

Neonatal Abstinence Syndrome: A Multifaceted Approach to Infant/Family Care

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Disclosure

- We have no relevant financial relationships with the manufacturers(s) of any commercial products(s) and/or provider of commercial services discussed in this CME activity
- We do not intend to discuss an unapproved/investigative use of a commercial product/device in my presentation.

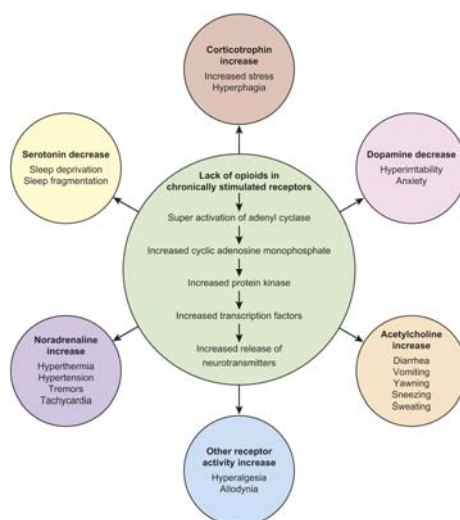


What is NAS?

- Infants born to mothers taking some medications during pregnancy may develop symptoms after delivery upon cessation of exposure
- These symptoms (neurological, gastrointestinal, respiratory) are a complex known as Neonatal Abstinence Syndrome (NAS)
- Neonatal withdrawal symptoms have been noted to occur following prenatal exposure to several drug classes:
 - Opioids
 - Benzodiazepines
 - Mood-stabilizing medications
 - Selective serotonin reuptake inhibitors
 - Nicotine

Kraft, W. Van Den Anker, J. (2012). Pharmacologic Management of the Opioid Neonatal Abstinence Syndrome, *Pediatr Clin N Am* 59, 1147 - 1165

A schematic illustration of the mechanism of opioid withdrawal in neonates.



Prabhakar Kocherlakota *Pediatrics* 2014;134:e547-e561

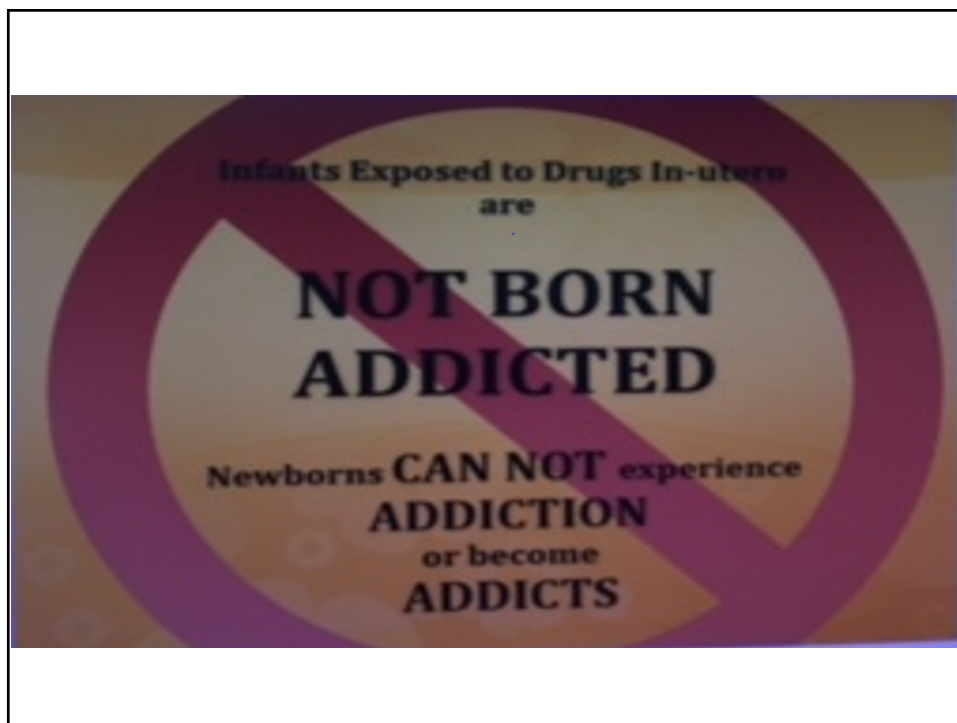
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Commentary on Reporting

- Babies should not be stigmatized as “addicts”
 - behavioral and compulsivity components do not apply
- They should be considered to be “drug-exposed”
- The phenomena of “tolerance” and “withdrawal” are normal physiologic responses to drug exposure and drug discontinuation

Slide adapted from Mark L. Hudak, MD
Improving Outcomes for Substance-Exposed Infants and Families
A Kansas Plan for Prevention and Intervention



Is NAS a Real Problem?

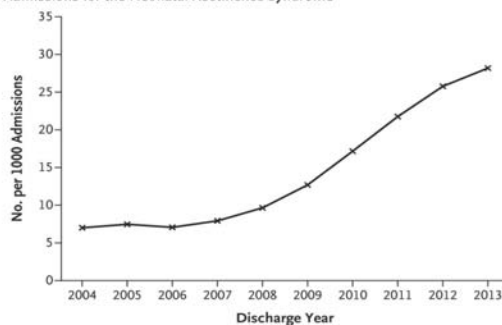
- Increase in the prevalence of NAS; varies by state and study
 - 1.2 - 5.9 per 1000 hospital births; 2000-2012
 - Patick, SW et al. J Perinatol 2015; 35:350-355
 - 7 - 27 per 1000 NICU admissions; 2004-2013
 - Tolia VN et al. N Engl J Med 2015;372:2118-2126 addresses a study of 299 clinical sites (making up 33 states)
- Local; 16 /1000 NICU admits, 2/1000 births; 80% increase over 5 years
- National Average LOS for NAS requiring tx ~ 19 days

A. Annualized Neonatal Intensive Care Unit (NICU) Admission Rates for Neonatal Abstinence Syndrome

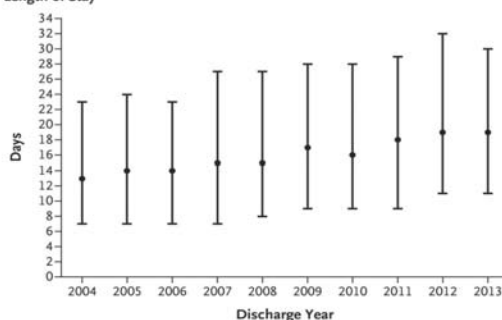
B. Median Length of Stay, According to Year. I bars in represent interquartile ranges

Tolia VN et al. N Engl J Med 2015;372:2118-2126.

A Admissions for the Neonatal Abstinence Syndrome



B Length of Stay

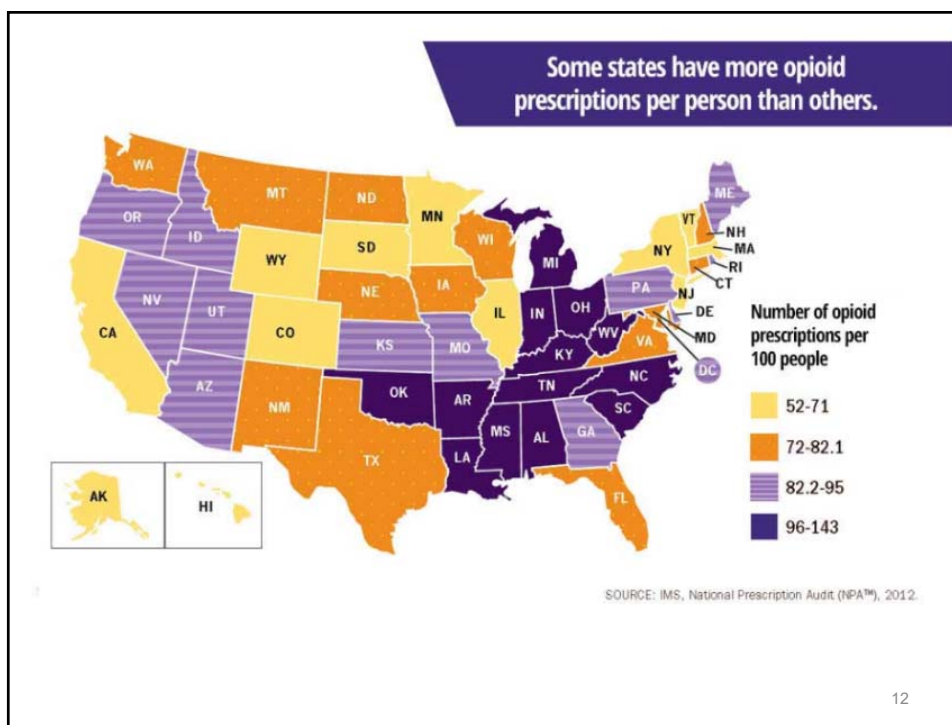
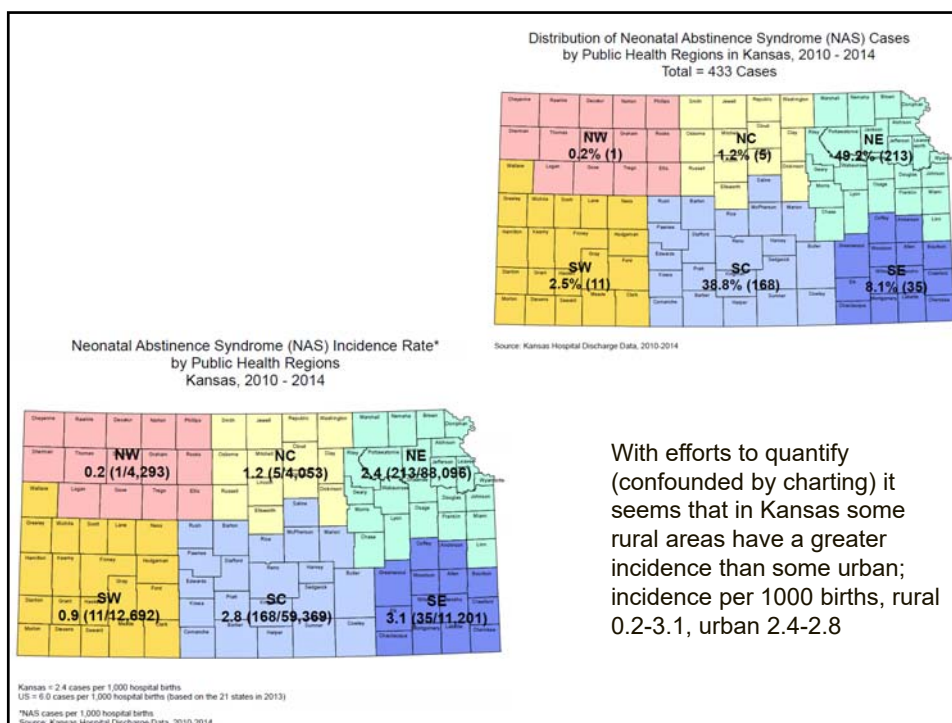


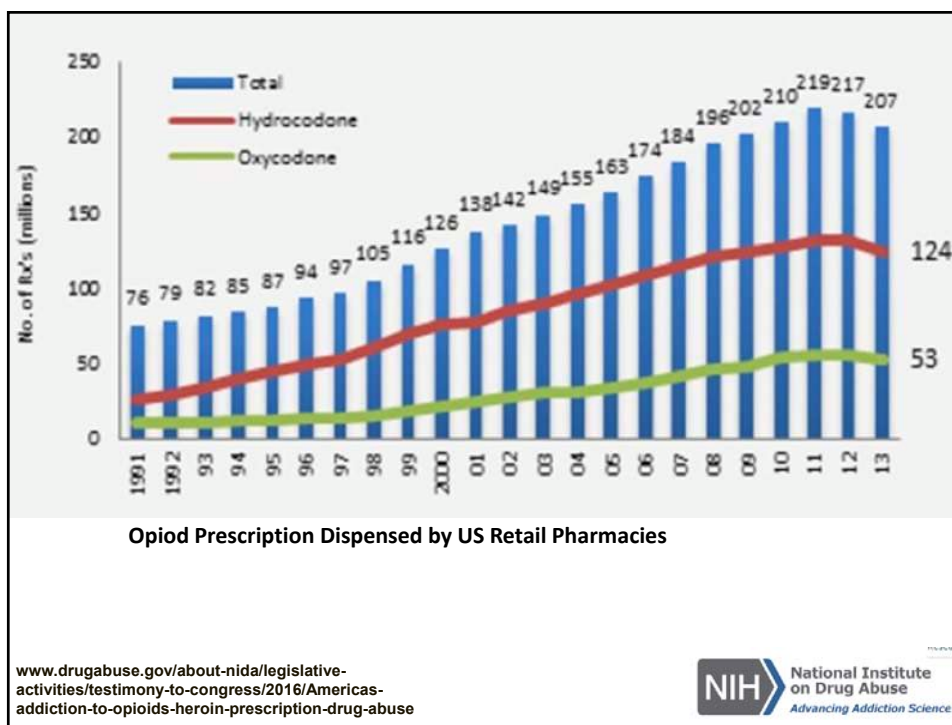
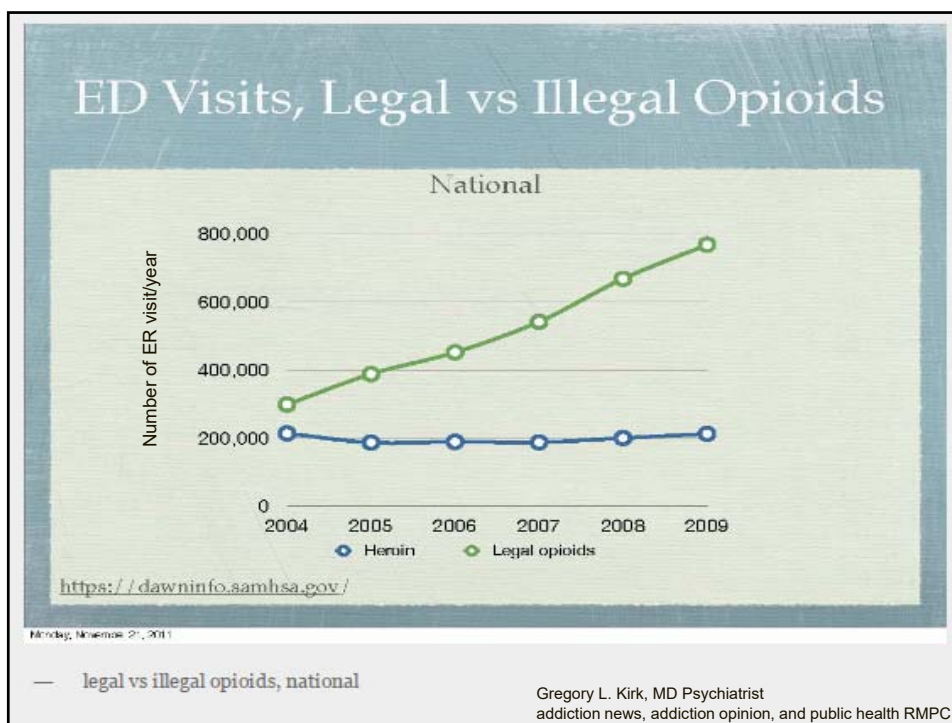
Increased Prevalence of Opioid Abuse Parallels Increased Incidence of NAS

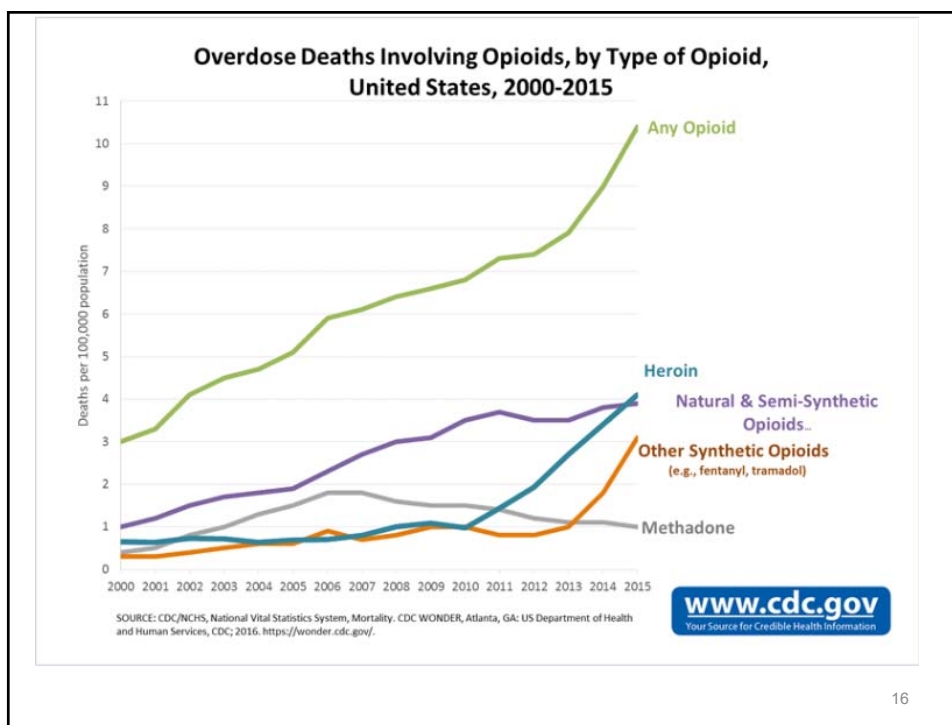
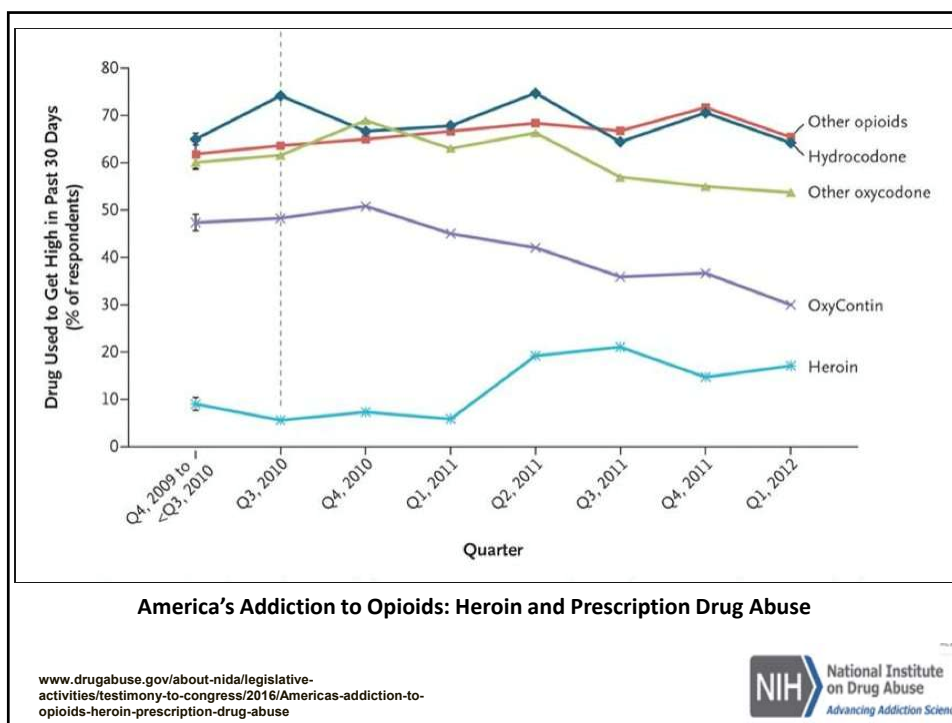
- **Illegal drugs**
- **Prescription drugs**
- **Populations merge**
 - People can illegally acquire prescription drugs
 - Start with prescription drugs and devolve to illegal drugs
 - Start with illegal drugs, and evolve to programs using prescription drugs
 - Methadone
 - Subutex/Suboxone (Buprenorphine)

Abuse of Prescription Drugs

- **Prescription drugs of abuse**
 - Opioids
 - Stimulants
 - Central nervous system (CNS) depressants
- **Factors contributing to severity of prescription drug crisis**
 - Drastic increase in the number of prescriptions written
 - Greater social acceptability for using medications
 - Aggressive marketing by pharmaceutical companies







How to Support Babies

- Not all babies exposed in utero will have NAS
- Caregiver education is essential, all members of team
 - Consistent care
 - Consistent scoring
- NAS can be treated with “*Comfort Measures*” alone
- When needed pharmacological tx goal: symptom relief
 - Weight gain
 - Avoid seizures
 - Sleep

Pediatrics

June 2017, VOLUME 139 / ISSUE 6

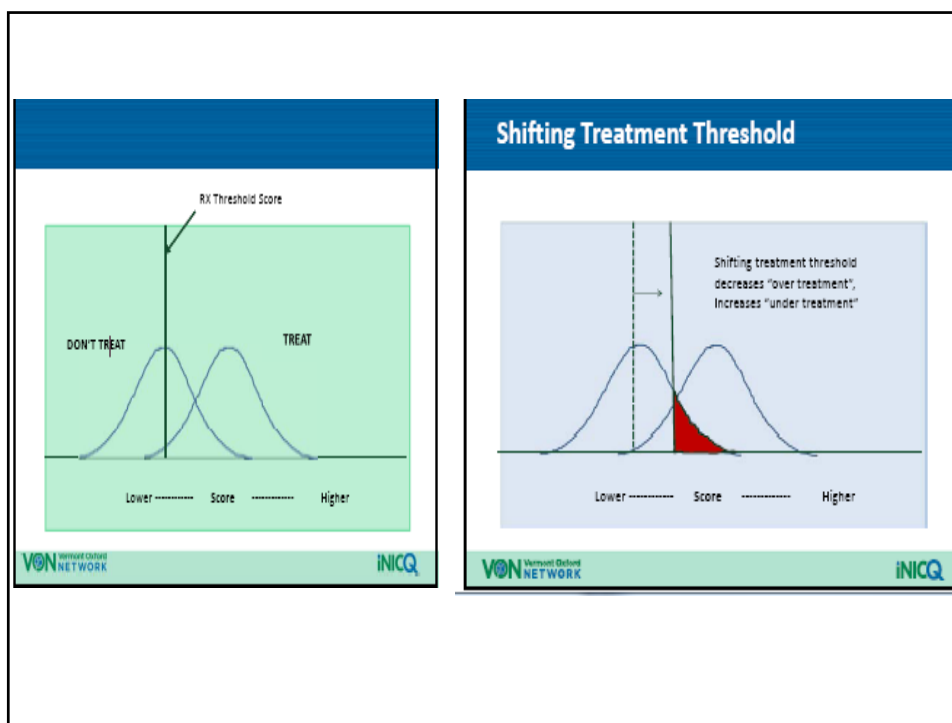
<http://pediatrics.aappublications.org/content/139/6/e20163360>

An Initiative to Improve the Quality of Care of Infants With Neonatal Abstinence Syndrome

Matthew R. Grossman, Adam K. Berkwitt, Rachel R. Osborn, Yaqing Xu, Denise A. Esserman, Eugene D. Shapiro, Matthew J. Bizzarro

Simplified Assessment of Infants

“We discontinued use of FNASS scores to guide pharmacologic management on the inpatient unit (FNASS was still used in the WBN and NICU). Instead, we developed and used our own functional assessment focused on 3 simple parameters: the infant’s ability to eat, to sleep, and to be consoled. If the infant was able to breastfeed effectively or to take ≥ 1 oz from a bottle per feed, to sleep undisturbed for ≥ 1 hour, and, if crying, to be consoled within 10 minutes, then morphine was neither started nor increased regardless of other signs of withdrawal. If the infant did not meet these criteria, staff first attempted to maximize nonpharmacologic interventions; if these attempts were unsuccessful, morphine was initiated or increased”.



Supporting the Families Supports the Baby

- Family education during the pregnancy
- Collaboration between hospital care team and prenatal outpatient OB team prior to delivery is essential
- Family and provider education regarding non-narcotic treatment of pain before, during and after birth is crucial
- Support of mothers during pregnancy regarding drug rehab, or just a stable environment can be beneficial to both mom and baby, and may result in the best outcome for both

This Amazing Program via VON

This video was created as the first in a series of Virtual Video Visits by the Vermont Oxford Network (VON) for use in an internet-based quality improvement collaborative, iNICQ 2013, focused on neonatal abstinence syndrome.

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For more information, contact Pam Ford at pford@vtxford.org or (802) 865-4814 x204.



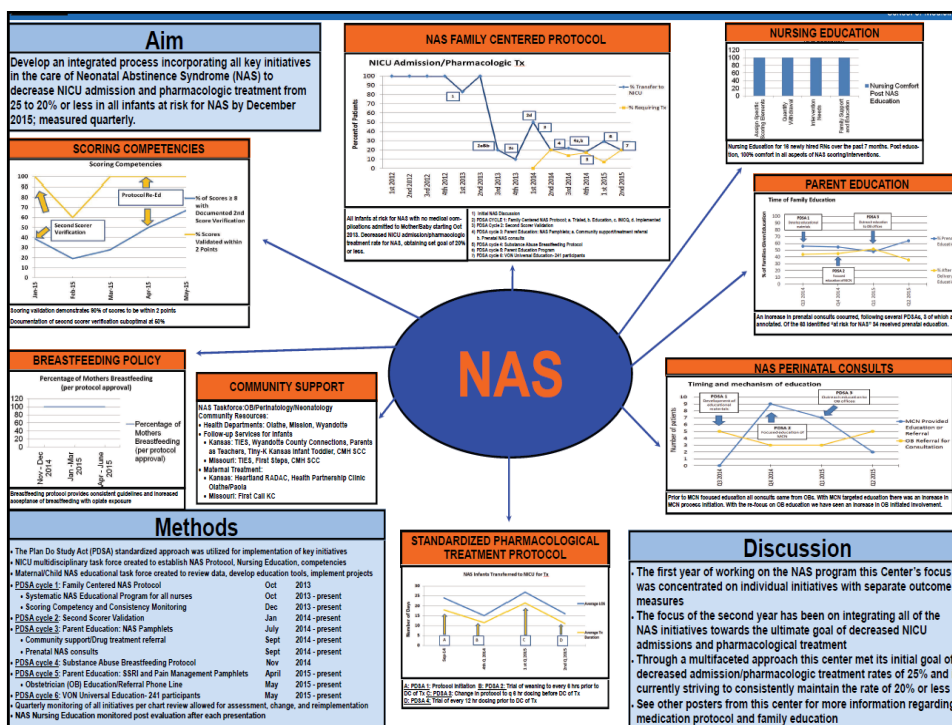
Highlights From the AAP Clinical Report

1. Consensus protocol for maternal screening for substance abuse and evaluation/management of infants at risk for or with signs of withdrawal.
2. Emphasis on non-pharmacologic support.
3. Standardization of assessment of clinical signs.
4. Caution about initiating pharmacologic treatment.
5. Optimal threshold score for initiating treatment is unknown.
6. Encouragement of breastfeeding when indicated.
7. Pharmacologic treatment, when needed, with opioids. Absolute indications include seizures, feeding intolerance, dehydration/poor weight gain.
8. Duration of in-hospital observation; outpatient follow-up.

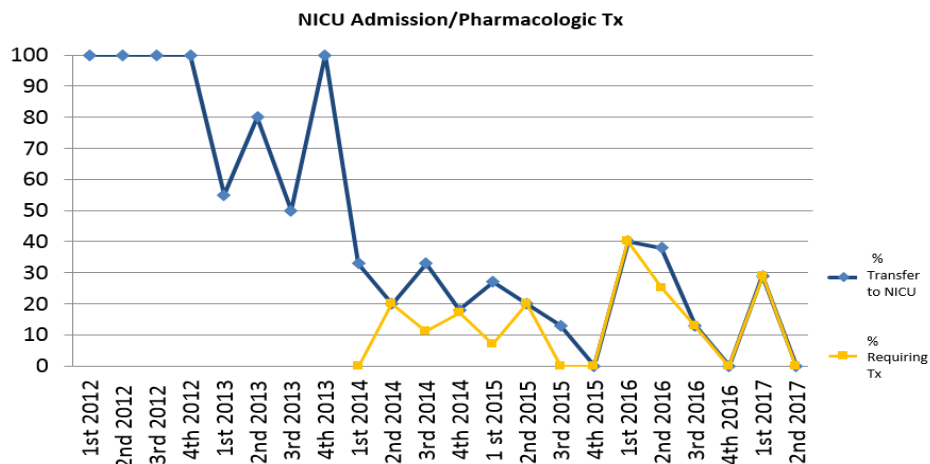
Hudak ML, Tan RC, Committee on Drugs, Committee on Fetus and Newborn. Pediatrics 2012; 129:e540-60

Key Factors in NAS Care

- Standard process for identification, evaluation, treatment and discharge
- NAS Protocol to Guide Consistent Care/ address site of care
- Nursing Education/Universal education and training
- Family Education
- Comfort Care
- Scoring Consistency/Consistent Timing of Scoring
- Consistency in Treatment
 - Breast feeding and Pharmacologic Protocols
- Education regarding non-narcotic methods of pain relief
- Family centered, trauma informed programming for women prior to giving birth, continuing in the post partum



SMMC Data Showing the Benefits of the NAS Program Decreased Treatment and NICU Admissions



Dear Parent,

Congratulations from Shawnee Mission Medical Center (SMMC)! We are committed to give you and your baby the best care possible. This letter is to help you to know what to expect during your hospital stay. It will help you be prepared to care for your baby.

We know that a baby at risk for Neonatal Abstinence Syndrome (NAS) will have less problems when they are cared for by their family. It is best, for your baby, when you and your family can be here to comfort them. We also know that a quiet environment can help. We would like to keep you and your baby together during the hospital stay. This might be on the Mother/Baby unit or in the Neonatal Intensive Care Unit (NICU). It has been shown that babies need less medical treatment and may go home faster, when their parents provide care and comfort.

After delivery, we will monitor your baby. This is what you can expect:

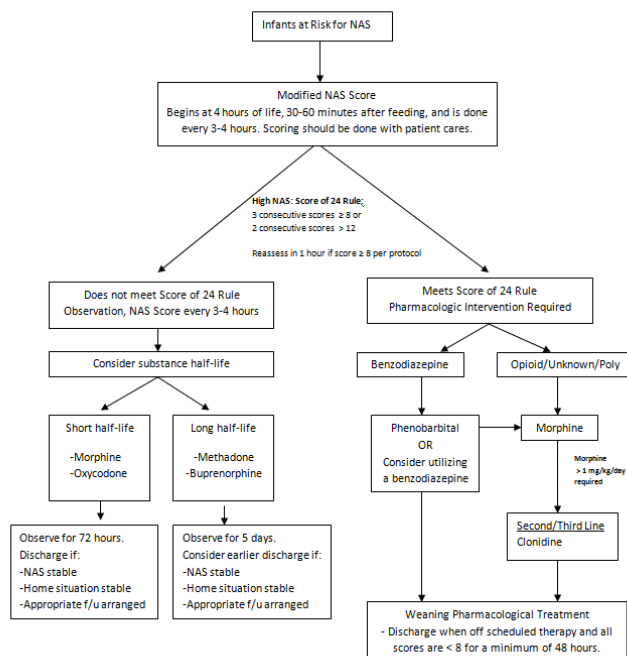
1. Your baby will stay with you on the Mother/Baby unit.
2. The nurses will begin watching for signs of NAS by using a score system starting at about 4 hours of age.
3. The scoring will be done with a NAS scoring tool. Your baby will be scored every 2 to 4 hours. This will be done around feeding times. We would like you to participate in the scoring with your nurse, please keep your own log that we will provide.
4. We will monitor your baby for 3 to 5 days. The length will depend on the type of drug/medication used during your pregnancy.
5. If your baby needs medication for NAS, he or she will be transferred to the NICU. The NICU has private patient rooms so you will be able to continue to stay with your baby.
6. Once a baby is placed on medication, it may take at least 2 weeks or more to wean off the medication.

During your baby's stay, it is best if you and your family provide comfort care to your baby. The staff will be here to help you, but it is best if you are the main caregiver. You can provide this care in the following ways:

▼ **Provide comfort for your baby in a quiet, calm environment**

- ◆ Provide "skin to skin" care for your baby
- ◆ Place baby in a swaddle sac. This is to provide comfort when not skin to skin
- ◆ Keep room lights dim
- ◆ Keep room noise low
- ◆ Limit visitors
- ◆ Breastfeed, unless you are told not to by a provider for medical reasons
- ◆ If you choose to formula feed, a small volume more often may help

Pharmacologic Treatment Algorithm



Other Centers' NAS Work

St. Lukes South:

L. Salder, RN; J. Howlett, MD; L. Thurlow, APRN

- Prenatal consult program, standardized NAS protocol, pharmacologic protocol. Revisiting approach after completing site visit at Yale

Overland Park Regional Medical Center:

L. Salder, RN; J. Howlett, MD; A. Longhiller, RN

- VON Designated Center of Excellence in NAS Training and Education, participated in VON NAS iNICQ, standardized NAS protocol, nursing education, pharmacologic protocol

Stormont-Vail Regional Health Center:

K. Brey, MD; S. Crouch, MD; M. Navarro, MD; D. Salisbury, APRN

- Staff education focused on Finnegan scoring and parent involvement, standard morphine weaning approach, NAS parenting letter encouraging participation. Data notes decreased LOS to 24 days in 2016

Olathe Medical Center:

J. Howlett, MD; L. Neyens, RN

- Standardized NAS and pharmacologic protocols

University of Kansas Medical Center:

C. Weiner, MD; M. Parrish, MD; P. Vishal, MD; T. Kilhenny DNP, APRN

- Multidisciplinary NAS taskforce formed with sub-committees focusing on the obstetrical patient, non pharmacologic treatment protocol, OT/speech involvement, standard NAS education

Menorah Medical Center:

D. Oberdorf, RN; J. Howlett, MD; J. Espy RN

- Standardized NAS and pharmacologic protocols

Wesley Medical Center:

B. Blume, MD; D. Lyman RN; L. Gwyn MD; S. Kuhlmann DO; K. Hommertzhaim RN; F. Hampton MSN, RN; P. Delmore MSN, RN

- Standardized NAS protocol, broad based education, ongoing NAS data collection, participated in VON NAS iNICQ

Journal of Addictive Diseases

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/wjad20>

The Perinatal Outcome of Children Born to Women With Substance Dependence Detoxified in Residential Treatment During Pregnancy

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Accepted author version posted online: 09 Apr 2014. Published online: 24 Jun 2014.

Slide adapted from Mark L. Hudak, MD
Improving Outcomes for Substance-Exposed Infants and Families
A Kansas Plan for Prevention and Intervention

Norway Study: 1991-1996 vs. 2004-2008

TABLE 1. Substance Abuse per Trimester in Cohorts 1 and 2

Substance abuse	Cohort 1: Mothers out-patients (n = 78), no. (%)			Cohort 2: Mothers in-patients (n = 21), no. (%)		
	1st Trimester	2nd Trimester	3rd Trimester	1st Trimester	2nd Trimester	3rd Trimester
Opiates	46 (59.0)	45 (57.7)	44 (56.4)	14 (63.6)	6 (27.3)	1 (4.5)
Benzodiazepines	35 (44.9)	37 (47.4)	35 (44.9)	14 (63.6)	5 (22.7)	1 (4.5)
Cannabis	24 (30.8)	23 (29.5)	22 (28.2)	14 (63.6)	4 (18.2)	0 (0)
Amphetamines	13 (16.7)	15 (19.2)	13 (16.7)	13 (59.1)	2 (9.1)	0 (0)
Alcohol	29 (37.7)	26 (33.3)	23 (29.5)	8 (36.4)	1 (4.5)	1 (4.5)
Nicotine daily	78 (100)	—	—	20 (90.1)	20 (90.1)	13 (59.1)
Other substances ^a	13 (16.7)	—	—	5 (22.7)	1 (4.5)	1 (4.5)

^aBarbiturates, cocaine, ecstasy.

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Norway Study: Outcomes

TABLE 2. Birth Parameters in Cohorts 1 and 2

Birth Parameters	Cohort 1		Cohort 2	
	Mothers out-patients, n = 78 (45 boys)	Comparison group, n = 58 (35 boys)	Mothers in treatment, n = 22 (12 boys)	Comparison group, n = 30 (18 boys)
Gestational age, ^a mean (SD)	38.3 (2.4)	40.4 (1.4)	39.4 (1.2)	40.0 (1.2)
Birthweight, ^a mean (SD)	3022 (715)	3707 (455)	3293 (428)	3720 (433)
Head circumference, ^a mean (SD)	33.9 (1.9)	35.6 (1.2)	34.8 (1.5)	35.4 (1.2)
Maternal age at delivery, mean (SD)	28.5 (5.4)	29 (3.7)	27.3 (6.0)	33.3 (5.0)
Apgar 1 min, ^b mean (SD)	8.4 (1.3)	—	9.1 (0.4)	—
Apgar 5 min, mean (SD)	9.0 (0.6)	—	9.6 (0.5)	—
Gestational age <37 weeks, no. (%)	20 (25.6)	1 (1.72)	0 (0)	0 (0)
NAS, no. (%)	60 (76.92)	0 (0)	0 (0)	0 (0)

^aBirthweight is given in grams, gestational age in weeks, and head circumference in cm.

^bApgar score was obtained for 62 and 14 infants from the study groups in cohorts 1 and 2, respectively.

NAS = neonatal abstinence syndrome; SD = standard deviation.

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Improving Outcomes for Substance-Exposed Infants and Families
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OBSTETRICS

Detoxification from opiate drugs during pregnancy

Jennifer Bell, MD; Craig V. Towers, MD; Mark D. Hennessy, MD; Callie Heitzman, RN;
Barbara Smith; Katie Chatten

Demographics	Group 1	Group 2	Group 3	Group 4	Total
Number	108	23	77	93	301
Gestational age at detoxification and NICU admission					
Detoxification first trimester, 5–13 wks gestation	10 (9%)	4 (17%)	12 (15%)	2 (2%)	28 (9%)
Detoxification second trimester, 14–27 wks gestation	65 (60%)	10 (43%)	36 (47%)	37 (40%)	148 (49%)
Detoxification third trimester, ≥28 wks gestation	33 (31%)	9 (39%)	29 (38%)	54 (58%)	125 (42%)
Preterm deliveries prior to 37 wks gestation	21 (19%)	3 (13%)	13 (17%)	16 (17%)	53 (17.6%)
Neonatal intensive care unit admission	32 (30%)	5 (22%)	60 (78%)	22 (24%)	119 (40%)
Pregnancy outcome					
Rate of NAS	20 (18.5%)	4 (17.4%)	54 (70.1%)	16 (17.2%)	94 (31%)
Rate of relapse ^b	25 (23.1%)	4 (17.4%)	57 (74.0%)	21 (22.5%)	107 (36%)

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ACOG Committee Statement on Opioid Use/Abuse in Pregnancy

- Early universal screening, referral for treatment of pregnant women with opioid use improve maternal and infant outcomes
- A coordinated multidisciplinary approach without criminal sanctions has the best chance of helping infants and families
- For pregnant women with an opioid use disorder, opioid agonist pharmacotherapy is the recommended therapy and is preferable to medically supervised withdrawal because withdrawal is associated with high relapse rates, which lead to worse outcomes.
- More research is needed to assess the safety (particularly regarding maternal relapse), efficacy, and long-term outcomes of medically supervised withdrawal

ACOG, Aug 2017

Prenatal Substance Abuse: Short- and Long-term Effects on the Exposed Fetus

Marylou Behnke, Vincent C. Smith, COMMITTEE ON SUBSTANCE ABUSE,
COMMITTEE ON FETUS AND NEWBORN
Pediatrics Mar 2013, 131 (3) e1009-e1024; DOI: 10.1542/peds.2012-3931

TABLE 2 Summary of Effects of Prenatal Drug Exposure

	Nicotine	Alcohol	Marijuana	Opiates	Cocaine	Methamphetamine
Short-term effects/birth outcome						
Fetal growth	Effect	Strong effect	No effect	Effect	Effect	Effect
Anomalies	No consensus on effect	Strong effect	No effect	No effect	No effect	No effect
Withdrawal	No effect	No effect	No effect	Strong effect	No effect	*
Neurobehavior	Effect	Effect	Effect	Effect	Effect	Effect
Long-term effects						
Growth	No consensus on effect	Strong effect	No effect	No effect	No consensus on effect	*
Behavior	Effect	Strong effect	Effect	Effect	Effect	*
Cognition	Effect	Strong effect	Effect	No consensus on effect	Effect	*
Language	Effect	Effect	No effect	*	Effect	*
Achievement	Effect	Strong effect	Effect	*	No consensus on effect	*

* Limited or no data available.

e1016 FROM THE AMERICAN ACADEMY OF PEDIATRICS

Limitations: Inability to separate socio-economic factors, polydrug usage, genetic factors

Difficulties of studies: Inconclusive results, lack studies, length of studies needed

Adapted from Dennis Cooley, MD FAAP Presentation

Discharge and Follow-up for babies who have exhibited signs and symptoms of NAS

- **Neurodevelopmental assessments** to identify motor deficits, cognitive delays, or relative microcephaly
- **Psycho-behavioral assessments** to identify hyperactivity, impulsivity, and attention-deficit in preschool-aged children, as well as school absence, school failure, and other behavioral problems in school-aged children
- **Ophthalmologic assessment** to identify nystagmus, strabismus, refractive errors, and other visual defects
- **Growth and nutritional assessment** to identify failure to thrive and short stature
- **Family support assessments** to exclude continuous maternal substance abuse and child abuse.

Parents need to be educated about sudden infant deaths as well as complications due to perinatal infections. The complexity and challenging nature of the home atmosphere should never be underestimated in these situations. The importance of an optimal home environment for the global development of these children should be emphasized to all parents.

Prabhakar Kocherlakota Pediatrics 2014;134:e547-e561

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State Perinatal Quality Collaboratives with NAS Programs*

State	Collaborative	Notes
Florida	Florida Perinatal Quality Collaborative http://health.usf.edu/publichealth/chiles/fpgc/index.htm	<ul style="list-style-type: none"> • Promotes Florida Task Force on Prescription Drug Abuse and Newborns 2013 Final Report • Started Florida's Born Drug Free campaign • The Born Drug Free NAS Program is implemented through hospitals and is overseen by the Attorney General's office
Kentucky	Kentucky Perinatal Quality Collaborative Initiative http://kentuckyperinatal.com/KPOCI.htm	<ul style="list-style-type: none"> • KY NAS Project is in the initial stages of data collection and site enrollment • Seeks to determine best practices and standardize treatment in Kentucky • Focuses on maternal-based, palliative care
Massachusetts	Neonatal Quality Improvement Collaborative of Massachusetts http://www.neogic.org/	<ul style="list-style-type: none"> • NAS program launched in 2013 • 40 hospitals in the state have joined together to share practices, compare data, and develop local improvement projects • Part of a national NAS program (VON's INICQU)
Massachusetts	Massachusetts Perinatal Quality Collaborative http://www.mapqc.org/	<ul style="list-style-type: none"> • NAS project in initial phases, with strategy developed in April 2014 • Joint project with the Massachusetts Department of Children and Families (DCF) • Collaborative site provides DCF NAS Fact Sheet
Michigan	MHA Keystone Center: Obstetrics http://www.mhakeystonecenter.org/collaboratives/ob.htm	<ul style="list-style-type: none"> • Part of a national program (VON's INICQ) that disseminates a standardized NAS toolkit to members of the Michigan collaborative • Has identified NAS as a problem and receives regular programmatic audits to ensure participating centers are implementing best practices
New Hampshire & Vermont	Northern New England Perinatal Quality Improvement Network http://www.nnepain.org/	<ul style="list-style-type: none"> • Participates in national program to standardize NAS treatment (VON's INICQ) • Provides updated guidelines for screening and treating NAS to contributing health centers within the collaborative
North Carolina	Perinatal Quality Collaborative of North Carolina http://www.pqcnc.org/	<ul style="list-style-type: none"> • Made NAS a "key issue in 2013" • Initiated a quality improvement project collecting data to determine a standard of care, while also implementing current best practices • 27 sites participate across the State • RN-driven
Ohio	Ohio Perinatal Quality Collaborative https://opqc.net/	<ul style="list-style-type: none"> • Well-established NAS Program • Standard, evidence-informed treatments implemented in 40 facilities across the state • Seeks to increase identification of and compassionate withdrawal treatment for full-term infants born with NAS • Seeks to reduce the length of stay of NAS infants by 20% across participating sites by June 30, 2015

Tennessee	Tennessee Initiative for Perinatal Quality Care http://www.tipqc.org/	<ul style="list-style-type: none"> • NAS Project initiated in February 2013 • Quality improvement project to decrease NAS infants admitted to NICU • Infant-focused, lacking acknowledgement of maternal/fetal dyad
Vermont	Vermont Oxford Network https://public.vtoxford.org/	<ul style="list-style-type: none"> • VON is a national nonprofit voluntary collaboration of health care professionals working to improve neonatal care • NAS initiative (INICQ) launched in 2013, partners with collaboratives in MA, MI and NH to help coordinate their states' NAS quality improvement project • Participating state collaboratives adopt VON NAS toolkit and curriculum • VON regularly monitors state-wide progress through audits of collaborative work
Washington	Washington State Perinatal Collaborative http://www.waperinatal.org/	<ul style="list-style-type: none"> • Serves as an information center for NAS treatment and screening guidelines • Primarily clinical information and protocol with little acknowledgement of maternal side of mother/infant dyad • No evidence of active dissemination of resources
West Virginia	West Virginia Perinatal Partnership http://www.wvperinatal.org/	<ul style="list-style-type: none"> • WV Perinatal Partnership initiated the Drug-Free Moms and Babies program (DFMB) in 2012 • DFMB offers funding for projects that provide comprehensive services for pregnant women • Seeks to identify programs that support healthy baby outcomes by providing prevention, early intervention, addiction treatment and recovery support services for pregnant and postpartum women • Provides RN-centered NAS Toolkit and model policy for substance screening of pregnant women
Wisconsin	Wisconsin Association for Perinatal Care http://www.perinatalweb.org/	<ul style="list-style-type: none"> • Published 2011 report on opioid dependence and pregnancy and developed Newborn Withdrawal Project Educational Toolkit • Collaborative website is an information hub for providers, offering a factsheet and checklist, and referring providers to the Toolkit • Offers detailed resources for patients, including compassionate FAQ for mothers

*This list is based on information available through each collaborative's website and may not represent the full array of NAS programs. [Click here](#) to find out if your state has a collaborative and check in with contacts there to see what work they may be doing on this emerging issue.

<http://www.acog.org/~media/Departments/Government%20Relations%20and%20O%20utreach/2014NASStateCollabChart.pdf>

Updated September 2014

Big Take Home

- Consistency of Care
- Control over Subutex Distribution
- Education regarding non-narcotic methods of pain relief
- Family centered, trauma informed programming (inpatient) for women prior to giving birth, continuing in post partum..beyond

Need State's Help

“Treat the Woman, Treat the Child”

Stop the cycle of abuse, family separation, deprivation

**Use this magic window of time to Protect the Unborn child
and change the trajectory of the entire family unit**

SMMC NAS Team

- Dr. Betsy Wickstrom (Perinatologist)
- Danielle Renyer, LMSW (NICU Social Worker)
- Kim Mason, BSN, RN (Discharge Planner)
- Dr. Julie Weiner (Neonatologist)
- Carrie Miner, MSN, RN, CCRN (Nursing Program Coordinator/Clinical Specialist)

Interested in KPQC—please Email us at
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