

# NEONATAL ABSTINENCE SYNDROME ASSESSMENT AND MANAGEMENT - GCNIC - CHW PRACTICE GUIDELINE<sup>®</sup>

## DOCUMENT SUMMARY/KEY POINTS

### Caring for an infant with Neonatal Abstinence Syndrome (NAS) Practice Guideline

- Used to assess infants of known substance dependent mothers to enable effective management of Neonatal Abstinence Syndrome.
- Using the modified Finnegan NAS Severity Scale (NASS) to determine the need for intervention using non-pharmacological or pharmacological interventions to treat these infants.
- Non Pharmacological Management of NAS
- Pharmacological Management of NAS
- NAS is diagnosed if 3 consecutive scores of the Modified Finnegan NASS are 8 or above or 2 consecutive scores of 12 or above.

## CHANGE SUMMARY

- Added content – Scoring flow chart, Substances and their effects
- Aligned medications with ANMF recommendations
- Updated references

<b>Approved by:</b>	SCHN Policy, Procedure and Guideline Committee	
<b>Date Effective:</b>	1 <sup>st</sup> September 2021	<b>Review Period:</b> 3 years
<b>Team Leader:</b>	Nurse Educator	<b>Area/Dept:</b> Grace Centre for Newborn Care

## READ ACKNOWLEDGEMENT

- All clinicians working in Grace Centre for Newborn Intensive Care GCNIC e.g. nursing staff, Registrars, Fellows and Neonatologists.

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## 1 Background

Neonatal Abstinence Syndrome (NAS) occurs when a newborn infant has been exposed to addictive substances in-utero; and the addictive substance is able to cross the placental barrier from the maternal to foetal circulation, the infant remains physically dependent on the substance following birth<sup>1-4</sup>. This is exhibited by various signs of withdrawal involving the central nervous, gastro-intestinal, autonomic nervous and respiratory systems<sup>3-5</sup>. It is estimated 5–15% of pregnant women have a substance abuse problem including tobacco, alcohol, opioids, hallucinogens, depressants, and stimulants including high levels of caffeine intake from coffee, tea and carbonated soft drinks containing caffeine<sup>4-6</sup>.

Signs and Symptoms usually begin within 72 hours of age however it may take up to two weeks before some infants show signs of withdrawal<sup>4,6,7</sup>. Examples of potential signs and symptoms are outlined in Table 1.

System	Signs
Central Nervous System	Irritability, high-pitched crying, jitteriness, tremors, sleep disturbances, increased muscle tone, hyperactive reflexes, myoclonic jerks, convulsions <sup>3</sup>
Gastro Intestinal System	Vomiting, poor feeding, diarrhoea leading to excoriation of the buttocks, excessive sucking, inadequate weight gain <sup>3</sup>
Autonomic System	Yawning, sneezing, mottled skin, sweating <sup>3</sup>
Respiratory System	Tachypnoea, apnoea, nasal flaring <sup>3</sup>

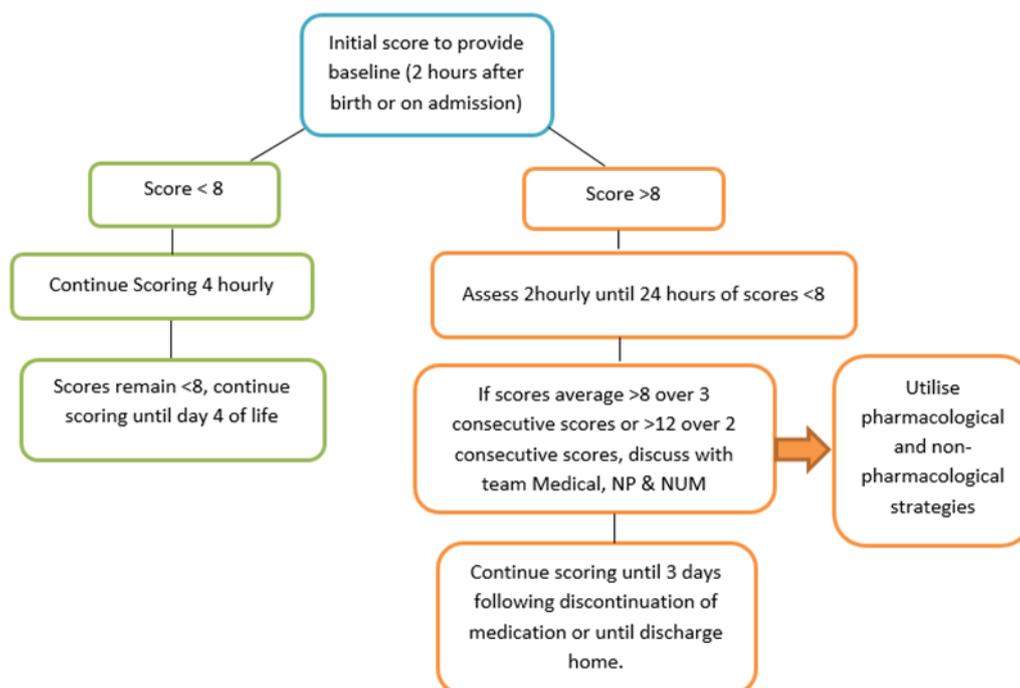
## 2 Principles of Care

- Many infants are at risk because of poor socio-economic circumstances and parental lifestyle factors associated with illicit drug use. All healthcare workers are responsible for protecting newborn infants at risk. Early intervention may prevent further morbidity<sup>3</sup>.
- Where NAS is predicted it is negotiated with the family that the infant should remain in hospital for no less than 5 to 7 days. It is important to maintain positive engagement with the family and to ensure privacy and confidentiality for the infant and family<sup>3,5</sup>. NAS can produce a major disruption to mother infant attachment, unnecessary separation of the mother and infant should be avoided<sup>3,8</sup>.
- It is also essential to create a professional, trusting and respectful relationship with the infant and family and to support an ongoing relationship between family and other health services<sup>3,4,8</sup>.
- Mothercraft techniques such as swaddling, settling, massage, relaxation baths and use of non-nutritive sucking with a pacifier (dummies) can assist in settling babies, reduce symptoms and reassure parents.

- Internationally an approach known as ‘Eat, Sleep and Console’ has been developed that focuses on maximizing non-pharmacologic methods, increasing family involvement in the treatment, and prn or “as needed” use of morphine<sup>8</sup>. Evidence of the success of this approach in the surgical NICU setting is currently unavailable.
- Obtain a urine sample from neonate within three days of birth, and meconium sample, for drug screening if requested by the neonatal team.

### 3 Assessment of Newborn Infants at Risk of NAS

- The use of the modified Finnegan Neonatal Abstinence Severity Scale (NASS) is recommended to manage an infant with NAS<sup>1,3,9</sup>.
- If maternal history of drug use during pregnancy is known, commence the newborn infant on the modified Finnegan NASS two hours following birth<sup>3</sup> or on admission.
- NAS is diagnosed if 3 consecutive scores of the Modified Finnegan NASS are 8 or above or 2 consecutive scores of 12 or above<sup>3</sup>.
- It is important to ensure that signs of NAS are not masking an underlying illness<sup>7</sup>.
- If an infant is showing signs of NAS commence scoring on the modified Finnegan NASS and refer the baby to the fellow, Nurse Practitioner or neonatal registrar<sup>3</sup>.
- For preterm infants at risk of NAS, signs associated with prematurity may mask underlying withdrawal syndrome and the signs of NAS may be more subtle<sup>3</sup>.
- Attend to modified Finnegan NASS to assess for signs of withdrawal 30mins to one hour after a feed<sup>10, 11</sup>.



## Safety Notice

The use of Naloxone is not recommended during the resuscitation of any infant given the unknown risk of NAS as it may lead to the rapid onset of seizures associated with withdrawal<sup>3</sup>. Naloxone is used where the narcotic is known to be iatrogenic.

## 4 Substances and their effects

Substances can effect infants in the newborn period in a number of ways. They are outlined in the following table<sup>4,12</sup>:

Substance	Effects	Comments
Opiates	<ul style="list-style-type: none"> <li>• <u>Central nervous system</u>: tremors, irritability, sleep disturbance.</li> <li>• <u>Respiratory system</u>: tachypnoea, nasal flaring, chest recession.</li> <li>• <u>Autonomic nervous system</u>: sneezing, yawning, fever, sweating.</li> <li>• <u>Gastrointestinal system</u>: poor feeding, vomiting, diarrhoea.</li> </ul>	<p>Withdrawal from maternal opiate use is present in 40-90% of antenatally exposed infants.</p> <p>A subacute withdrawal may persist for four to six months.</p>
Buprenorphine (Subutex®)	<ul style="list-style-type: none"> <li>• Infants exposed to buprenorphine in pregnancy may experience respiratory depression in the newborn period and/or NAS.</li> </ul>	Is used to treat opiate dependence.
Amphetamines	<ul style="list-style-type: none"> <li>• Decreased head circumference, length, birth weight, increased rates of abruption, preterm birth and growth restriction have been reported in pregnancies of mothers using intravenous amphetamines.</li> </ul>	A significant withdrawal syndrome is not generally seen and Finnegan scoring is not necessary routinely used.
Cocaine and Derivatives	<ul style="list-style-type: none"> <li>• Can cause poor growth. It also increases risk of placental abruption.</li> </ul>	The effects on a baby are more likely from the drug itself instead of withdrawal.
Marijuana	<ul style="list-style-type: none"> <li>• Has been associated with reduced birth length and low birth weight.</li> </ul>	Subtle neurobehavioural abnormalities have been described in infants whose mothers are heavy users of marijuana
Alcohol, Inhalants,	<ul style="list-style-type: none"> <li>• This group of non-opioid depressants can cause withdrawal</li> </ul>	These substances are often taken along with stimulants.

Tranquilizers and Sedatives	symptoms that are not dissimilar to those of opioid withdrawal.	
Antidepressant medicines (SSRIs)	<ul style="list-style-type: none"> <li>Tremors, hypotonia, tachycardia, rapid breathing, respiratory distress, hypertonia and hypoglycaemia are identified SSRI withdrawal signs.</li> </ul>	SSRI neonatal behavioural syndrome (poor neonatal adaptation syndrome – PNAS) is common but usually mild and transient.

Users of illicit drugs frequently use more than one drug. Meta-analysis of studies suggests that polydrug users have an increased risk of abnormal pregnancy outcomes and the infants of polydrug users also have an increased risk of SIDS<sup>4</sup>.

## 5 Management

### 5.1 Non-Pharmacological Management of NAS

The first line treatment for infants who are beginning to display signs of a Neonatal Abstinence Syndrome is non-pharmacological interventions. Below is a list of behavioural cues displayed by infants experiencing NAS, and interventions healthcare professionals and parents can use to support the infant<sup>3, 5, 13</sup>.

Infant Behaviour	Interventions
High-pitched crying	Respond to baby's cues Swaddle the infant and hold close Non-nutritive sucking using a pacifier Decrease environmental stimuli such as noise and lighting Contain infant in cot, consider nest if baby has full cardio-respiratory monitoring Comfort measures such as stroking and talking quietly to infant Cuddles, hand hugs and skin-to-skin contact with parent <sup>1,3</sup>
Sleep disturbances	Minimise handling when attending to infant cares Swaddle infant and hold close Decrease environmental stimuli such as noise and lighting Comfort measures such as stroking and talking quietly to infant Cuddles, hand hugs and skin-to-skin contact with parent Breastfeeding (unless contraindicated) <sup>1,3</sup>
Reluctant feeding and slow weight gain	Attend second daily weighs to ensure appropriate weight gain Ensure infant's fluid and calorie intake is appropriate for age and required nutritional requirement. If caloric intake appears insufficient with breastfeeding alone supplement with expressed breast milk or formula until adequate caloric intake is achieved. <sup>13</sup> Decrease environmental stimuli when attending to infant feeds Encourage breastfeeding (unless contraindicated) <sup>1,3</sup>

Nasal stuffiness	Suction nares if required When attending to infant feeds, pace infant and allow for rest periods Consider cardio-respiratory monitoring <sup>1,3</sup>
Hyperactivity	Swaddle infant and hold close Decrease environmental stimuli such as noise and lighting Contain infant in cot, consider nest if baby has full cardio-respiratory monitoring Comfort measures such as stroking and talking quietly to infant Cuddles and skin-to-skin contact with parent <sup>1,3</sup>
Tremors or jitteriness	Swaddle infant when care giving Minimal handling of infant

## 5.2 Pharmacological Management of NAS

Pharmacological treatment is necessary if the modified Finnegan NASS remains 8 or above for 3 consecutive assessments, or 12 and above for 2 consecutive assessments and are used in conjunction with non-pharmacological interventions<sup>3,5</sup>.

Pharmacological treatment may be required to continue for several weeks up to six months.

### Morphine

- In NSW morphine is the medication of choice to treat NAS in combination with non-pharmacological interventions. The pharmacological dosage of morphine to treat NAS is calculated on the infant's birth weight or current weight if it is greater than the birth weight. It is recommended to administer oral morphine unless contraindicated due to underlying illness<sup>3</sup>.
- Doses should be titrated to NAS scores to manage infant signs and symptoms of NAS.
- It is recommended to extend frequency while weaning when patient reaches small doses. For example doses less than 100microgram/**dose** have a risk of inaccurate measurement because this would be below 0.1mL when using the morphine 1mg/mL oral solution.
- Morphine oral solution is available in several strengths. Check strength carefully. In general, morphine 1mg/mL oral solution should be used in neonates as this is the lowest strength currently available.

**MORPHINE DOSING**<sup>14</sup>

Score averages $\geq 8$ for 3 scores	Morphine 0.5 mg/kg/DAY in 4-6 divided doses orally
If score persists $\geq 8$ despite morphine 0.5 mg/kg/day	Morphine 0.7 mg/kg/DAY in 6 divided doses orally
If score persists $\geq 8$ despite morphine 0.7 mg/kg/day	Morphine 0.9 mg/kg/DAY in 6 divided doses orally
If infants are on Morphine 0.9mg/kg/day	Cardiorespiratory and SaO <sub>2</sub> monitoring <b>Consider Phenobarbital (Phenobarbitone)</b>
When 3 consecutive Finnegan NASS scores are under 8 or for 48hours dose reduction is considered	Decrease dose by 10–25% every 2–4 days titrated to Neonatal Abstinence Syndrome scores (when scores $\leq 4$ ) and clinical condition.  At 100micrograms per dose stretch the administration period between the doses to reduce the inaccuracy of measuring smaller volumes
Ceasing morphine	Monitor infant 72 hours post-cessation of morphine for any withdrawal symptoms

***Vomiting after dose administration***

Ensure that the infant is not being overfed and that the infant is being appropriately positioned during and after feeding. Give the morphine before the feed. If baby has a large vomit after being given morphine:

- If vomits within 10 minutes of dose, re-dose.
- If vomits after 10 minutes, give ½ dose.
- If infant vomits after feed, do not give further morphine (always err on side of caution).

**Phenobarbital (Phenobarbitone)**

- Is the preferred treatment if the mother uses non-opioid drugs (e.g. benzodiazepines, barbiturates, and alcohol) and if maternal drugs used are unknown
- Phenobarbital is also used in narcotic withdrawal as an additive if the Finnegan NASS remains 8 or above for 3 consecutive scores despite high-dose oral morphine.
- Oral administration is recommended unless contraindicated due to underlying illness<sup>3</sup>.
- A loading dose is usually not necessary for babies on 0.9mg/kg/day of morphine.
- The dose of Phenobarbital should be titrated according to the Finnegan Score.

- Dose reductions should not occur more often than every 72 hours following regular NAS scoring.
- Due to the long half-life (>24 h) of Phenobarbital, the dose should be reduced by 10% to 20% when Finnegan scores are consistently less than 8 for 72 hours<sup>3</sup>.
- Phenobarbital should be weaned before Morphine in infants who are primarily exposed to opiates due to the adverse effects of Phenobarbital on infant sucking behaviour.
- For non-barbiturate withdrawal (e.g. benzodiazepines, narcotics), the dose may be reduced more rapidly after withdrawal symptoms settle.

### **PHENOBARBITAL DOSING**<sup>15</sup>

<b>NAS Score (every 4 hours)</b>	<b>Phenobarbital Dosage</b>
Score remains $\geq 8$ for 3 consecutive scores	<p>If already on Morphine 0.9mg/kg/day no need for loading dose, commence:</p> <p style="text-align: center;">Phenobarbital 5mg/kg/DAY in 1 to 2 divided doses</p> <p>Otherwise, if <b>not</b> on Morphine:</p> <p style="text-align: center;">Load with Phenobarbital 8mg/kg orally Then post 12-24 hours loading dose commence maintenance dose of 5mg/kg/DAY in 1 to 2 divided doses</p>
Score $\geq 8$ for 3 consecutive scores on 5mg/kg/day	Increase to 8mg/kg/day in two divided doses

### **Clonidine**

- Clonidine is used as an adjunct to morphine OR primary agent in non-opiate withdrawal.
- Regular blood pressure monitoring is required when using Clonidine; 4<sup>th</sup> hourly for the first 48hours, then BD.

### **Weaning Clonidine**

- Clonidine should be discontinued prior to discharge.
- If on clonidine for >5 days, the dose should be weaned by about 50% each day for 2 to 3 days (reflecting average half-life of 17 hours) before ceasing the drug<sup>16</sup>.
- When discontinuing Clonidine BP should be monitored 4<sup>th</sup> Hourly for 48 hours to assess for rebound hypertension.
- Observe for tachycardia, hypertension, sweating, agitation during dose weaning.

**CLONIDINE DOSING<sup>16</sup>**

NAS Score (every 4 hours)	Clonidine Dosage
Score averages > 8 for 3 consecutive scores despite morphine dosing >0.8mg/kg/day	5 microgram/kg/day divided in 6 to 8 doses (oral recommended)
If scores persist >8	Increase dose by 25% every 24 hours to a maximum 12 microgram/kg/day according to neonatal abstinence syndrome scores.

**6 Breastfeeding Considerations**

The benefits of breastfeeding generally outweigh the risks. Breastfeeding has been shown to reduce the incidence of NAS and length of time pharmacotherapy is required<sup>3</sup>.

- Mothers should be supported and encouraged to breastfeed unless there are existing contraindications.
- Contraindications include maternal Hepatitis C with accompanying cracked or bleeding nipples, continued maternal administration of narcotic substances, or due to underlying illness of the infant<sup>13</sup>.
- If mother is Hepatitis C positive, breastfeeding is **only** contraindicated whilst she has cracked and bleeding nipples, when these have healed she can recommence breastfeeding<sup>3</sup>.
- Mothers stabilised on Methadone should be encouraged to breastfeed. Methadone concentration in breast milk is low and is unrelated to maternal dose<sup>3</sup>
- Despite the methadone in breast milk being low dose any abrupt cessation of breastfeeding may precipitate NAS and therefore requires NASS should this occur<sup>3</sup>

Refer mother to the Grace Centre for Newborn Intensive Care (GCNIC) Lactation Specialist for further support.

**7 Family Support**

It is important to facilitate the parent-infant relationship prior to discharge from hospital. During this period assessment of maternal wellbeing and parenting skills can ensure appropriate support is given to parents from healthcare workers.

Any child protection concerns should be reported to the GCNIC Social Worker or Child Protection Unit (CPU)<sup>3</sup>.

## 8 Discharge

Babies with NAS are discharged when they are in the weaning phase of a single medication e.g. Morphine. They are not discharged when still on dual therapy e.g. Morphine and Phenobarbital. Prior to discharge the multi-disciplinary team is required to create a written discharge plan, which is documented in the GCNIC Discharge Summary. A referral will be made to appropriate health and support services. Parents will also require:

- Documented education regarding SIDS safe sleeping guidelines as these infants are at increased risk of SIDS<sup>3</sup>.
- Consider the use of an apnoea monitor in the home due to increased risk of SIDS.
- Education to ensure parents are able to administer medications.
- Evaluation that an appropriate home environment exists, and the main carer's have the skills to recognise and control the infants' withdrawal symptoms.

It is recommended that infants diagnosed with NAS be discharged as early as possible with research showing benefits for the infant and the family when this occurs<sup>3</sup>.

Discharge should only be delayed if the infant has shown poor weight gain, there are parent craft issues, or if there is concern for the infants' wellbeing because of the family and home environment<sup>3</sup>.

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## Appendix 1: Modified Finnegan Neonatal Abstinence Scoring System

System	Symptom	Score							
Central Nervous System Imbalances	Excessive high pitched (or other) cry (<5 mins)	2							
	Continuous high pitched (or other) cry (>5 mins)	3							
	Sleep <1 hour after feeding	3							
	Sleep < 2 hours after feeding	2							
	Sleep <3 hours after feeding	1							
	Hyperactive Moro reflex	2							
	Markedly hyperactive Moro reflex	3							
	Mild tremors when disturbed	1							
	Moderate/severe tremors when disturbed	2							
	Mild tremors when undisturbed	3							
	Moderate/severe tremors when undisturbed	4							
	Increased muscle tone	1							
	Excoriation (eg chin, knees, elbow, toes, nose)	1							
Myoclonic jerks (twitching/jerking of limbs)	3								
Generalised convulsions	5								
Metabolic / Motor / Respiratory Disturbances	Sweating	1							
	Hyperthermia (37.2-38.2°C)	1							
	Hyperthermia (>38.4°C)	2							
	Frequent yawning (>3-4/interval)	1							
	Mottling	1							
	Nasal stuffiness	1							
	Frequent sneezing (>3-4/interval)	1							
	Nasal flaring	2							
	Respiratory rate >60/min	1							
Respiratory rate >60min with retractions	2								
Gastro-intestinal Disturbances	Excessive sucking	1							
	Poor feeding (infrequent/uncoordinated suck)	2							
	Regurgitation (≥ times during/post feed)	2							
	Projectile vomiting	3							
	Loose stools (curdy/seedy appearance)	2							
Watery stools (water ring on nappy around stool)	3								
	<b>TOTAL SCORE</b>								
	Date and time								
	Initials of scorer								