Nemours Children's Hospital Guideline	Neonatal Abstinence Syndrome (NAS) Pharmacologic Protocol and Management Guidelines	Effective Date	12/13/16
		Date Approved	12/13/16
		Supersedes Date	None
		Originating Dept.	NICU
		Document Owner	Dir., NICU
Document applies to: NCH		Required	Not Required

PURPOSE

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

PROTOCOL

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.

GUIDELINES

1. Initiate NAS or NAS Admission Order-set

2. Screen for drugs of abuse *(Appendix A, Appendix B)*:
    a. Maternal: urine (referral hospital lab)
    b. Infant: cord (referral hospital lab), urine, meconium

3. Symptoms *(Appendix C)*:

Central Nervous System	Gastrointestinal System	Autonomic Nervous System
Irritability/Restlessness	Poor feeding	Fever
Tremors	Excessive sucking	Excessive sweating
High-pitched cry	Suck-swallow incoordination	Mottling
Hyperreflexia	Vomiting/Diarrhea	Tachypnea
Sleep disturbance	Poor weight gain	Nasal congestion/Sneezing
Yawning	Dehydration	
Seizures		

4. Finnegan scoring (*Appendix D*):

    a. Begin Finnegan scoring within 24 hours of birth for term infants with suspected or proven NAS.
    b. Scoring is most applicable to infants tolerating full feeds, without respiratory distress, and not experiencing pain or discomfort due to diagnoses independent of NAS.
    c. Record scores every 3-4 hours.
        - scoring should be performed after feeds when infant is awake

- the score should represent the status of the infant at the time of the assessment and during the preceding time period
- scoring should routinely be done by nurses trained to use the Finnegan abstinence scoring tool
- dual scoring should be utilized as needed to confirm trending of scores

5. Non-pharmacologic measures may include:

    a. Limited stimulation
        - minimizing sound and light
        - holding and rocking by qualified personnel
        - swaddling
    b. Management of skin integrity
        - perianal breakdown as a result of frequent/loose stools
        - excoriation of extremities from excessive friction caused by agitation
        - sucking blisters on hands and fingers
        - scratches to face
    c. Consideration for developmental support
        - in-patient physical and occupational therapy
        - out-patient referral for Early Intervention Program and the Newborn Intensive Care Developmental Follow-Up Clinic

6. Feeding:

    a. Enfamil Gentlease or Similac Sensitive are the formulas of choice to minimize gastric discomfort and improve feeding tolerance.
    b. Caloric requirements may range from 150-250 cal/kg/day to achieve optimal growth.
    c. Frequent small volumes of hypercaloric (22-24 cal/oz) feedings may help minimize hunger and improve growth.
    d. Breast feeding and breastmilk:
        - Provide lactation consultation and support when applicable.
        - Mothers should be educated about the risks of breastfeeding their infants if they continue to use illicit drugs.
        - Encourage breastfeeding with the following considerations:
            - stable Methadone or Subutex (buprenorphine) daily maintenance dose
            - breastfeeding mothers on high doses of methadone (>150mg/day) should be informed of the infant's potential adverse effects, including sedation, poor feeding, and apnea
            - communication with the mother's substance abuse treatment program
            - plan to continue in substance abuse treatment in the postpartum period
            - negative maternal urine toxicology testing at delivery, except for prescribed medications (with proof of prescription)

- consistent prenatal care

- Breastfeeding is discouraged or contraindicated in the following:
  - positive maternal urine toxicology testing for illicit substances at delivery
  - medical contraindication to breastfeeding (such as HIV)
  - relapsed into illicit/licit substance misuse/abuse prior to delivery
  - inability to engage in substance abuse treatment, or in treatment but declines consent for counselor contact
  - no confirmed plans for postpartum substance abuse treatment
  - demonstration of behavioral qualities or other indicators of active substance use

7. Pharmacologic management *(Appendix E)*:

Oral Morphine

a. Dosing will be initiated, increased, decreased, or discontinued based on Finnegan scoring. (Dosing 3 – 4 hours)
b. Once initiated, all medication adjustments should be based on the weight used for the starting dose.
c. Start oral Morphine when 2 consecutive scores are ≥12, or 3 consecutive scores are ≥8.
d. Starting dose is based on highest score:
   Scores 8-10 → starting dose = 0.05 mg/kg/dose
   Scores 11-13 → starting dose = 0.08 mg/kg/dose
   Scores 14 -16 → starting dose = 0.11 mg/kg/dose
   Scores >16 → starting dose = 0.15 mg/kg/dose
e. Increase/decrease dose by 10% every 24-48 hours when:
   - scores are consistently ≥12: increase the dose
   - scores are between 9 and 11: no change in the dose
   - scores are consistently ≤8: decrease the dose
f. Morphine weaning:
   - when dose reaches 0.02 mg/kg/dose or infant advances to ad lib demand feeds every 4 hours, wean dose frequency from every 3 to every 4 hours
   - when every 4 hour dosing is tolerated, wean to every 6 hours
   - when every 6 hour dosing is tolerated, wean to prn dosing
   - discontinue prn dosing after 24-48 hours without Morphine
g. Consider a rescue dose when scores are ≥12 for two consecutive times. This additional dose should be the same dose as the currently scheduled dose.
h. Maximum oral Morphine dose 1.3 mg/kg/day.

Oral Phenobarbital

a. Phenobarbital may be considered when maximum Morphine dose of 1.3 mg/kg/day is reached or 3 consecutive Morphine wean attempts have been unsuccessful.

b. Dosing will be increased, decreased, or discontinued based on Finnegan scoring.
c. Start oral Phenobarbital with loading dose 16 mg/kg/dose and maintenance dose 4-5 mg/kg/day in two divided doses, based on current weight.
d. Following successful wean and discontinuation of Morphine, increase/decrease oral Phenobarbital dose by 10% or 1 mg every 24-48 hours.
e. Once initiated, all medication adjustments should be based on the weight used for the starting dose.
f. Phenobarbital levels are not indicated in the absence of seizures.
g. Recommendations for outpatient weaning of Phenobarbital should be included in the discharge summary for the infant's Primary Care Provider (PCP).

8. Criteria for monitoring and/or transferring:

a. Newborn infants experiencing NAS symptoms (suspected or proven), but not requiring pharmacologic intervention, must be monitored in the hospital setting for a minimum of 3-5 days.
b. Infants requiring pharmacologic management may be considered for transfer to a lower acuity unit when clinically stable.

9. Discharge Criteria *(Appendix E)*:

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

10. Reporting Guidelines *(Appendix F):*
a. Social Work (SW) consult is placed for all NAS infants.
b. Infants suspected of being "drug exposed" prenatally may be reported to the Department of Children and Families (DCF).
    - If immediate concerns arise while there is no social work coverage, medical staff member can initiate a report *(Appendix G).*

DEFINITIONS

Neonatal Abstinence Syndrome (NAS): central nervous system hyperexcitability and autonomic instability among newborns withdrawing from in utero exposure to Opioids, CNS stimulants, CNS Depressants, Hallucinogens, and/or Antidepressants.

RELATED DOCUMENTS – None

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American Academy of Pediatrics Clinical Report (2012). The transfer of drugs and therapeutics into human breast milk: An update on selected topics. *Pediatrics, 132.* e796-e809.

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APPENDIX

A. Major drugs of abuse
B. Maternal non-narcotic drugs that cause neonatal psychomotor behavior consistent with withdrawal
C. Onset, duration, and frequency of NAS caused by various substances
D. Finnegan abstinence scoring tool
E. AAP Management Plan algorithm for NAS, 2014
F. Florida State Statute for reporting prenatal drug exposure
G. How to file a DCF report

Scroll below to see all appendices

Appendix A

TABLE 1 Major Drugs of Abuse[a]

Opioids	CNS Stimulants	CNS Depressants	Hallucinogens
Agonists	Amphetamines	Alcohol	Indolealkylamines (LSD, psilocin, psilocybin, DMT, DET)
Morphine	Dextroamphetamine (Dexedrine)	Barbiturates	Phenylethylamines (mescaline, peyote)
Codeine	Methamphetamine	Benzodiazepines	Phenylisopropylamines (MDA, MMDA, MDMA, MDEA)
Methadone	Amphetamine sulfate	Other sedative-hypnotics	Inhalants
Meperidine (Demerol)	Amphetamine congeners	Methaqualone (Quaalude)	Solvents and aerosols (glues, gasoline, paint thinner, cleaning solutions, nail polish remover, Freon)
Oxycodone (Percodan, OxylR, Percolone, Roxicodone, Percocet, OxyContin)	Benzphetamine (Didrex)	Glutethimide (Doriden)	Nitrites
Propoxyphene (Darvon)	Diethylpropion (Tenuate)	Chloral hydrate	Nitrous oxide
Hydromorphone (Dilaudid)	Fenfluramine	Cannabinoids	
Hydrocodone (Lortab, Vicodin)	Phendimetrazine (Adipost, Bontril, Prelu-2)	Marijuana	
Fentanyl (Sublimaze)	Phentermine (Adipex-P, Zantryl)	Hashish	
Tramadol (Ultram, Ultracet)	Cocaine		
Heroin	Methylphenidate (Ritalin, Concerta)		
Antagonists	Pemoline (Cylert)		
Naloxone (Narcan)	Phenylpropanolamine		
Naltrexone (ReVia)	Phencyclidines		
Mixed Agonist-Antagonists	Nicotine		
Pentazocine (Talwin)			
Buprenorphine (Buprenex)			

Hudak ML, Tan RC; Committee on Drugs; Committee on Fetus and Newborn; American Academy of Pediatrics. Neonatal drug withdrawal. Pediatrics 2012;129: e541. http://dx.doi.org/10.1542/peds.2011-3212

Appendix B

TABLE 2 Maternal Nonnarcotic Drugs That Cause Neonatal Psychomotor Behavior Consistent With Withdrawal

Drug	Signs	Onset of Signs	Duration of Signs[a]	Ref. No.
Alcohol	Hyperactivity, crying, irritability, poor suck, tremors, seizures; onset of signs at birth, poor sleeping pattern, hyperphagia, diaphoresis	3–12 h	18 mo	14,15
Barbiturates	Irritability, severe tremors, hyperacusis, excessive crying, vasomotor instability, diarrhea, restlessness, increased tone, hyperphagia, vomiting, disturbed sleep; onset first 24 h of life or as late as 10–14 d of age	1–14 d	4-6 mo with prescription	12,13
Caffeine	Jitteriness, vomiting, bradycardia, tachypnea	At birth	1-7 d	161
Chlordiazepoxide	Irritability, tremors; signs may start at 21 d	Days–weeks	9 mo; 11/2 mo with prescription	11
Clomipramine	Hypothermia, cyanosis, tremors; onset 12 h of age		4 d with prescription	162
Diazepam	Hypotonia, poor suck, hypothermia, apnea, hypertonia, hyperreflexia, tremors, vomiting, hyperactivity, tachypnea (mother receiving multiple drug therapy)	Hours–weeks	8 mo; 10–66 d with prescription	10
Ethchlorvynol	Lethargy, jitteriness, hyperphagia, irritability, poor suck, hypotonia (mother receiving multiple drug therapy)		Possibly 10 d with prescription	163
Glutethimide	Increased tone, tremors, opisthotonos, high-pitched cry, hyperactivity, irritability, colic		6 mo	164
Hydroxyzine	Tremors, irritability, hyperactivity, jitteriness, shrill cry, myoclonic jerks, hypotonia, increased respiratory and heart rates, feeding problems, clonic movements (mother receiving multiple drug therapy)		5 wk with prescription	58
Meprobamate	Irritability, tremors, poor sleep patterns, abdominal pain		9 mo; 3 mo with prescription	165
SSRIs	Crying, irritability, tremors, poor suck, feeding difficulty, hypertonia, tachypnea, sleep disturbance, hypoglycemia, seizures	Hours–days	1–4 wk	31–33,35

[a] Prescription indicates the infant was treated with pharmacologic agents, and the natural course of the signs may have been shortened.

Hudak ML, Tan RC; Committee on Drugs; Committee on Fetus and Newborn; American Academy of Pediatrics. Neonatal drug withdrawal. Pediatrics 2012;129: e542. http://dx.doi.org/10.1542/peds.2011-3212

Appendix C

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[56,60]	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, P. (2014). Neonatal Abstinence Syndrome. *Pediatrics. 134*, e552. DOI: 10.1542/peds.2013-3524

Appendix D

* Scoring has been adapted in EPIC to incorporate a “0” in place of an empty box to

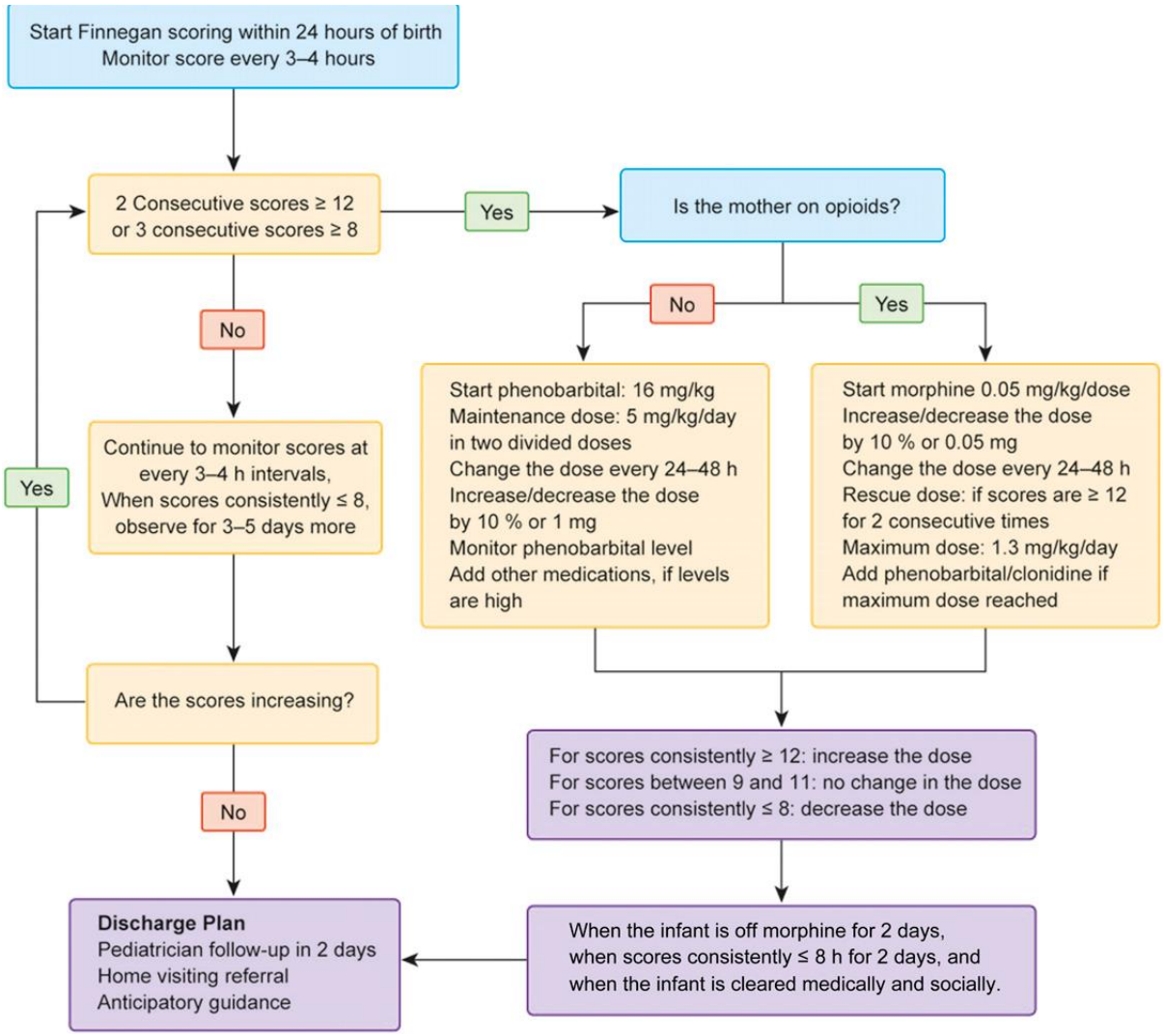
indicate symptom not present.

NEONATAL ABSTINENCE SCORING SYSTEM

SYSTEM	SIGNS AND SYMPTOMS	SCORE	AM						PM						COMMENTS
CENTRAL NERVOUS SYSTEM DISTURBANCES	Continuous High Pitched (or other) Cry	2													Daily Weight:
	Continuous High Pitched (or other) Cry	3													
	Sleeps <1 Hour After Feeding	3													
	Sleeps <2 Hours After Feeding	2													
	Sleeps <3 Hours After Feeding	1													
	Hyperactive Moro Reflex	2													
	Markedly Hyperactive Moro Reflex	3													
	Mild Tremors Disturbed	1													
	Moderate-Severe Tremors Disturbed	2													
	Mild Tremors Undisturbed	3													
	Moderate-Severe Tremors Undisturbed	4													
	Increased Muscle Tone	2													
	Excoriation (Specific Area)	1													
	Myoclonic Jerks	3													
	Generalized Convulsions	5													
METABOLIC/VASOMOTOR/RESPIRATORY DISTURBANCES	Sweating	1													
	Fever 100.4°-101°F (38°-38.3°C)	1													
	Fever > 101°F (38.3°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													
	Respiratory Rate > 60/min with Retractions	2													
GASTRO-INTESTIONAL DISTURBANCES	Excessive Sucking	1													
	Poor Feeding	2													
	Regurgitation	2													
	Projectile Vomiting	3													
	Loose Stools	2													
	Watery Stools	3													
	TOTAL SCORE														
	INITIALS OF SCORER														

Finnegan LP. Neonatal abstinence. In: Nelson NM, ed. *Current Therapy in Neonatal–Perinatal Medicine*. 2nd ed. Toronto, Ontario: BC Decker Inc; 1990

Appendix E



Kocherlakota, P. (2014). Neonatal Abstinence Syndrome. *Pediatrics. 134*, e556. DOI: 10.1542/peds.2013-3524

<u>Appendix F</u>
Stat. § 39.201; Admin. Code § 65C-29.002

Any person who knows, or has reasonable cause to suspect, that a child is abused, abandoned, or neglected by a parent, legal custodian, caregiver, or other person responsible for the child's welfare, or that a child is in need of supervision and care and has no parent, legal custodian, or responsible adult relative immediately known and available to provide supervision and care shall report such knowledge or suspicion to central abuse hotline of the Department of Children and Family Services.

Any person who knows, or who has reasonable cause to suspect, that a child is abused by an adult other than a parent, legal custodian, caregiver, or other person responsible for the child's welfare also shall report such knowledge or suspicion to the department on the central abuse hotline.

Florida Stat. § 39.01(30)(a),(2),(g)

"Harm" to a child's health or welfare can occur when any person:

(a) Inflicts or allows to be inflicted upon the child physical, mental, or emotional injury. In determining whether harm has occurred, the following factors must be considered in evaluating any physical, mental, or emotional injury to a child: the age of the child; any prior history of injuries to the child; the location of the injury on the body of the child; the multiplicity of the injury; and the type of trauma inflicted.

(2) Purposely giving a child poison, alcohol, drugs, or other substances that substantially affect the child's behavior, motor coordination, or judgment or that results in sickness or internal injury. For the purposes of this subparagraph, the term "drugs" means prescription drugs not prescribed for the child or not administered as prescribed, and controlled substances as outlined in Schedule I or Schedule II of s. 893.03.

(g) Exposes a child to a controlled substance or alcohol. Exposure to a controlled substance or alcohol is established by:

1. A test, administered at birth, which indicated that the child's blood, urine, or meconium contained any amount of alcohol or a controlled substance or metabolites of such substances, the presence of which was not the result of medical treatment administered to the mother or the newborn infant; or
2. Evidence of extensive, abusive, and chronic use of a controlled substance or alcohol by a parent when the child is demonstrably adversely affected by such usage.

As used in this paragraph, the term "controlled substance" means prescription drugs not prescribed for the parent or not administered as prescribed and controlled substances as outlined in Schedule I or Schedule II of s. 893.03.

Mandatory reporters include the following based on Florida Statute 39.201 (1)(d):

1. Physician, osteopathic physician, medical examiner, chiropractic physician, nurse, or hospital personnel engaged in the admission, examination, care, or treatment of persons;
2. Health or mental health professional other than one listed in subparagraph 1.;

3. Practitioner who relies solely on spiritual means for healing;
4. School teacher or other school official or personnel;
5. Social worker, day care center worker, or other professional child care, foster care, residential, or institutional worker;
6. Law enforcement officer; or
7. Judge.
8. Any person that suspects or knows about abuse, neglect, abandonment or exploitation of a child

Appendix G

How to file a DCF report:

1. Report to 1-800-96 ABUSE should be initiated following Florida Stat. § 39.01(30)(a)(2), (g). Social Worker is available to assist and help with reporting. If concerns about imminent danger arise when Social Worker is not available, any hospital worker is considered a mandatory reporter and can initiate report.
    - Call 1-800-96 ABUSE (1-800-962-2873) to report concerns
    - Reporter should obtain as much information as possible about the family. Call should be placed even if reporter only have some of the following:
        - Information regarding subjects of the report, including name, race, sex, date of birth, Social Security number, ethnicity, school, employment, address, phone number, and/or other acceptable means to locate the victim if the address is not known
        - The relationship between the victim and the alleged perpetrator
        - Names and contact information for any person who can provide assistance to the child or additional information about the family's circumstances
        - The type of maltreatment alleged and the nature and extent of harm suffered by the victim, including when the incident occurred or whether it is a chronic, ongoing situation
        - Any known history of abuse, neglect, or abandonment of persons named in the report The risk of continued maltreatment and whether the alleged perpetrator continues to have access to the victim
        - The current condition of the child
        - Other children in the environment
        - The name and occupation of the reporter, relationship between the child and the reporter, contact information for the reporter, and any other information the reporter believes will be of assistance

2. DCF Abuse Hotline staff determines if the case meets their abuse criteria. DCF abuse Hotline staff informs reporter if case was accepted or declined based on their criteria.
3. When call is completed, DCF Abuse Hotline staff should provide a name and ID number to reporter.
4. Hospital staff member will document in patient's chart if report was accepted or not and Abuse Hotline staff's name and ID number.
5. Child Protective Investigator (CPI) is assigned by local DCF office and initiates investigation.
6. CPI determines if services will be placed in the home to support family or if judicial intervention will be required.