonatal Abstinence Syndrome

- NAS are signs and symptoms in the Newborn infant that results from sudden discontinuation of fetal exposure to substances that were USED or ABUSED by the mother during pregnancy

- Substances may be LICIT or ILLICIT

Exposures Associated with NAS

- **Most commonly attributed to exposure to opioids**
  - Pain relievers: Vicodin®, OxyContin®, Percocet®
  - Illicit substances: Heroin
  - Opioid maintenance therapy: Methadone, buprenorphine
    - Maintenance therapy: Long-term treatment for opioid use disorder, under medical supervision, with a longer-acting but less euphoric opioid
    - Recommended by ACOG during pregnancy
- **Cocaine, amphetamines, and barbiturates have also been implicated**

ACOG: American College of Obstetricians and Gynecologists

ACOG Committee on Health Care for Underserved Women, American Society of Addiction Medicine. *Obstet Gynecol.* 2012 May;119(5):1070-6.

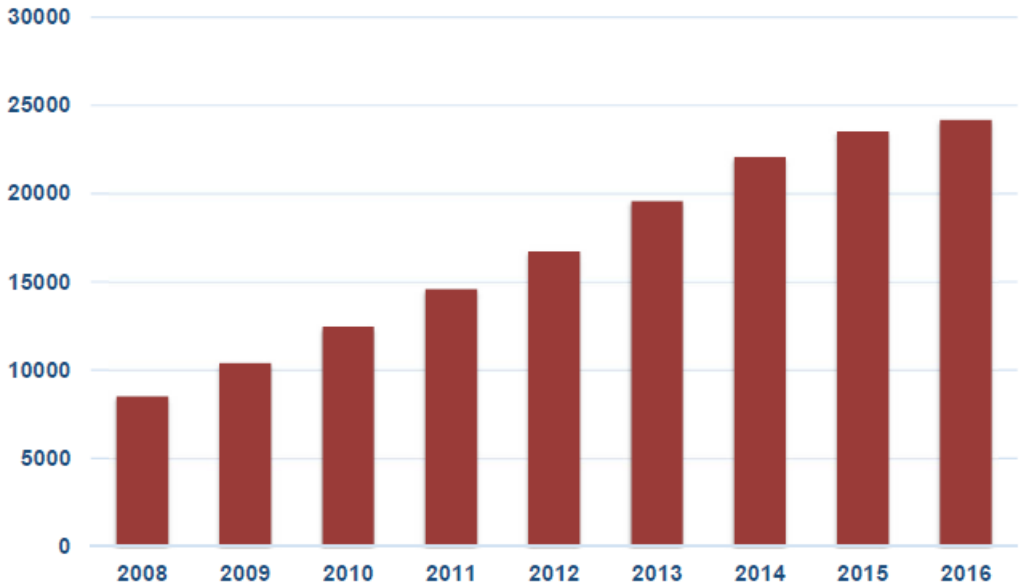
In 2019 …1 baby was born with NAS every 15 minutes

CDC(MMWR) January 11- 2019

Increase in Affected Infants

- 2,920 in the year 2000
- 21,732 in the year 2012
- In 2012, one infant with NAS was born every 25 minutes

NEWBORN VICTIMS OF THE OPIOID EPIDEMIC



Source: AHRQ HCUP State Inpatient Databases

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Outcomes in the fetus

- Growth restriction
- Prematurity
- Death

Outcomes in the Newborn

- Low birthweight
- Small head circumference
- Neonatal abstinence syndrome

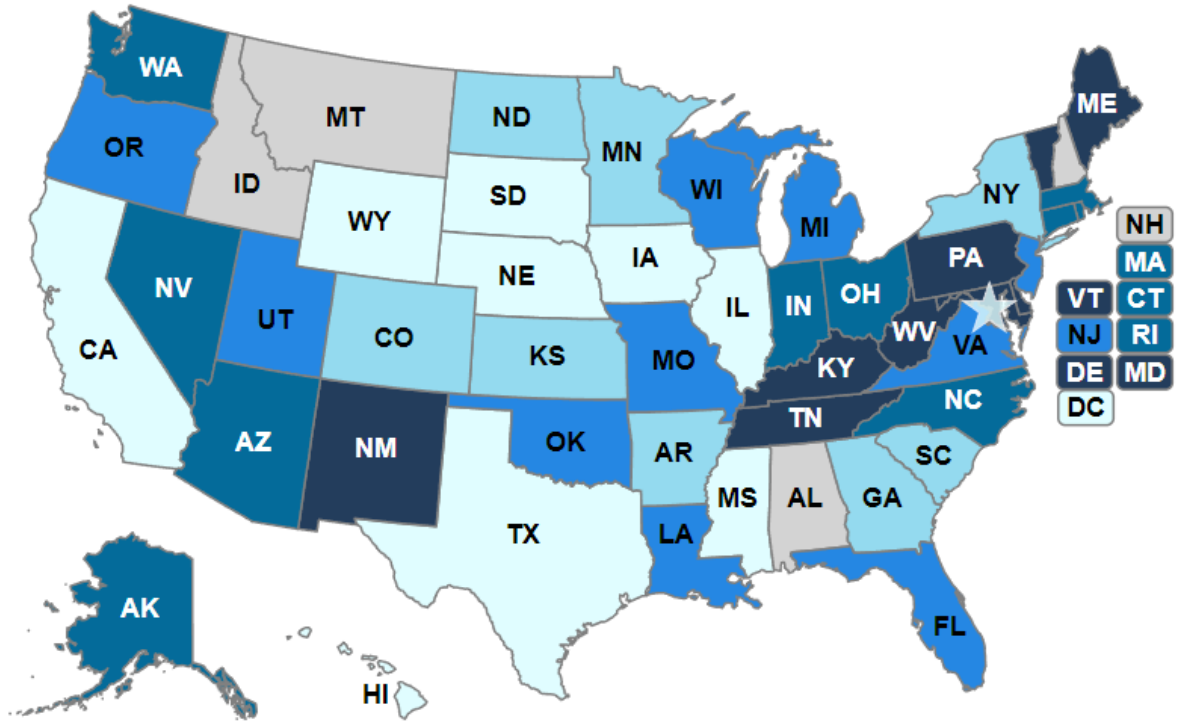
Outcomes in the Child

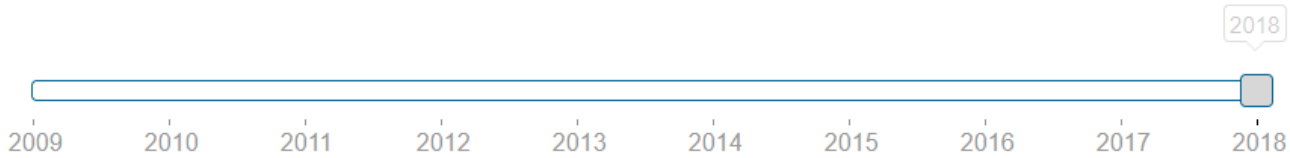
- Developmental disorders

McQueen, NEJM 2016

Rate of NAS per 1,000 Newborn Hospitalizations

2018 National rate: 6.8





No Data	< 3.3	3.3 - 5.4	5.5 - 7.6	7.7 - 12.8	> 12.8

States are classified into five categories which were defined based on an equal grouping of States in 2016.
Data Notes & Methods and Data Export options are available within the data exploration tool.

NJ Health
New Jersey Department of Health

addictive substances while in the womb. NAS usually appears within 48–72 hours of birth, when the babies begin to suffer withdrawal. Common symptoms include low birth weight, tremors, high-pitched, continuous crying, feeding difficulties, vomiting and fever.

Opioid exposure during pregnancy might result from a mother's physician-approved use of prescription opioids for pain relief, from misuse of prescription opioids, from illicit opioid use (e.g.,heroin), or medication-assisted treatment of opioid use disorder. The most common opiate drugs that are associated with NAS are heroin, codeine, oxycodone (oxycontin), methadone and buprenorphine.

Note: For confidentiality purposes, the number of NAS cases have been suppressed (grey areas on map) if there were less than 5 in a county.

There is no standard case definition for identifying NAS cases using diagnosis codes. The counts may change as the definition becomes finalized. NAS cases were identified using ICD-9-CM code 779.5 or ICD-10-CM code P96.1.

Neonatal Abstinence Syndrome (NAS) in New Jersey

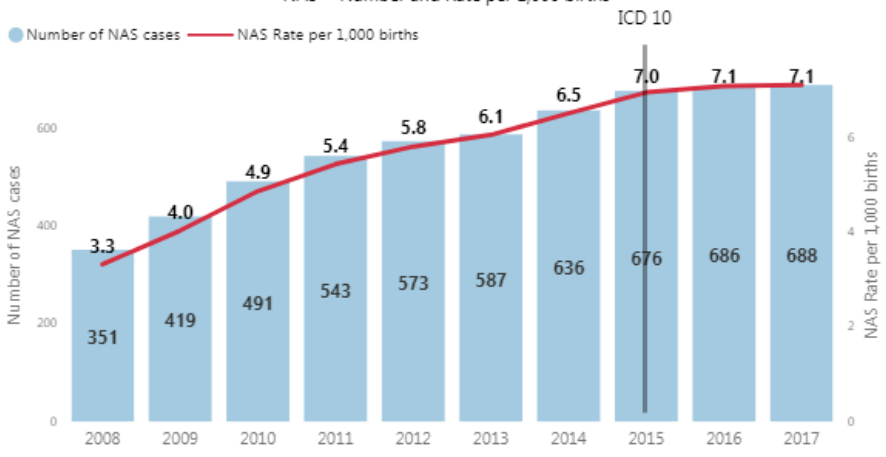
Clear Filters

Year
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017

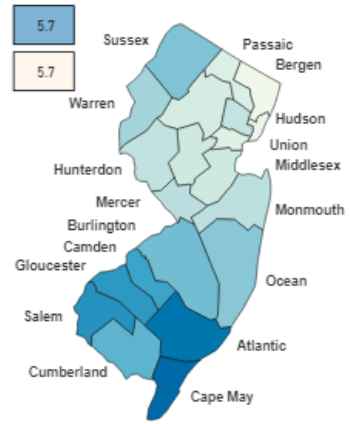
Patient County: All

Payer Type: All

NAS - Number and Rate per 1,000 births

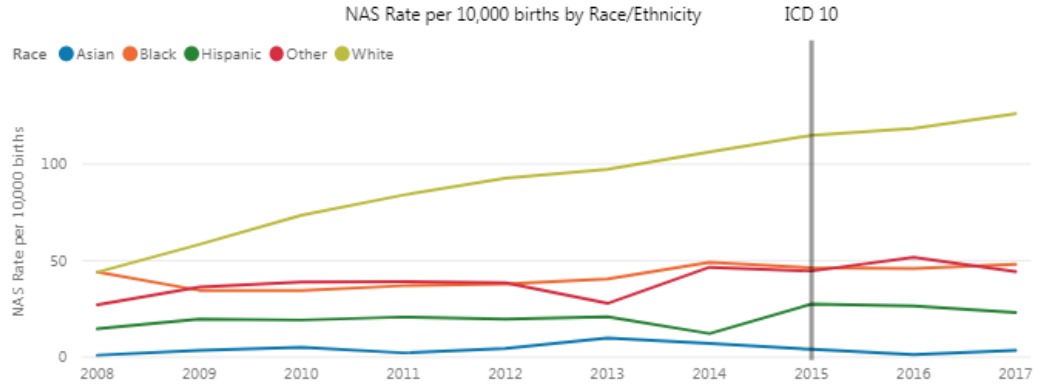


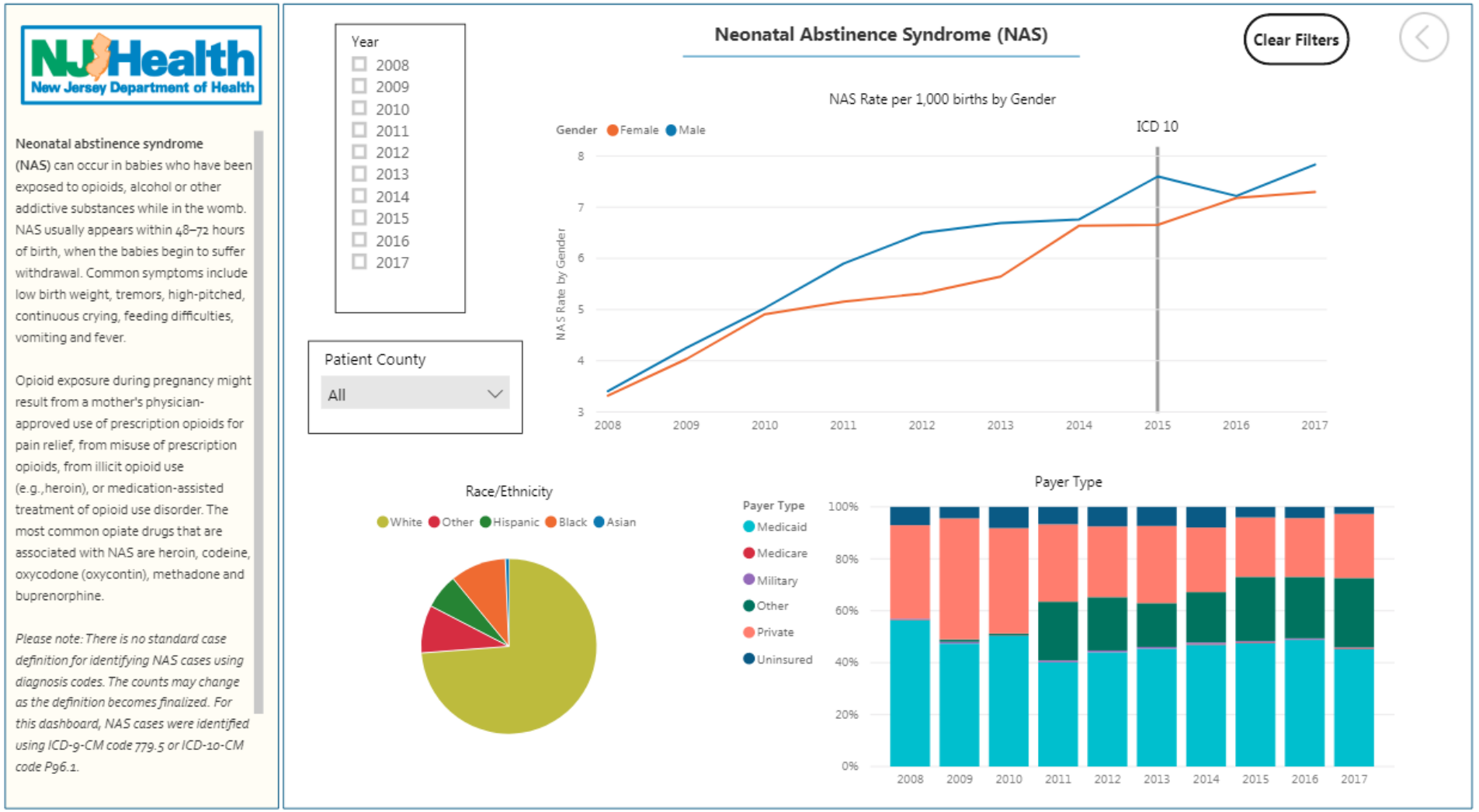
NAS Rate per 1,000 births



Gender

NAS Rate per 10,000 births by Race/Ethnicity




NJ Health
New Jersey Department of Health
Neonatal abstinence syndrome (NAS) can occur in babies who have been exposed to opioids, alcohol or other addictive substances while in the womb. NAS usually appears within 48–72 hours of birth, when the babies begin to suffer withdrawal. Common symptoms include low birth weight, tremors, high-pitched, continuous crying, feeding difficulties, vomiting and fever.
Opioid exposure during pregnancy might result from a mother's physician-approved use of prescription opioids for pain relief, from misuse of prescription opioids, from illicit opioid use (e.g.,heroin), or medication-assisted treatment of opioid use disorder. The most common opiate drugs that are associated with NAS are heroin, codeine, oxycodone (oxycontin), methadone and buprenorphine.
Please note: There is no standard case definition for identifying NAS cases using diagnosis codes. The counts may change as the definition becomes finalized. For this dashboard, NAS cases were identified using ICD-9-CM code 779.5 or ICD-10-CM code P96.1.
Year
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Patient County
All
Neonatal Abstinence Syndrome (NAS)
Clear Filters
NAS Rate per 1,000 births by Gender
Gender Female Male
ICD 10
NAS Rate by Gender
Race/Ethnicity
White Other Hispanic Black Asian
Payer Type
Payer Type
Medicaid
Medicare
Military
Other
Private
Uninsured

Coding for Intrauterine Substance Exposure and Neonatal Abstinence Syndrome. NO ICD CODE FOR NAS

Neuroactive Substance	ICD-10 Diagnostic Codes* for Newborns with "Exposure" to Substances
Opiates: Buprenorphine, Codeine, Fentanyl, Heroin, Methadone, Morphine, Meperidine, Pentazocine	**P04.14: Newborn affected by maternal use of opiates**
Neurontin (Gabapentin)	P04.13: Newborn affected by maternal use of anticonvulsants
SSRIs and anti-depressants	P04.15: Newborn affected by maternal use of antidepressants
Adderall, methamphetamine	P04.16: Newborn affected by maternal use of amphetamines
Barbiturates, Diazepam, lorazepam, Chlordiazepoxide	P04.17: Newborn affected by maternal use of sedative-hypnotics
Tobacco	P04.2: Newborn affected by maternal use of tobacco
Alcohol	P04.3: Newborn affected by maternal use of alcohol
Cocaine	P04.41: Newborn affected by maternal use of cocaine
Phencyclidine	P04.42: Newborn affected by maternal use of hallucinogens
Other Drugs	P04.49: Newborn affected by maternal use of other drugs of addiction *Note: there are other P04.* codes available. Please determine if a more specific code is more applicable prior to assigning this code
Marijuana, THC	P04.81: Newborn affected by maternal use of cannabis
Neonatal withdrawal (NAS)	**ICD-10 Diagnostic Code* for Newborns with Withdrawal**
	P96.1 – Neonatal Withdrawal symptoms from maternal use of drugs of addiction

What is Neonatal Abstinence Syndrome (NAS)?

- **Drug withdrawal syndrome that occurs primarily among opioid-exposed infants shortly after birth**

- **Withdrawal symptoms most commonly occur 48–72 hours after birth**
  - Tremors, hyperactive reflexes, seizures
  - Excessive or high-pitched crying, irritability, yawning, stuffy nose, sneezing, sleep disturbances
  - Poor feeding and sucking, vomiting, loose stools, dehydration, poor weight gain
  - Increased sweating, temperature instability, fever

Hudak ML, Tan RC, Committee on Drugs, et al. *Pediatrics.* 2012;129;e540-60.

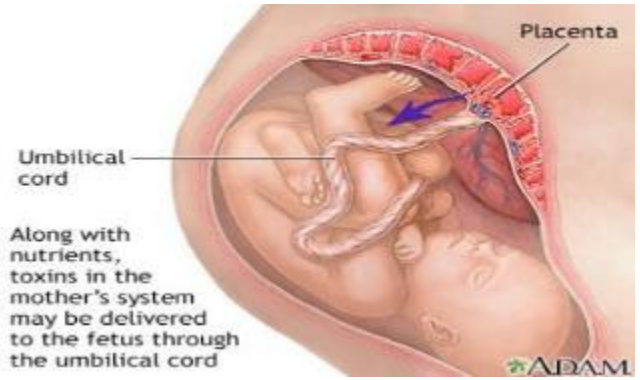
Mechanism of Neonatal Drug Withdrawal

- Opiates can easily cross the placenta
- Placental permeability increases with gestation and poly substance abuse
- Opiates has prolonged half life in fetus
- Opiates can easily cross the fetal blood brain barrier
- Placenta is more permeable to synthetic than semi synthetic Opiates
- The pathophysiology of opioid withdrawal is more complex in neonates because of immature neurologic development, impaired neurologic processing and complex

  Maternal-Fetal-Placental pharmacokinetics

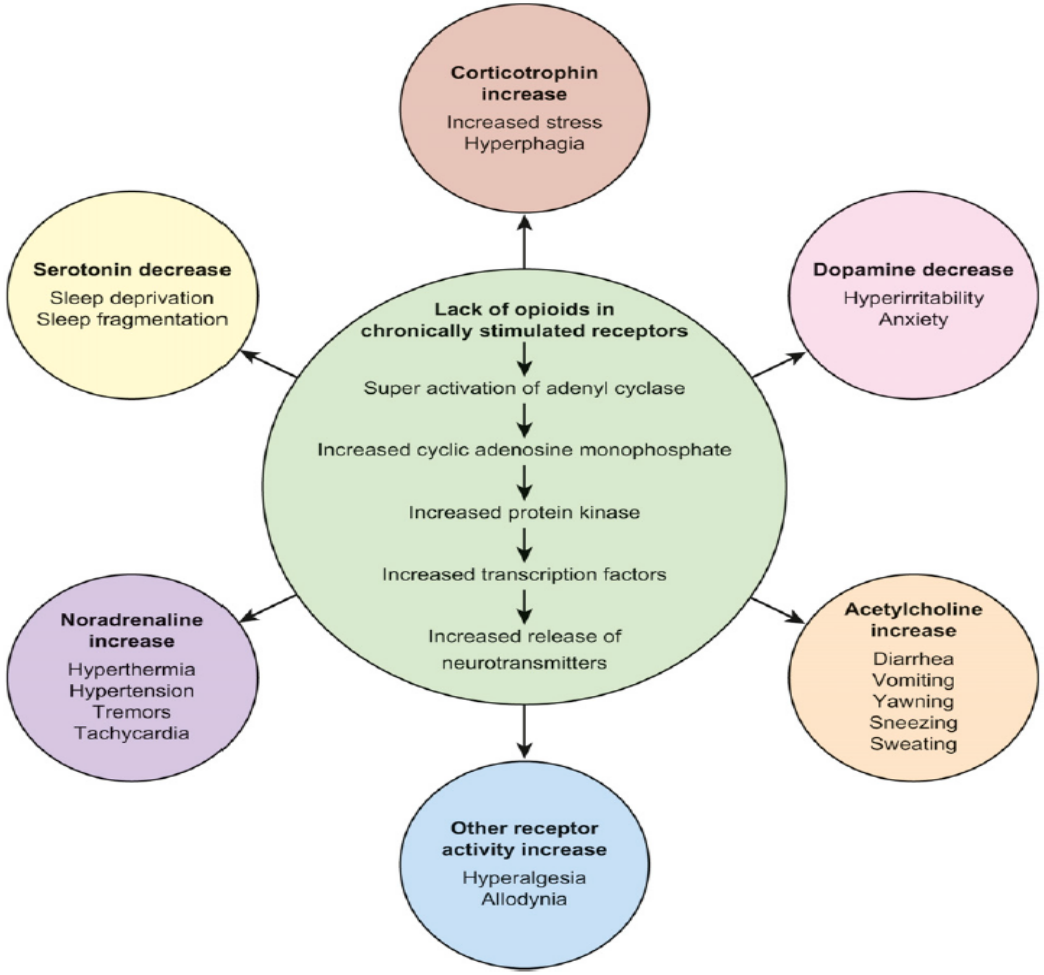
Mechanism of Neonatal Drug Withdrawal in Preterm Neonates

- Lower incidence and severity of withdrawal in preterm neonates.
- Shorter gestation decreased cumulative exposure
- Decreased transmission due to low placental permeability
- Decreased morphine clearance and excretion because of immaturity of the kidneys and liver
- Decreased fatty tissues in preterm infants (methadone is accumulated in fatty tissue)
- Decreased receptor development and decreased receptor sensitivity.



Mechanism of Neonatal Drug Withdrawal

- After birth lack of opioids in a chronically stimulated fetus increases activity in the opioid receptors, affecting the production of neurotransmitters through a cascade of events.



Adapted from Pediatrics vol 134, number 2 Aug 2014

TABLE 1 Onset, Duration, and Frequency of NAS Caused by Various Substances

Drug	Onset, h	Frequency, %	Duration, d
Opioids			
Heroin	24–48	40–80[27]	8–10
Methadone	48–72	13–94[37]	Up to 30 or more
Buprenorphine	36–60	22–67[46,48]	Up to 28 or more
Prescription opioid medications	36–72	5–20[58,60]	10–30
Nonopioids			
SSRIs	24–48	20–30[64]	2–6
TCAs	24–48	20–50[64]	2–6
Methamphetamines	24	2–49[101]	7–10
Inhalants	24–48	48[70]	2–7

Kocherlakota. Pediatrics July 2014

Maternal Universal Screening

Number 711 *(Replaces Committee Opinion Number 524, May 2012, 2017.* ***Reaffirmed 2021****)*
Committee on Obstetric Practice
American Society of Addiction Medicine
The Society of Maternal–Fetal Medicine endorses this document. This Committee Opinion was developed by **the American College of Obstetricians and Gynecologists' Committee on Obstetric** Practice in collaboration with committee members Maria A. Mascola, MD, MPH; Ann E. Borders, MD, MSc, MPH; and the American Society of Addiction Medicine member Mishka Terplan, MD, MPH.

- **Early universal screening**, brief intervention (such as engaging the patient in a short conversation, providing feedback and advice), and referral for treatment of pregnant women with opioid use and opioid use disorder improve maternal and infant outcomes.

- Routine screening should rely on **validated screening tools**, such as questionnaires, including 4Ps, NIDA Quick Screen, and CRAFFT (for women 26 years or younger).

Published in final edited form as:
Addiction. 2019 September ; 114(9): 1683–1693. doi:10.1111/add.14651.

Accuracy of five self-report screening instruments for substance use in pregnancy

Steven J. Ondersma[1], **Grace Chang**[2], **Tiffany Blake-Lamb**[3], **Kathryn Gilstad-Hayden**[4], **John Orav**[5], **Jessica R. Beatty**[1], **Gregory L. Goyert**[6], **Kimberly A. Yonkers**[4,7]

Findings—Three hundred and fifteen of 1220 participants (26.3%) met reference standard criteria for positivity. The single-item screening questions from the NIDA Quick Screen showed high specificity (0.99) for all substances, but very poor sensitivity (0.10–0.27). The 5Ps showed high sensitivity (0.80–0.88) but low specificity (0.35–0.37). The CRAFFT, SURP-P and 5Ps had the highest area under the curve (AUC) for alcohol (0.67, 0.66 and 0.62, respectively), and the WIDUS had the highest AUC for illicit drugs and opioids (0.70 and 0.69, respectively). Performance of all instruments varied significantly with race, site and economic status.

Conclusions—Of five screening instruments for substance use in pregnancy tested (Substance Use Risk Profile—Pregnancy (SURP-P), CRAFFT, 5Ps, Wayne Indirect Drug Use Screener (WIDUS) and the National Institute on Drug Abuse (Quick Screen), none showed both high sensitivity and high specificity, and area under the curve was low for nearly all measures.

- Maternal Screening
  - History, Self Report
    - Unreliable, depends on patient and interviewer
    - Canadian Study
      - Neonatal urine testing indicates 27% of mothers did not admit to substances detected in the infant.
      - 24% of meconium screens detected additional substances other than what the mothers admitted to.

MATERNAL self reporting is UNRELIABLE

Targeted Toxicological screening VS **Universal** Toxicological screening

- Suspicion (Risk Factors)
  - Gravida 4 or more
  - No or late prenatal care
  - Previous children not living with mother
  - History of CPS involvement
  - Abruption
  - Physical injuries
  - History of chronic pain
  - STDs, Other risky behavior
  - Disorientation, confusion during interviews
- Maternal urine or hair testing

NEONATAL SCREENING

- Infant Screening
  - Urine Drug Screen
    - Detects recent exposure
  - Meconium Drug Screen
    - Detects prolonged or not recent exposure
      - Beyond 20 weeks gestation
    - Expanded opiate testing required to detect oxycodone, propoxyphene and methadone
    - May not be available
      - Early passage (fetal stress), limited or delayed passage (very preterm)
  - Universal Screening?
    - Regulations, privacy?

- Other tests
  - Umbilical cord tissue
    - Easy, noninvasive, quick, long window of exposure detection
    - Specialized testing
  - Neonatal hair
    - Present on the fetus after 6 months of gestation
    - Can be used during the first 3 months of life

	14 PANEL	13 PANEL	12 PANEL
Amphetamines	●	●	●
Cannabinoids	●	●	●
Cocaine	●	●	●
Opiates	●	●	●
Phencyclidine	●	●	●
Methadone	●	●	●
Barbiturates	●	●	●
Benzodiazepines	●	●	●
Propoxyphene	●	●	●
Oxycodone	●	●	●
Meperidine	●	●	●
Tramadol	●	●	●
Buprenorphine	●	●	
Fentanyl	●		

Add-Ons Available

- EtG (Direct Ethanol Biomarker)
- Designer Stimulants (Bath Salts)
- Cotinine

Add-Ons Available

- FAEE (Direct Ethanol Biomarker)

SIGNS OF DRUG WITHDRAWAL

- CNS dysfunction
  - High-pitched cry
  - Restlessness
  - Hyperactive reflexes
  - Jitteriness
  - Tremors
  - Hypertonia
  - Myoclonic Jerks
  - Seizure
- Metabolic and Vasomotor Disturbance
  - Sweating
  - Fever
  - Mottling
  - Yawning
- GI Dysfunction
  - Excessive Sucking
  - Poor Feeding
  - Hyperphagia
  - Vomiting
  - Loose Stools
  - Severe diaper rash
- Respiratory Symptoms
  - Sneezing
  - Nasal Flaring
  - Tachypnea
  - Apnea
- Other
  - Abrasions
  - Excoriations

ASSESSMENT OF DRUGWITHRAWAL

- Finnegan
  - Assessment of 21 common symptoms of NAS with weighted scores for each symptom
    - Pharmacotherapy after score of 8
    - Most commonly used form
  - Considered too complex by some
- Ostrea
  - 6 item simple scale (yes/no)
    - No guidelines for pharmacotherapy
  - Does not allow for summing of multiple symptoms
    - Little attention to autonomic symptoms. Focus on seizure control and adequate nutrition/growth.
      - "If he is laying there waving his hands around we give him flags to hold"
- Lipsitz
- Neonatal Withdrawal Inventory
- Neonatal Narcotic Withdrawal Index
- Neonatal Brazelton Neurobehavioral Scales (NBAS)
- Neonatal Network Neurobehavioral Scales (NNNS)

SYSTEMS	SIGNS AND SYMPTOMS	SCORE	AM 2	4	6	8	10	12	PM 2	4	6	8	10	12	DAILY WT.
CENTRAL NERVOUS SYSTEM DISTURBANCES	High Pitched Cry	2													
	Continuous High Pitched Cry	3													
	Sleeps < 1 Hour After Feeding	3													
	Sleeps < 2 Hours After Feeding	2													
	Hyperactive Moro Reflex	2													
	Markedly Hyperactive Moro Reflex	3													
	Mild Tremors Disturbed	2													
	Moderate Severe Tremors Disturbed	3													
	Mild Tremors Undisturbed	1													
	Moderate Severe Tremors Undisturbed	2													
	Increased Muscle Tone	2													
	Excoriation (specify area): _____	1													
	Myoclonic Jerks	3													
	Generalized Convulsions	3													
METABOLIC VASOMOTOR/ RESPIRATORY DISTURBANCES	Sweating	1													
	Fever < 101°F (39.3°C)	1													
	Fever > 101°F (39.3°C)	2													
	Frequent Yawning (> 3-4 times/interval)	1													
	Mottling	1													
	Nasal Stuffiness	1													
	Sneezing (> 3-4 times/interval)	1													
	Nasal Flaring	2													
	Respiratory Rate > 60/min	1													
	Respiration Rate > 60/min with Retractions	2													
GASTROINTESTINAL DISTURBANCES	Excessive Sucking	1													
	Poor Feeding	2													
	Regurgitation	2													
	Projectile Vomiting	3													
	Loose Stools	2													
	Watery Stools	3													
SUMMARY	TOTAL SCORE														
	SCORER'S INITIALS														
	STATUS OF THERAPY														

Adapted from Finnegan L. Neonatal abstinence syndrome: assessment and pharmacotherapy. Neonatal Therapy: An update, F.F. Rubaltelli and B. Granti, editors. Elsevier Science Publishers B.V. (Biomedical Division). 1986: 122-146

NAS Scoring Tools

- Original Finnegan- 32 items/scoring 1-5
    - Tx initiated for ≥ 8 on 3 consecutive scores
- Modified Finnegan- 21 items/scoring 1-5
    - Eliminated dehydration, levels of excoriation
    - General accepted treatment threshold:
        - ≥ 8 on 3 consecutive scores
        - ≥ 12 on 2 consecutive scores
    - Finnegan focuses on **symptom severity**

- Eat, Sleeps, Consoles Model
    - Focuses on **infant's function** (ability to eat, sleep or console related to NAS symptoms) and maximizing non-pharmacological care

Eat, Sleep, Console (ESC)

The tool is guided by the infant's clinical signs of withdrawal through evaluation of an infant's ability to eat ≥1oz or breastfeed well, sleep undisturbed ≥1 hour, and be consoled >10 minutes

If these criteria are not met, the medical team meets, assesses the environment and non pharmacologic approaches, and considers initiating or escalating pharmacotherapy.

ESC is appealing because of its ease of use and simplicity but has not been studied outside of quality improvement initiatives. It remains somewhat unclear, for example, if improvements in length of hospital stay are attributable to the ESC approach itself or to better adherence to nonpharmacologic approaches, which can also reduce length of stay.

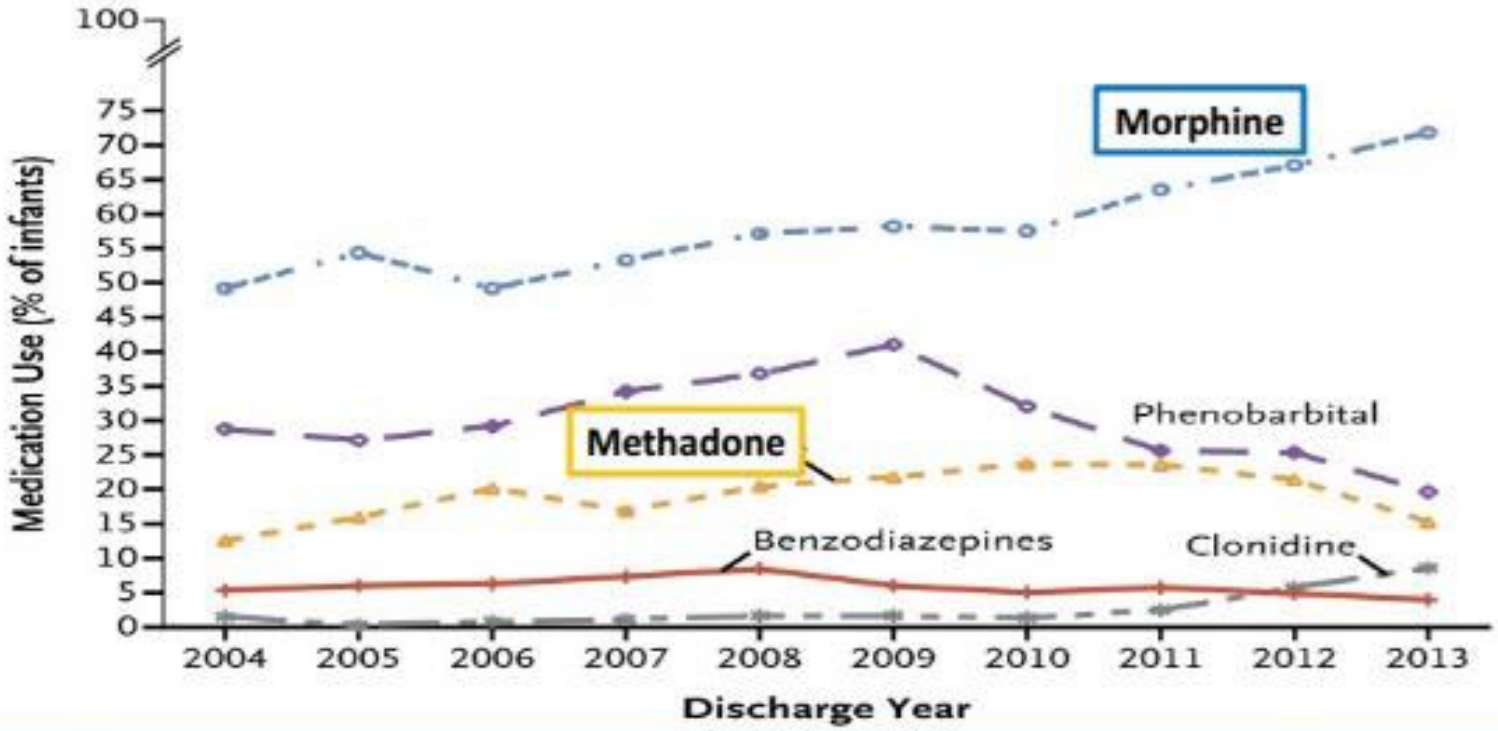
Which Tool is Right?

- Not necessarily a “right” tool.
- Key is consistent use and standard education of tool
- Use of a non-pharmacological bundle along with NAS tool is essential
- Correlation with patient data, exam and scoring trends are a must

- **MANAGEMENT**

- Goals
  - Treat with drug from same class as exposure
  - Minimize symptoms
  - Promote appropriate growth and weight gain
  - Promote care-taker:child interaction
- Concerns about multiple exposures and "therapeutic" sedation effects.
- Optimal regimen has not been established.
  - Considerable heterogeneity in the diagnosis and treatment.
- Only clearly defined benefit of pharmacologic treatment is the short-term amelioration of clinical signs.
  - Unknown if long-term morbidity is changed by pharmacotherapy.

Treatment Variation for NAS



Morphine and methadone are the recommended first-line treatment for infants with NAS

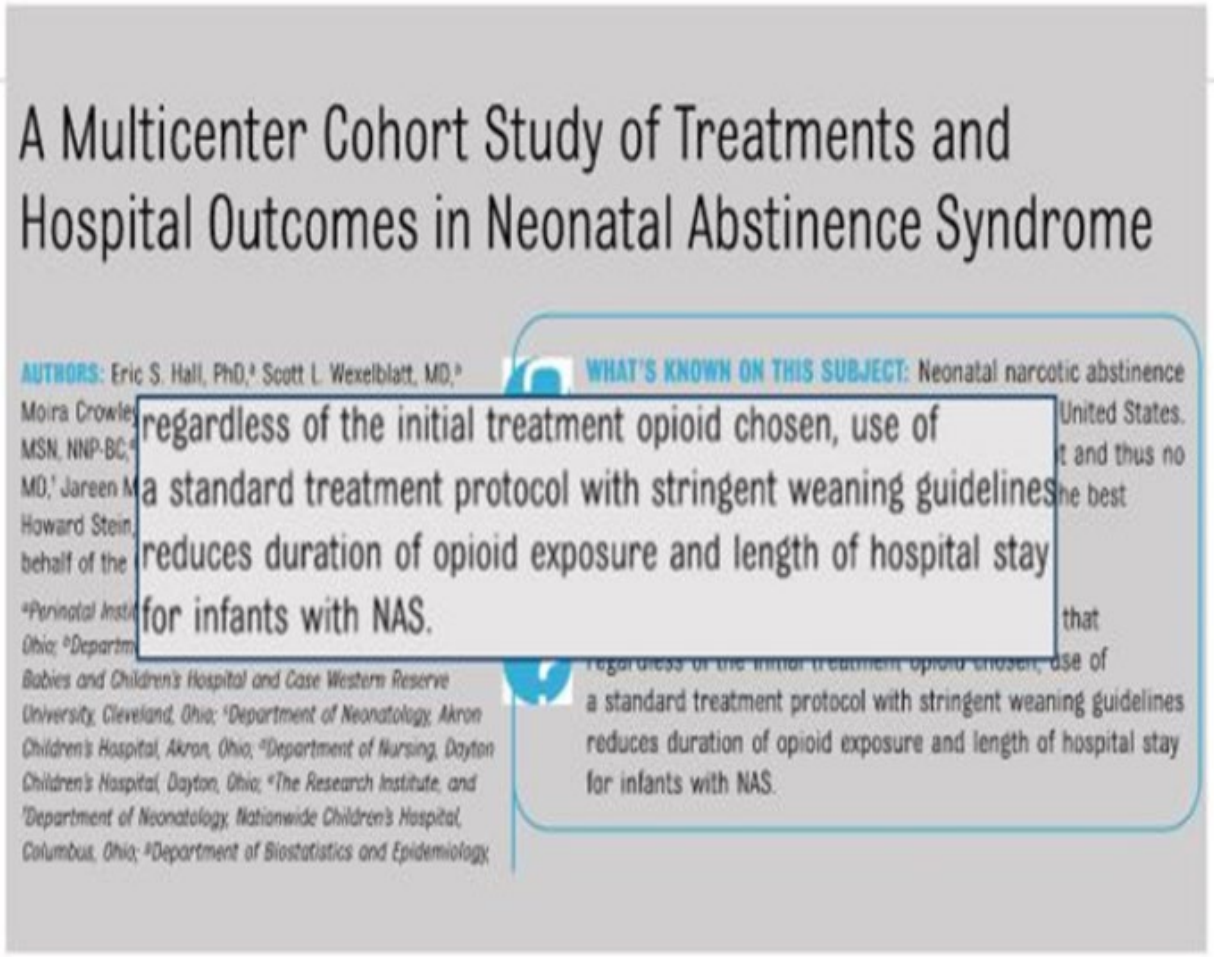
Tolia VN, Patrick SW, Bennett MM, et al. *N Engl J Med.* 2015 May 28;372(22):2118-26.

Buprenorphine vs Morphine – Kraft 2017

- Kraft WK, et al. Buprenorphine for the Treatment of the Neonatal Abstinence Syndrome. N Engl J Med. 2017 Jun 15;376(24):2341-2348.
- Randomized, blinded prospective trial.
- 63 total infants, 33 buprenorphine-treated and 30 morphine-treated.
- The median LOT was shorter with buprenorphine than with morphine (15 days vs. 28 days), as was the median length of hospital stay (21 days vs. 33 days) ($P<0.001$ for both comparisons).
- Adjunctive phenobarbital was administered in 15% in the buprenorphine group and in 23% in the morphine group ($P=0.36$).

Buprenorphine vs Methadone – Hall 2018

- Hall ES, et al. Comparison of Neonatal Abstinence Syndrome Treatment with Sublingual Buprenorphine versus Conventional Opioids. Am J Perinatol. 2018 Mar;35(4):405-412.
- Retrospective cohort analysis, single hospital
- 360 total infants (186 with traditional opioid and 174 with buprenorphine)
- Buprenorphine treated infants had a shorter LOT 7.4 (6.3-8.5) versus 10.4 (9.3-11.5) days ($p < 0.001$) and a shorter LOS of 12.4 (11.3-13.6) versus 15.2 (14.1-16.4) days ($p < 0.001$).



A Multicenter Cohort Study of Treatments and Hospital Outcomes in Neonatal Abstinence Syndrome

AUTHORS: Eric S. Hall, PhD,[a] Scott L. Wexelblatt, MD,[b]
Moira Crowley, MSN, NNP-BC,[c] MD,[d] Jareen M
Howard Stein,
behalf of the
[a]Perinatal Insti
Ohio; [b]Departm
Babies and Children's Hospital and Case Western Reserve University, Cleveland, Ohio; [c]Department of Neonatology, Akron Children's Hospital, Akron, Ohio; [d]Department of Nursing, Dayton Children's Hospital, Dayton, Ohio; [e]The Research Institute, and [f]Department of Neonatology, Nationwide Children's Hospital, Columbus, Ohio; [g]Department of Biostatistics and Epidemiology,

regardless of the initial treatment opioid chosen, use of a standard treatment protocol with stringent weaning guidelines reduces duration of opioid exposure and length of hospital stay for infants with NAS.

WHAT'S KNOWN ON THIS SUBJECT: Neonatal narcotic abstinence
United States.
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a standard treatment protocol with stringent weaning guidelines reduces duration of opioid exposure and length of hospital stay for infants with NAS.

Hall ES, Wexelblatt SL, Crowley M, et al. A multicenter cohort study of treatments and hospital outcomes in neonatal abstinence syndrome. Pediatrics 2014;134:e527-34.

Infants with NAS: Treatment and Costs

- **Exposed infants can require pharmacologic treatment (e.g. morphine, methadone, phenobarbital)**
  - 30%, 68%, and 91% of NAS infants required pharmacologic treatment in separate studies
- **Mean length of hospital stay: 23 days**
- **Mean hospital charge: $93,400 per infant**
- **Total cost: $1.5 billion**
  - Medicaid is 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.

Hospital Variability in NICU Care

- **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

NICU: Neonatal Intensive Care Unit

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

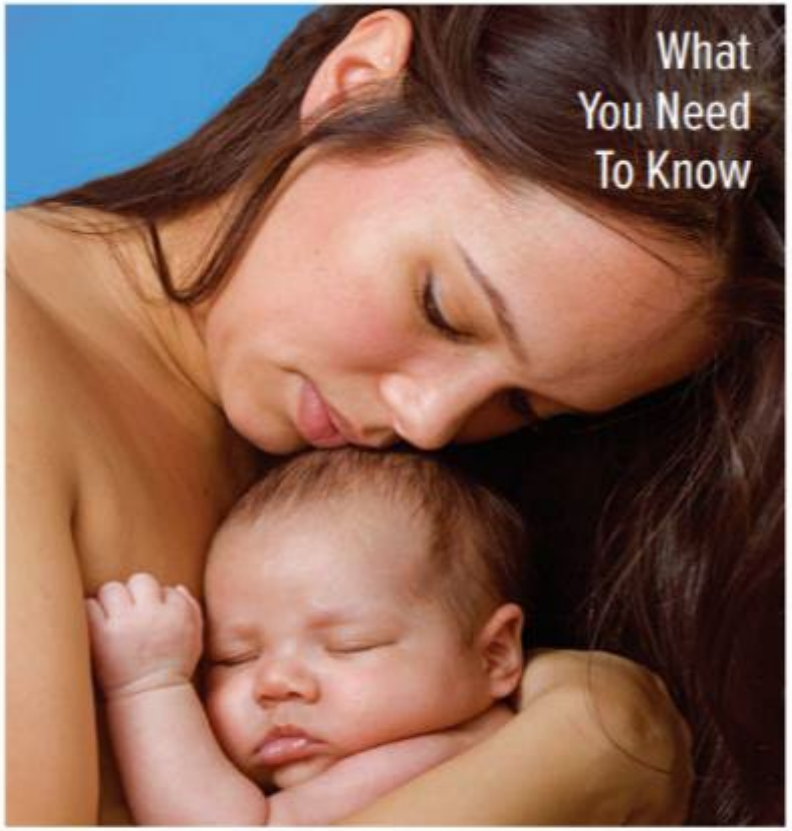
Standardizing Care Results in Shorter Treatment Courses and Hospital Stays

- **Ohio perinatal collaborative, multicenter cohort**
  - Weaning from opioids according to protocol vs. without a protocol results in shorter length of treatment
    (17.7 vs. 32.1 days, p<0.001)
- **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)
  - Hospitals with protocols or policies focused on infant symptom scoring had lowest length of stay
    - 3.1 days (95%CI –4.9, –1.4)

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).

University Hospital NASTOP For NAS Babies

NEONATAL ABSTINENCE SYNDROME (NAS)



Be with your baby.
You are the treatment!

NEW YORK STATE Department of Health | nyspQc Perinatal Quality Collaborative | Illinois Department of Public Health | ILPQC

1. **Hold your baby:** When your baby is fussy or upset, hold your baby. Your family can help, too.
2. **Practice these calming techniques:**
   - Swaddle or tightly wrap your baby in a blanket to help soothe him or her. Ask your nurses to show you how to swaddle your baby.
   - Offer a pacifier.
   - Try shushing.
   - Use slow, rhythmic, up-and-down movements.
3. **Feed on demand:** If you can, feed your baby breast milk. Feed your baby on demand by watching for signs your baby is hungry instead of the clock.
4. **Skin-to-skin:** Holding your baby skin-to-skin can help calm your baby. Be careful, though – avoid falling asleep while holding your baby. If you are feeling sleepy, place your baby on his or her back in a bassinet or crib close to your bed.
5. **Room-In:** Stay in the same room with your baby in the hospital if possible. This will help make sure you will be close by when your baby cries or is fussy, so you can hold and comfort your baby.
6. **Quiet room:** Keep the noise level as low as possible by limiting visitors, asking your family, friends and hospital staff to speak softly, keeping the TV volume low, and talking quietly on the phone.
7. **Dim the lights** in your room.
8. **Cluster care:** Ask your doctors and nurses to group their care visits together when possible to help limit disruptions for your baby.
9. **Medications:** Some babies with NAS require medication to help with their symptoms of withdrawal, to allow them to sleep, eat, and be comfortable.

NYSDOH and ILPQC gratefully acknowledge Boston Medical Center for its contributions to this brochure.

#0722 9/19

Reducing Length of Stay with Implementation of a Standardized NAS Protocol

Balaji Sutharsanam MD, Rohit Josyabhatla MD, Aayush Gabrani MD, Salma Ali MD

Introduction

Using a standardized NAS protocol has been shown to reduce length of stay, decrease hospital resource utilization and improve consistency of care between practitioners.

AIM:

To demonstrate that the implementation of a standardized NAS protocol reduces the length of pharmacological therapy in neonates

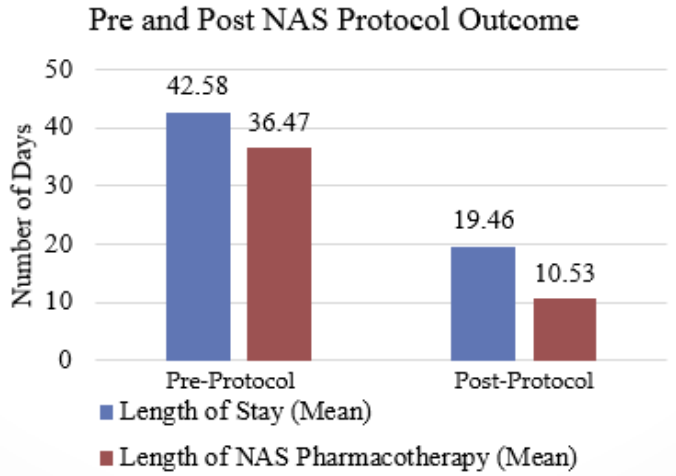
NAS Protocol Overview:

Non-Pharmacological Treatment	
Swaddling, Skin-to-Skin, Decreased Stimulation Breastfeeding, 22kcal Formula	
Pharmacological Treatment	
Initiation	Morphine PO; Finnegans scores >8 TWO times or >12 ONE time
Escalation	If scores 9-12 increase by 0.02mg/kg/dose; if >12 then increase by 0.04mg/kg/dose
Weaning	Wean every 24 hours by 10 percent of stabilization Morphine dose
Discharge	Discharge after 48 hours without Morphine

Results:

Characteristic	Pre-Protocol (n=19)	Post-Protocol (n=21)
Gestational Age (Mean)	38.87 weeks	38.06 weeks
Birthweight (Mean)	2828.47	3245.76
Number of Drugs Used by Mother (Mean)	1.68	1.14
Phenobarbital Used in Treatment	10 (.52)	3 (.14)
Mothers Who Used Methadone	9 (0.47)	10 (0.47)

Outcomes	Pre- Protocol n=19	Post-Protocol n=21	P-Value
Length of Stay (Mean)	42.58	19.46	0.02
Length of NAS Pharmacotherapy (Mean)	36.47	10.53	0.03



Discussion:

Implementing a standardized NAS protocol significantly reduced the mean length of stay and mean duration of pharmacological therapy in infants affected by NAS. These results are likely due to reduced variation between providers in their management of NAS. Non-pharmacological therapies were used on all infants diagnosed with NAS.

At University Hospital, Morphine is the drug of choice for all physicians but escalation, back slide and weaning of morphine vary between providers. This protocol provided definitive criteria for escalation and weaning of morphine. We also provided criteria for initiation of adjunct therapy (Phenobarbital). The results also demonstrate that there was a decrease in the use of phenobarbital. This protocol also empowered the nurses to reach out to physicians to implement timely management of care and to discuss the plan of care with the families as per protocol.

Insert references here

RUTGERS

Reducing Length of Stay with Implementation of a Standardized NASTOP Protocol

Balaji Sutharsanam MD, Rohit Josyabhatla MD, Aayush Gabrani MD, Salma Ali MD

Introduction

Using a standardized NASTOP protocol has been shown to reduce length of stay, decrease hospital resource utilization and improve consistency of care between practitioners.

Aim

To demonstrate that the implementation of a standardized NASTOP protocol reduces the length of pharmacological therapy in neonates

NASTOP Protocol Overview:

Non-Pharmacological Treatment

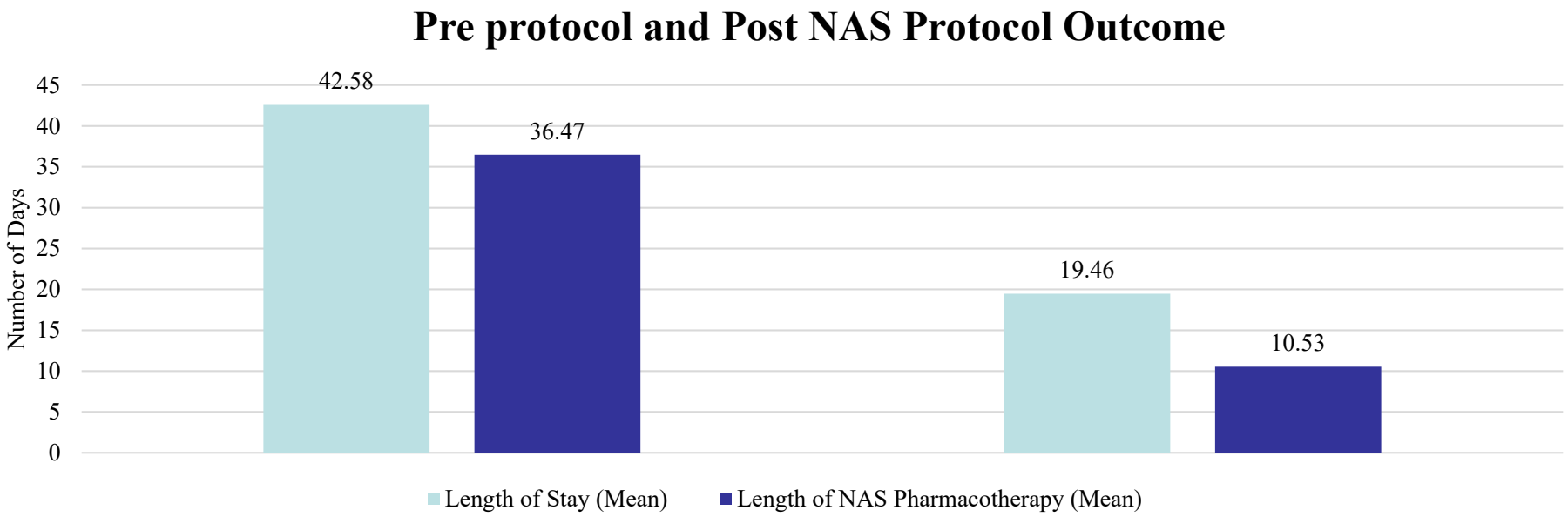
- Non-pharmacologic Interventions
- Rooming-in
- Parent/caregiver presence
- Holding by parent/caregiver/cuddler
- Skin to skin
- Safe swaddling
- Optimal feeding
- Quiet, low light environment
- Non-nutritive sucking
- Rhythmic movement
- Additional help
- Visitor limitation
- Clustering care
- Parent/caregiver self-care
- Cuddlers

NASTOP Protocol Overview

- **Pharmacological Treatment**
- **Initiation**
- Morphine PO;
- Finnegans scores >8 TWO times or >12 ONE time
- **Escalation**
- If scores 9-12 increase by 0.02mg/kg/dose; if >12 then increase by 0.04mg/kg/dose
- **Weaning**
- Wean every 24 hours by 10 percent of stabilization Morphine dose
- **Discharge**
- Discharge after 48 hours without Morphine

Results:

Outcomes	Pre- Protocol n=19	Post-Protocol n=21	P-Value
• Length of Stay (Mean)	• 42.58	• 19.46	• 0.02
• Length of NAS Pharmacotherapy (Mean)	• 36.47	• 10.53	• 0.03



Discussion:

- Implementing a standardized NASTOP protocol significantly reduced the mean length of stay and mean duration of pharmacological therapy in infants affected by NAS.
- These results are likely due to reduced variation between providers in their management of NAS.
- Non-pharmacological therapies were used on all infants diagnosed with NAS.
- At University Hospital, Morphine is the drug of choice for all physicians but **Escalation, Back slide and Weaning** of morphine vary between providers.
- This protocol provided definitive criteria for escalation, back slide and weaning of morphine.
- This protocol also provided criteria for initiation of adjunct therapy (Phenobarbital).
- The results also demonstrate that there was a decrease in the use of phenobarbital.
- This protocol also empowered the nurses to reach out to physicians to implement timely management of care and to discuss the plan of care with the families as per protocol.

Conclusions:

- Standardized, locally adaptable NAS treatment protocols such as NASTOP may reduce treatment duration, cost of hospitalization, and medication exposure while supporting equitable NAS care delivery.

- Pragmatic adaptation of evidence-based models is essential to improve outcomes across heterogeneous NICU environments.

- This outcome among infants managed by providers at University hospital with NASTOP treatment protocol was sustained over last few years for more than three PSDA cycles. Phenobarbital use decreased to zero during these cycles, reflecting timely morphine titration guided by protocol helps in reduction of polypharmacy.

Conclusions:

- NAS and Drug use in pregnancy is on the rise
- Up to 50% NICU beds are occupied for NAS babies
- $1.5 billion/year, $93000/admission cost
- Lack of standardized protocols for management of these mother and babies
- NAS signs occur from Day 3-7 unidentified babies, ER visits fever, seizures, dehydration, SIDS, expansive work up, CT, MRI LP
- Demographics white, urban and suburban, insured
- UH study decrease LOT from 36-10 days
- Aim to share UH experience at HOSPITAL, SYSTEM AND STATE LEVEL

Goal: Standardization of process

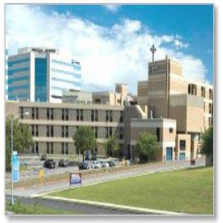
- Develop and implement a standardized process for identification, treatment and management of an infant with NAS.
- Standardization of toxicology screening criteria for both mother and baby.
- Standardization of scoring with modified Finnigan tool with improved consistency between providers by proper training.
- Standardization of protocol bundles breast feeding, rooming in, nonpharmacological and pharmacological treatment, nutritional support, discharge planning and long term developmental follow up care.
- Creating a culture of compassion, understanding and healing for mother infant dyad affected by NAS

GOAL:

If University Hospital can reduce the length of treatment from 38 days to 10 days, can this result be achieved by other systems?

Who Will Benefit?

Statewide Collaboratives



Health Systems

Hospital Teams & Individuals

VON Vermont Oxford NETWORK

OUTCOME

- Between 2007 and 2012 an estimated **21,000 pregnant women** annually abused opioids during their pregnancy
- **At least 2 million children** have a parent who uses illicit drugs, including opioids
- Children under 18 live in homes where householders are grandparents, other relatives or foster care, leading to increase risk of child abuse and neglect.
- Results in oppositional, defiant behavioral problems at school increased ADHD, PTSD referrals, suspensions or expulsions and life-time juvenile and adult criminal acts and drug abuse.

OUTCOME

- Poor scores in the areas of attention, memory, information processing, representational play, responsiveness and attachment
- Lower scores than the population means
- Presence of confounding variables
- Effect of cumulative risk factor
- Child-care giver interaction
- Intervention services targeting the cumulative risk factors

OUTCOME

- Increased risk of SIDS:
  - 3.7 times increased risk in methadone exposed infants
  - 2.3 times increased risk in cocaine exposed infants
    - Prolonged QT in adults, Sleep habits
- Increased Risk of Abuse
  - Substance abuse is a risk factor in 80% of child abuse cases.
  - No published data, but intuition suggests infants with NAS may be at higher risk
- Seizures:
  - 2-11% incidence of seizures in infants withdrawing from opiates*
  - Withdrawal associated seizures do not carry increased risk of poor outcome.

PUBLIC HEALTH INTERVENTIONS

- State role in public health response to NAS to decrease the number of babies affected
- What are the funding sources
- NAS as reportable disease, all exposures vs symptomatic
- Mandatory Prenatal screening, testing and treatment
- Neonatal screening, testing Universal vs Targeted
- Educational and Intervention Program, public and physicians
- Statewide enrollment in Quality Collaborative
- Guideline for Screening, Testing and Treatment

Thank You!

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Rutgers/NJMS/UHNJ

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Partnership for a Drug-Free New Jersey
In Cooperation with the Governor's Council on Substance Use Disorder and the NJ Dept. of Human Services

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