Clinical Guideline

Neonatal Abstinence Syndrome (NAS) Management

Sites where Clinical Guideline applies	All Maternity and Newborn Service sites in HNELHD
This Clinical Guideline applies to:	
1. Adults	No
2. Children up to 16 years	No
3. Neonates – less than 29 days	Yes
Target audience	Clinicians in Neonatal units and Maternity sites, including postnatal care areas in HNELHD
Description	Provides information for neonatal clinicians regarding the care of the newborn baby at risk of neonatal abstinence syndrome and their family

Go to Guideline

Keywords	Neonate, newborn, NICU, SCU, maternity, substance, NAS, withdrawal, abstinence, Finnegan's, drug use
Document registration number	HNELHD CG 20_49
Replaces existing document?	Yes
Registration number and dates of superseded documents	Maternity and Newborn – Neonatal Abstinence Syndrome (NAS) Management HNELHD CG 17_03

Related Legislation, Australian Standard, NSW Ministry of Health Policy Directive or Guideline, National Safety and Quality Health Service Standard (NSQHSS) and/or other, HNE Health Document, Professional Guideline, Code of Practice or Ethics:

- NSW Health Guideline GL2013_008 Neonatal Abstinence Syndrome Guidelines
- NSW Health Guideline GL2014_022 Guidelines for the Management of Substance Use During Pregnancy Birth and the Postnatal Period
- NSW Health Policy Directive PD2007_091 Nursing & Midwifery Management of Drug & Alcohol issues in the Delivery of Health Care

Position responsible for Clinical Guideline Governance and authorised by	Dr Paul Craven, Executive Director, Children, Young People and Families Services
Clinical Guideline contact officer	Jo Davis, CNC, Newborn Services, NICU JHCH
Contact details	Jo.davis1@health.nsw.gov.au
Date authorised	25 September 2020
This document contains advice on therapeutics	Yes Approval gained from HNE Quality Use of Medicines Committee on 11 August 2020
Issue date	1 October 2020
Review date	1 October 2023

Note: Over time, links in this document may cease working. Where this occurs, please source the document in the PPG Directory at: http://ppg.hne.health.nsw.gov.au/

PURPOSE AND RISKS

This document has been developed to provide support and guidance to the health clinicians in provision of high quality, safe and timely care for newborns who are at risk of withdrawal syndromes. It provides guidance for detection of signs and symptoms and supportive management strategies for both the mother and baby.

The risks are:

- *Missed diagnosis of Neonatal Abstinence Syndrome*
- *Delayed initiation of supportive interventions for withdrawal symptoms*
- *Separation of mother and baby*

The risks are minimised by:

- *Clinicians having knowledge of signs and symptoms of withdrawal syndromes*
- *Clinicians seeking assistance if the therapy is outside their scope of practice*
- *Following the recommendations set out in the clinical guideline*

Any unplanned event resulting in, or with the potential for injury, damage or other loss to infants/staff/family as a result of this procedure must be reported through the Incident Management System and managed in accordance with the NSW Health Policy Directive PD2020_020: Incident Management Policy. This would include unintended injury that results in disability, death or prolonged hospital stay.

*It is mandatory for staff to follow relevant: "Five moments of hand hygiene", infection control, moving safely/safe manual handling, documentation practices and to use HAIDET for patient/carer communication: **H**and hygiene **A**cknowledge, **I**ntroduce, **D**uration, **E**xplanation, **T**hank you or closing comment.*

Risk Category: *Clinical Care & Patient Safety*

CLINICAL PROCEDURE SAFETY LEVEL

Every clinician involved in the procedure is responsible for ensuring the processes for clinical procedure safety are followed. The following level applies to this procedure (click on the link for more information):

Level 1 procedure

CONTENT

GUIDELINE

While not requiring mandatory compliance, staff must have sound reasons for not implementing standards or practices set out within guidelines issued by HNE Health or for measuring consistent variance in practice.

Introduction

Early identification and engagement of women taking at-risk drugs during pregnancy is important in achieving the best outcome for mother and baby. Continuity of care through the pregnancy, labour and birthing, postnatal care and follow up is needed to achieve best outcomes for the family.

Withdrawal Syndromes

Neonatal Abstinence Syndrome (NAS)

Top

NAS occurs in newborns experiencing withdrawal as a result of the mother's dependence on drugs during pregnancy. This syndrome usually begins within 72 hours of birth, but may appear up to two weeks after birth. NAS is more common in infants born to opioid dependent women than in infants born to women dependent on other drugs. Symptoms and signs of withdrawal include:

- Hyperirritability, high-pitched cry, hypertonia
- Jitteriness, tremors or seizures
- Sleep-wake abnormalities
- Gastrointestinal dysfunction (excessive sucking, poor feeding, regurgitation, diarrhoea)
- Respiratory distress/depression
- Vague autonomic symptoms (yawning, sneezing, mottling, fever)

All the symptoms and signs of withdrawal can be caused by other neonatal illnesses so it is important to consider common causes of symptoms and, if necessary, exclude those causes with appropriate investigations, e.g. hypoglycaemia causing jitteriness or infection causing fever.

Serotonin Toxicity

Top

Serotonin toxicity occurs after exposure to Selective Serotonin Reuptake Inhibitors (SSRI) medication in the third trimester. Symptoms begin within 3 days of birth and usually settle within 10 to 14 days, at times symptoms may last up to a month. It is not an abstinence syndrome but overstimulation by serotonin, referred to as neonatal adaptation syndrome. Serotonin toxicity includes irritability, constant crying, and hypertonia with jitteriness, tremors and twitching, tachypnoea, tachycardia, overactive bowel with diarrhoea, feeding and/or sleeping difficulties. It is usually not severe enough to require pharmacological management. Only general supportive care is usually required (see section below on Non-pharmacological Management).

'At-Risk' Drugs

Top

Many drugs, both non-prescribed and prescribed, carry risks to the fetus including NAS. All who take at-risk drugs during pregnancy should have appropriate plans made in the antenatal period for management immediately after birth and follow-up. NAS is more common in women with opioid dependence, including pharmaceutical opioid dependence. This includes women receiving opioid

substitution treatment (methadone or buprenorphine) or using prescription opioids (such as oxycodone, morphine, pethidine or tramadol). However, there are many drugs of addiction that may need to be considered in the overall management of neonates experiencing withdrawal.

Common drugs that may cause NAS or neonatal intoxication are listed in the table below:

DRUG GROUP	RISK OF NAS	OTHER RISKS IN NEWBORN PERIOD
OPIOIDS	**HIGH**	Growth restriction, respiratory depression, nasal congestion
SEDATIVES (benzodiazepines)	LOW	Hypothermia, sedation, lethargy, respiratory depression, hypotonia, poor feeding, settling difficulties
STIMULANTS (cocaine, amphetamines)	LOW	Intoxication – agitation, overactivity. NAS possible but rare
SSRI, SNRI	LOW	Serotonin toxicity, mimics withdrawal syndrome
CIGARETTE SMOKING	LOW	Intrauterine growth restriction
ALCOHOL	LOW	Fetal alcohol effect – hyperexcitability, GI symptoms, seizures. Fetal alcohol syndrome rare
MARIJUANA (cannabis/cannabidiol)	LOW	Growth restriction, sedation, feeding difficulties, hypotonia, impaired sleeping
CAFFEINE	LOW	NAS usually mild

Antenatal Care

Top

The care of babies at high risk of NAS should be the responsibility of experienced paediatric medical staff. Babies at lower risk of NAS can receive standard postnatal care under obstetric and midwifery staff.

Women identified pre-pregnancy taking at-risk drugs should be counselled regarding:

- Risks and benefits of drug use while pregnant
- Risks of in utero exposure to drugs
- Risk of withdrawal in utero
- The management of postnatal abstinence syndrome (including management options)
- At risk drug use and breastfeeding

Postnatal care

Top

Postnatal care offers a period to assess:

- The baby for signs of NAS
- Wellbeing of the mother
- Maternal bonding and behaviour
- Parenting skills
- Feeding and excessive weight loss
- Any child protection concerns
- Follow up needs and arrange plans

The following minimum postnatal stay is recommended:

POSTNATAL STAY	RECOMMENDATION
7 DAYS	For mothers on long-acting opioids, as newborn withdrawal can first present late in the first week
5 DAYS	For mothers who have taken non-opioid illicit drugs in the antenatal period
3 DAYS	For mothers taking SSRI or SNRI antidepressant therapy in the third trimester, as serotonin toxicity will usually be apparent within 72 hours

Referral to Follow-up Team Top

Any baby identified as 'at risk' for withdrawal syndromes must be referred at birth to either a Neonatal Consultant (tertiary centre) or Paediatric Consultant (regional centres).

Admission to Special Care Unit Top

'At-risk' drugs taken during the antenatal period is not on its own a reason to admit a baby to Special Care. Newborn babies should be assessed and then admitted to a Special Care Unit (SCU) on an individual basis dependent upon the newborn's condition and individual risk factors. Initial monitoring should occur in the postnatal environment, if an infant becomes symptomatic consideration to transfer to a higher level maternity service is required. Admission to neonatal services is rare and is typically only required to manage multi-pharmacological treatment regimes.

Mandatory reporting applies for any newborn deemed to be at risk of significant harm
Please refer to the Child Wellbeing and Child Protection page on HNELHD intranet

'At-Risk' Drugs and Breastfeeding Top

Breastfeeding is recommended for all babies, unless there are absolute contraindications for doing so. Some drugs are present in breast milk. Concentrations in breast milk will vary according to the drug and may be so small as to be insignificant and considered safe. Other drugs may be present in significant concentrations and considered unsafe so that a period of expressing and discarding milk is necessary after each use or breastfeeding is not recommended.
Potential risks should be weighed up against benefits of breastfeeding. The balance of benefit of breastfeeding versus the safety of drug exposure should be considered when making recommendations around breastfeeding. Referral to a Lactation Consultant is advised.

Prescribed Medications

Please refer to standard texts or online sources available through the Clinical Information Access Portal (CIAP) including:

- Briggs' Drugs in Pregnancy and Lactation
- LactMed database

The Victorian Royal Women's Hospital Pregnancy and Breastfeeding Medicines Guide is available via HNE Health Libraries. Patient Information sheets may be available for individual agents. Alternatively, MotherSafe, based at the Royal Hospital for Women, Randwick provides a comprehensive counselling service for women and their healthcare providers concerned about exposures during pregnancy and breastfeeding. MotherSafe can be contacted on (02) 9382 6539 or 1800 647 848. Therapeutics advice can also be sought from the Hunter Drug Information Service or phone (02) 4014 3695.

Alcohol

Australian Alcohol Guidelines recommend a prudent approach to breastfeeding if alcohol is consumed. No amount of alcohol while breastfeeding is safe, no safe level of alcohol intakes exists. Alcohol reduces breast milk production so no alcohol in the first month is advised so that breastfeeding is well established. If a breastfeeding mother wants to drink alcohol, it is suggested that she breastfeed before drinking alcohol, then wait a minimum of three to four hours after the last drink before breastfeeding again (maximum 2 standard drinks per day).
If she exceeds the recommended levels of drinking (i.e. more than 2 standard drinks), it is suggested that she wait approximately three hours per standard drink (10 gm alcohol) consumed before breastfeeding again. Consider expressing and storing breastmilk prior to drinking as alcohol will be in the breastmilk 30 to 60 minutes after drinking is started. Mothers may wish to express and discard their breast milk. As a general rule, it takes 2 hours for an average women to get rids of the alcohol from 1 standard alcoholic drink. The time is taken from the start of drinking. The Feed Safe app can help support mothers to work out times more accurately.

Benzodiazepines

If a woman taking benzodiazepines wishes to breastfeed, she should be advised that she should not stop taking the benzodiazepines abruptly, but should undergo supervised gradual withdrawal if she wishes to cease use. Benzodiazepines have been taken during breastfeeding without adverse effects in the baby. However, avoid repeated doses if possible, particularly of long-acting agents (which may accumulate in the baby), as lethargy and poor feeding in the baby may occur.
Women on short-acting benzodiazepines should be advised not to breastfeed immediately after taking a dose because of the dual risk of her falling asleep, potentially smothering the infant, and of the infant receiving a maximum dose and becoming excessively drowsy.

Illicit Drugs: Amphetamines, Ecstasy, Cocaine

Advise mothers to withhold breastfeeding for:

- 24 hours after amphetamine or cocaine use
- Up to 48 hours after ecstasy use

Encourage mothers to continue to express and then discard milk during that period. Ongoing use is a contraindication to breastfeeding.

Marijuana (cannabis/cannabidiol)

Data on the effects of marijuana and cannabidiol (CBD) product exposure to the infant through breastfeeding are limited and conflicting. To limit potential risk to the infant, breastfeeding mothers should be advised not to use marijuana or marijuana-containing products in any form, including those containing CBD, while breastfeeding.
If a mother continues to use marijuana or CBD while breastfeeding, she should be encouraged to significantly reduce her intake. To minimise second-hand smoke exposure, advise families to smoke away from infants and children, out of the house and not in the car.

Methadone, Buprenorphine, Oxycodone and other Opioids

Small amounts of these drugs are present in breast milk so mothers receiving these medications will transfer small amounts of the drug to the baby. These amounts may help the baby have less withdrawal symptoms. The low volumes of these drugs also mean sudden cessations of breastfeeding will cause withdrawal later on.

Smoking and Nicotine Replacement Therapy

Minimal amounts of nicotine are present in breast milk and absorbed in the infant gut. Smoking tobacco reduces milk supply and makes breastfeeding less likely and shorter in duration. The effects of other chemicals from smoking that may be present in breast milk are unknown.

The risk–benefit favours nicotine replacement over smoking. Nicotine can be minimised in breast milk by choosing a short-acting nicotine-replacement product (i.e. avoid patches) and taking a dose just after a feed.

Screening for Withdrawal

Top

The Modified Finnegan's Scale/Neonatal Abstinence Severity Score should be used to record NAS scores (see Appendix 2). The scoring system was originally developed for opioid withdrawal but can be used for other drugs and substances to score symptoms.
The Finnegan scoring system is validated only for opioid exposure in term or near-term infants and its use in preterm or stimulant-exposed infants may result in erroneous assessment of the withdrawal or intoxication status of the infant.

Scoring

Top

Scoring an infant with known maternal history
All infants born to drug dependant mothers should receive routine postnatal monitoring, including specific assessment for signs and symptoms of NAS using the Modified Finnegan's Scale/Neonatal Abstinence Severity Score.

Scores should be:

- Commenced within 2 hours after birth and
- Conducted 30-60 minutes after every feed (Note: this must not exceed more than 4 hours regardless of feeding pattern)

Scoring should continue at the minimum 4 hourly requirement until the baby has stabilised. This should be discussed with the managing medical officer and scoring frequency may be adjusted appropriate to the individual infant.

Scoring an infant with unknown maternal history
In the event an infant displays symptoms suggesting that withdrawal may be a problem, scoring can be commenced by any clinician using the Modified Finnegan's Scale/Neonatal Abstinence Severity Score. This can occur with drugs such as nicotine, caffeine, alcohol and a number of psychotropic medications.

Scores should be:

- Commenced at a minimum of 4 hourly and
- Conducted 30-60 minutes after every feed (Note: this must not exceed more than 4 hours regardless of feeding pattern)

Scoring should continue at the minimum 4 hourly requirement until the baby has stabilised. This should be discussed with the managing medical officer and scoring frequency may be adjusted appropriate to the individual infant.

Scoring Requirements:

- Healthcare providers involved in the care of opioid-exposed infants must be educated in the appropriate application of these scores. The modified finnegan neonatal abstinence severity score guideline can be used to support the scoring process (see Appendix 3)
- Score each section between the black lines on the Modified Finnegan's Scale/Neonatal Abstinence Severity Score. If the infant does not meet the criteria, then they score a zero in that section, which can be left as a blank. (Do not score less than or more than the score available in that section, e.g. nasal flaring is either present or not and therefore scores 2 or 0, it cannot be scored as a 1)
- The scoring time and date must be recorded at the top of the scoring section

- The score must be totalled up at the bottom of the chart
- The chart must be initialled at the bottom of the page by the scoring clinician

For outcomes of scoring assessment see decision to treat.

Drug Screens

Top

Routine screening for drugs in urine or meconium is not recommended. There is a significant risk of false positive and false negative results. Mothers are often given opioids for pain relief in labour or after caesarean section and those prescribed methadone or buprenorphine will test positive. Amphetamines wash out in about 3 days; marijuana washes out in about a month. So timing of drug taking and sampling are critical in interpreting results.
If Department of Communities & Justice (DCJ), formerly known as Family and Community Services (FACS), request screening, a sample can be provided so they can arrange analysis outside of hospital services. In this instance DCJ must provide documentation of the sample request.

Decision to Treat

Top

The NAS score is used to help decide on appropriate treatment but is not the only criterion for deciding on pharmacological therapy. Normal term newborns can score up to 8.
The decision to treat is based on the following findings:

- When the total score averages more than 8 over 3 consecutive scores
- When a baby has a single score of ≥12 and is showing signs of significant withdrawal
- When the baby has scores between 8 and 12 and is dependent on the drug taken by the mother, timing of withdrawal after birth, speed of onset of withdrawal, the particular clinical signs in the baby such as severe diarrhoea, inability to feed adequately or sleep, excessive weight loss and parental preferences about treating

Management of NAS

Top

Babies at risk of or with NAS can usually be managed on a postnatal ward.

The first line of managing NAS are non-pharmacological techniques, if these are insufficient, the baby needs pharmacotherapy. Once pharmacological treatment is started and the baby is stabilised on a dose, then the baby can be discharged home on medication provided the baby is at least 5 days after birth. Follow-up weekly in clinic is organised to monitor withdrawal of drug therapy and provide ongoing supplies of medication.
A baby with signs of withdrawal should be weighed every second day (bare weighs) as poor feeding, increased respiratory rate, fever and diarrhoea can all lead to significant dehydration and excessive weight loss. Notify medical staff if weight loss is greater than 10% of birth weight or greater than 5% in any 2-day period.

Non-pharmacological Management

Top

Carer Education

Behavioural and parent craft cares are the first line of treatment of neonatal withdrawal. As drug therapy is being reduced or after it has been stopped, the parents have to rely on the parent craft skills learnt in hospital to settle the baby. This makes teaching these techniques to the parents an important part of their education while in hospital.

Environment

Infants who are suffering from withdrawal are experiencing an excess of stimuli that they cannot cope with. Measures to reduce this excessive input can help the baby with withdrawal.

Suggestions include:

- A single room for mother and baby can greatly assist to reduce stimulation
- Swaddling firmly in a blanket (or sheet if too hot) with the hands up to the face helps limit jitteriness and excessive movement
- Noise is alarming and therefore a quiet room, no radio, no television, with soft soothing talk can be calming
- Bright lights are also a source of stimuli and therefore semi-darkness can help
- Always ensure safe sleeping practices are used:
  - To sleep on their back with baby's head and face uncovered
  - Encourage mothers to keep their baby smoke-free before and after birth
  - Due to the increased incidence of sleep accidents in babies whose mothers are drug-affected, babies are not to co-bed and co-sleep with the mother

Interaction

While the baby has an excess of stimuli, it also doesn't have anything to focus attention on and therefore being face to face with the carer can help the baby overcome the excess of extraneous stimuli and engage the carer to help establish good bonding.

Feeding and Dummies

Babies of mothers who have been prescribed methadone in particular, but often other babies experiencing withdrawal like to suck. It is important that this does not lead to excessive feeding, because too much milk intake may lead to abdominal bloating, pain and worsen diarrhoea. Use of a dummy is encouraged for these babies to meet the need to suck without the possible effects of excessive milk intake.
Similarly, small frequent feedings may be better than large infrequent feedings as this gives the baby a focus, satisfies hunger frequently and has a soothing effect.

Pharmacological Management

Top

Morphine is the medication of choice in the management of opioid-dependent babies. This includes babies with seizures due to opioid withdrawal. It is preferable for Morphine administration to occur in the postnatal environment, to support physiological management between mother and baby. A daily clinical review by the managing neonatal/paediatric team is required with this model of care.

If morphine alone is inadequate to control NAS, a second drug can be used. Clonidine or phenobarbital (phenobarbitone) can be useful in opioid withdrawal, in addition to morphine, when the dose of morphine is at the maximum recommended and there are still signs of significant withdrawal. Phenobarbital (phenobarbitone) may also be considered earlier (i.e. before morphine dose reaches maximum if there is definite evidence of concurrent non-opioid drug use e.g. benzodiazepines, cocaine). In the rare event multi-pharmacological management is required admission to neonatal services should be considered at this time.
Phenobarbital (phenobarbitone) is the drug of choice in withdrawal from non-opioid drugs of addiction and is particularly indicated when abstinence symptoms include convulsions.
Phenobarbital (phenobarbitone) is the drug of choice in mothers who have relied on more than one drug of dependency unless the primary reason for withdrawal is thought to be an opioid withdrawal, and then morphine should be used as a first line and phenobarbital (phenobarbitone) added if necessary.

Caffeine can be used if it is thought the baby is withdrawing from excessive maternal caffeine intake. The baby of a mother on 2 litres per day of Coca-Cola, 7 cups of instant coffee or 4 cups of brewed coffee a day may have withdrawal.

Length of Treatment

The duration of the withdrawal of treatment is usually several weeks but may take many months. The emphasis is on alleviating or treating symptoms of abstinence rather than rapid cessation of treatment.

Morphine

Top

Prescription

Morphine should be prescribed by a medical officer experienced in caring for the neonate suffering from NAS. Always prescribe morphine oral solution 1 mg/1 mL; higher concentrations may lead to inaccurate dosing at the low doses required.

Dose

- Start the baby on a total of 0.5 mg/kg/day orally, divided into 4 doses (give at 6-hourly intervals). Rarely this may be inadequate and a short period of 4-hourly dosing may be necessary at the same total daily dose i.e. 6 doses at 4-hourly intervals
- If the scores remains high after 24 hours of treatment, increase to a total dose of 0.7 mg/kg/day

Do not use a total dose more than 0.8 mg/kg/day
If additional treatment is required, add phenobarbital (phenobarbitone) or clonidine to the morphine treatment as per recommendations below

Discharge on Morphine

When NAS scores and treatment dose are stable for close to 48 hours, the baby can be discharged home on therapy for follow-up within 1 week in clinic.

Weaning Morphine

Top

Weaning the baby off morphine should preferably be done in the home if it is safe to do so. During withdrawal, mild symptoms may occur after a dose reduction of morphine and usually settle in around 24 hours. Some babies remain mildly irritable for weeks or months. This alone is not a reason to continue morphine treatment. In opioid withdrawal treated with morphine, it often takes 1 to 2 months to wean off the morphine completely (see Table 1 for an example of 30 days of weaning). During this time, a normal increase in total daily crying time may occur (and can be exaggerated in colic). Care should be taken to avoid continuing morphine to treat symptoms interpreted as withdrawal, which is in fact colic.

At Home (preferred)

Reduce the dose of morphine by 0.05 mg/dose every 3 days. At lower doses, the total daily dose is reduced by increasing the interval between doses e.g. from 0.3 mg 4 times a day to 0.3 mg 3 times a day and eventually to twice a day. Stop morphine when the baby has been on 0.1 mg/dose twice a day for 3 days. Occasionally babies cannot tolerate a dose reduction every 3 days and need to be weaned more slowly e.g. every 4 or 5 days.

In Hospital (not preferred)

When scores are stable below treatment levels for 48 hours, dose reduction can begin with the aim of total withdrawal of morphine. Reduce the dose by 0.05 mg/dose every 2–3 days provided the score remains below 8 and the baby is otherwise well. At lower doses, the total daily dose is reduced by increasing the interval between doses e.g. from 0.3 mg 4 times a day, to 0.3 mg 3 times a day and eventually to twice a day. Stop morphine when the baby has been on 0.1 mg/dose twice a day for 2 or 3 days.

DOSE	FREQUENCY	DURATION
0.45 mg/dose	4 times a day	For 3 days
0.40 mg/dose	4 times a day	For 3 days
0.35 mg/dose	4 times a day	For 3 days
0.30 mg/dose	4 times a day	For 3 days
0.30 mg/dose	3 times a day	For 3 days
0.25 mg/dose	3 times a day	For 3 days
0.20 mg/dose	3 times a day	For 3 days
0.20 mg/dose	2 times a day	For 3 days
0.15 mg/dose	2 times a day	For 3 days
0.10 mg/dose	2 times a day	For 3 days
	CEASE	

Table 1: Example of a weaning regime

Administration of Morphine

- Use only a 1 mL oral syringe to measure the dose
- Oral administration, preferably with feeds
- The timing of doses is not critical but should be within an hour of (before or after) the prescribed times. This allows some flexibility of dosing to allow for sleep and feeding patterns without risking having two doses too close together or too far apart
- Repeat the dose if the baby has a large vomit within 5 to 10 minutes of administration
- If an infant appears to be unusually sedated, urgent review is required before a dose is given as omitting dose/s and/or dose reduction may be required. If the baby is unusually irritable review is required to consider a dose increase

Phenobarbital (phenobarbitone)

Top

Primary Management Dose

- Start treatment with an oral loading dose of 15 mg/kg
- Continue with 5 mg/kg/day orally, divided into two 12-hourly (q12h) doses
- If symptoms are not controlled within 24 to 48 hours, increase the dose to 8 mg/kg/day divided into two 12-hourly doses (q12h)

Adjunct Dose

This regimen is used when phenobarbital (phenobarbitone) is required in addition to morphine therapy.

- No loading dose required
- Commence 2.5 mg/kg/dose at 12-hourly intervals

Therapeutic Drug Monitoring

Measuring therapeutic concentrations is not required. Published therapeutic concentrations are for seizure control and are not appropriate for control of withdrawal symptoms. Concentrations required to control withdrawal may be higher than used to control seizures.

Dosing

Repeat the dose if the baby has a large vomit within 5 to 10 minutes of administration.

Weaning

If score falls below the treatment levels for 48 hours and the baby is stable then withdrawal of the medication can start by reducing the dose by 2 mg per dose (10–20%), once or twice a week. The

half-life of phenobarbital is long (~70 hours at 4 weeks of age) and it will take 11-14 days to reach a new steady state. The dose must not be reduced more often than every 72 hours.

Clonidine

Top

If morphine alone is inadequate to control opioid withdrawal, clonidine can be used as an additional agent to control the signs and symptoms. However, there is limited information about clonidine use for NAS.

Dose

- Initial therapy: 5 microgram/kg/day divided in 6 to 8 doses (oral recommended)
- Increase dose by 25% every 24 hours to a maximum 12 microgram/kg/day according to neonatal abstinence syndrome scores

Monitoring

Clonidine can cause hypotension and bradycardia. Monitor blood pressure and pulse every 4 hours for first 48 hours.

Weaning

If a neonate has received regular clonidine for >5 days, the dose should be weaned by about 50% each day for 2 to 3 days (reflecting an average half-life of 17 hours in neonates) before ceasing the drug. Watch for tachycardia, hypertension, sweating, and agitation, remembering these may also be opioid withdrawal symptoms.

Caffeine

Top

Standard doses of caffeine for neonatal apnoea are usually adequate to control withdrawal from caffeine.

Dose

- The standard dose of caffeine citrate is:
    - 20 mg/kg oral loading dose and
    - 10 mg/kg/day oral maintenance

Monitoring

Caffeine can cause tachycardia, hypotension and other functional cardiac symptoms. Cardiac monitoring should occur for first 48 hours

Weaning

Should be based on clinical assessment and cessation of neonatal apnoeas

Discharge Planning

Top

Discharging a baby on morphine or phenobarbital (phenobarbitone) minimises time spent in hospital. A multidisciplinary decision is made in conjunction with the parents regarding discharge home on pharmacological treatment.

Consideration is given to the control of:

- The baby's withdrawal symptoms
- Baby's feeding
- Baby's wellbeing
- Baby's weight gain
- The parent's ability to administer the medication
- The home environment

Medication on discharge

At discharge a prescription for 7–10 day supply of the medication should be provided. It is essential to counsel the parents carefully about dose measurement and ensuring that other children cannot access the medication. Parents will need to be supplied with oral syringes to measure and administer the doses.

Follow-up

A follow-up appointment is made with a treating doctor for approximately 1 week after discharge. Decisions regarding further follow-up appointments and dose reductions are made in clinics at the discretion of the treating physician. Repeat prescriptions will usually be required to complete the course of medication.

IMPLEMENTATION PLAN

The clinical guideline will be:

- Circulated to General Managers and Sector Managers.
- Circulated to the clinicians via the Tiered Neonatal Network/Newborn Services, Children Young People and Families Services and the Women's Health and Maternity Network.
- Made available on the intranet (PPG) and HNEKidshealth website.
- Presented at facility/unit meetings and tabled for staff to action.

MONITORING AND AUDITING PLAN

- The person or leadership team who has approved the clinical guideline is responsible for ensuring timely and effective review of the guideline.
- Evaluation will require a review of the most current evidence as well as consideration of the experience of HNELHD staff in the implementation of the clinical guideline.
- Data derived from incidents, monitoring and evaluation should inform the review of the clinical guideline either as required or scheduled.
- Implementation, education support and monitoring compliance be completed by local Clinical Educators and Managers.
- Amendments to the guideline will be ratified by the Manager and Head of Newborn Services & WHaM Networks (where applicable) prior to final sign off by Children Young People and Families Services.

CONSULTATION WITH KEY STAKEHOLDERS

AUTHORS:	**Jo Davis, CNC Newborn Services, NICU JHCH** **Dr Larissa Korostenski, Neonatologist, NICU JHCH**
REVIEWERS:	Kristy Chesworth, Nurse Unit Manager, NICU JHCH Michelle Stubbs, Neonatal/Research Nurse, NICU JHCH Dr Jo McIntosh, Neonatologist, NICU JHCH Dr Javeed Travadi, Neonatologist, NICU JHCH Rae Gifford, Acting CMC Maternity Clinical Risk Management, HNELHD Mandy Hunter, Acting WHaM Network Manager, HNELHD
CONSULTATION:	Tiered Neonatal Network/Newborn Services HNELHD Women's Health and Maternity Services Network Children, Young People and Family Services District Quality Use of Medicines Committee District Clinical Quality & Patient Care Committee
APPROVED BY:	Natalie Butchard, Manager Newborn Services, NICU JHCH Dr Larissa Korostenski, Head of Newborn Services, NICU JHCH Dr Paul Craven, Executive Director, CYPFS

APPENDICES

1. Glossary & Abbreviations
2. Modified Finnegan's Scale/Neonatal Abstinence Severity Score
3. Modified Finnegan Neonatal Abstinence Severity Score Guideline

REFERENCES

1. Abdel-Latif, M.E et al 2007, Short term outcomes of infants of substance-using mothers admitted to neonatal intensive acer units in New South Wales and the Australian Capital Territory. *Journal of Paediatrics and Child Health*, vol. 43, no. 3, pp. 127-133.
2. Bertrand et al. 2018, Marijuana Use by Breastfeeding Mothers and Cannabinoid Concentrations in Breast Milk, *Pediatrics*, vol. 142, no. 3, pp. 1-8.
3. Broome, L & So T.Y 2011, Neonatal Abstinence Syndrome: The use of Clonidine as a Treatment Option, *Neoreviews*, vol. 12, no. 10, pp. 575-583.
4. Burns, L et al 2006, Methadone in pregnancy: treatment retention and neonatal outcomes, *Addiction*, vol. 102, pp. 264-270.
5. Commonwealth of Australia 2006, National Clinical Guidelines for the management of drug use during pregnancy, birth and the early development years of the newborn (Sydney, Australia).

6. Choo R.E et al 2004, Neonatal abstinence syndrome in methadone-exposed infants is altered by level of prenatal tobacco exposure, *Drug Alcohol Depend*, vol. 75, pp. 253-260.
7. Finnegan, L/P et al 1975, Neonatal Abstinence Syndrome: assessment and management, *Addictive Diseases*, vol. 2, pp. 141-158.
8. Gomez-Pomar, E & Finnegan, L.P 2018, The Epidemic of Neonatal Abstinence Syndrome, Historical References of its Origins, Assessment and Management, *Frontiers in Paediatrics* vol. 6, no. 33, pp. 1-8.
9. Jones, H.E et al 2010, Neonatal abstinence syndrome after methadone or buprenorphine exposure, *New England Journal of Medicine*, vol. 363, no. 24, pp. 2320-2331.
10. Kocherlakota, P 2014, Neonatal Abstinence Syndrome, *Pediatrics*, vol. 134, no. 2, pp. 547-561.
11. Kron, R.E et al 1976, Neonatal narcotic abstinence: effects of pharmacotherapeutic agents and maternal drug usage on nutritive sucking behaviour, *Journal Pediatrics*, vol. 88, no. 4, pp. 637-641.
12. MacMullen, N.J, Dulski, L.A & Blobaum, P 2014, Evidenced-Based Interventions for Neonatal Abstinence Syndrome, *Pediatric Nursing*, vol. 40, no. 4, pp. 165-203.
13. Malpas T.J & Darlow, B.A 1999, Neonatal abstinence syndrome following abrupt cessation of breastfeeding, *NZ Medical Journal*, vol. 112, pp. 12-13.
14. Neonatal Medicines Formulary Consensus Group, Medication Protocol - Caffeine, JHCH NICU, approved July 2016.
15. Neonatal Medicines Formulary Consensus Group, Medication Protocol – Morphine (oral), JHCH NICU, approved June 2019.
16. Neonatal Medicines Formulary Consensus Group, Medication Protocol - Phenobarbital, JHCH NICU, approved August 2017.
17. Neonatal Medicines Formulary Consensus Group, Medication Protocol - Clonidine, JHCH NICU, approved May 2020.
18. NSW Health Guideline GL2013_008 Neonatal Abstinence Syndrome Guidelines.
19. Oei, J.L & Lui, K 2007, Management of the newborn infant affected by maternal opiates and other drugs of dependency, *Journal of Paediatrics and Child Health*, vol. 43, pp. 9-18.
20. Streetz, V.N, Gildon, B.L & Thompson, D.F 2016, Role of Clonidine in Neonatal Abstinence Syndrome: A Systematic Review, *Annals of Pharmacotherapy*, vol. 50, no. 4, pp. 301-310.
21. Wachman E.M, Schiff D.M & Silverstein M 2018, Neonatal Abstinence Syndrome: Advances in Diagnosis and Treatment, *JAMA, vol.* 319, no. 13, pp.1362–1374.
22. Wijburg, F.A et al 1991, Morphine as an anti-epileptic drug in neonatal abstinence syndrome, *Acta Paediatrics Scand*, vol. 80, no. 8-9, pp. 875-877.
23. Wolf et al. 2019, A state-level study of opioid use disorder treatment access and neonatal abstinence syndrome, *BMC Pediatrics*, vol. 19, no.371, pp 1-8.
24. Women and Newborn Health Service, Neonatal Directorate, Neonatal Abstinence Syndrome (NAS) Clinical Practice Guideline, North Metropolitan Health Service, Government of Western Australia, available 30 January 2020 <https://www.kemh.health.wa.gov.au/~/media/Files/Hospitals/WNHS/For%20health%20professionals/Clinical%20guidelines/NEO/WNHS.NEO.NeonatalAbstinenceSyndromeNAS.pdf>

OTHER USEFUL LINKS

NSW Health Guideline GL2008_011 Drug and Alcohol Withdrawal Clinical Practice Guidelines - NSW
Australian guidelines to reduce health risks from drinking alcohol
Australian Breastfeeding Association – alcohol and breastfeeding
Australian Medicines Handbook

FEEDBACK

Any feedback on this document should be sent to the Contact Officer listed on the front page.

APPENDIX 1

GLOSSARY & ABBREVIATIONS

Acronym or Term	Definition
DCJ	Department of Communities & Justice
FACS	Family and Community Services
GI	Gastrointestinal
HNELHD	Hunter New England Local Health District
IMI	Intramuscular Injection
kg	Kilogram/s
mg	Milligram/s
mL	Millilitre/s
NAS	Neonatal Abstinence Syndrome
NICU	Neonatal Intensive Care Unit
SCU	Special Care Unit
SNRI	Serotonin Norepinephrine Reuptake Inhibitors
SSRI	Selective Serotonin Reuptake Inhibitors
Q12h	12-hourly dosing intervals
WHaM	Women's Health and Maternity Service Network

APPENDIX 2

MODIFIED FINNEGAN'S SCALE/NEONATAL ABSTINENCE SEVERITY SCORE

NSW Health

Facility:

NEONATAL ABSTINENCE SCORE

FAMILY NAME | MRN

GIVEN NAME | ☐ MALE ☐ FEMALE

D.O.B. _____/_____/_____ | M.O.

ADDRESS

LOCATION / WARD

COMPLETE ALL DETAILS OR AFFIX PATIENT LABEL HERE

SMR110400

Holes Punched as per AS2828.1: 2012

BINDING MARGIN - NO WRITING

Frequency: **Date and time in 24 hour clock**

SYSTEM	SIGNS & SYMPTOMS	SCORE												
CENTRAL NERVOUS SYSTEM DISTURBANCES	High pitched cry	2												
	Continuous high pitched cry	3												
	Sleeps < 1hr between feeds	3												
	Sleeps < 2 hrs between feeds	2												
	Sleeps < 3 hrs between feeds	1												
	Mild tremors disturbed	1												
	Moderate-Severe tremors disturbed	2												
	Mild tremors undisturbed	3												
	Moderate-Severe tremors undisturbed	4												
	Increased muscle tone	2												
	Excoriation (specify area)	1												
	Myoclonic jerks	3												
	Generalised convulsions	5												
METABOLIC/VASOMOTOR RESPIRATORY DISTURBANCES	Fever (37.3 – 39.3°C)	1												
	Fever (39.4°C & higher)	2												
	Frequent yawning (>3-4 times in ½hr)	1												
	Nasal stuffiness	1												
	Sneezing (3-4 times in ½hr)	1												
	Nasal Flaring	2												
	Respiratory rate > 60/min	1												
	Resp. 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												
	TOTAL SCORE:													
	SCORER'S INITIALS:													
SCORER'S SIGNATURE:														

NEONATAL ABSTINENCE SCORE

SMR110.400

301213

NO WRITING

Page 1 of 2

APPENDIX 2

MODIFIED FINNEGAN'S SCALE/NEONATAL ABSTINENCE SEVERITY SCORE

NSW Health

Facility:

NEONATAL ABSTINENCE SCORE

FAMILY NAME | MRN

GIVEN NAME | ☐ MALE ☐ FEMALE

D.O.B. _____/_____/_____ | M.O.

ADDRESS

LOCATION / WARD

COMPLETE ALL DETAILS OR AFFIX PATIENT LABEL HERE

Neonatal Abstinence Scoring Information Sheet

SIGNS & SYMPTOMS

High pitched cry:	Score 2 if a cry is high pitched in its peak. Score 3 if a cry is high pitched throughout.
Sleep:	Consider total amount of time baby was asleep between feeds.
Section on Tremors:	This is a scale of increasing severity and babies should only get one score from the four categories. Undisturbed means when a baby is asleep or at rest in cot.
Increased Muscle Tone:	Score if has generalised muscle tone greater than the upper limit of normal.
Excoriations:	**Score only when excoriations first appear, increase in severity or appear in a new area.**
Yawning and Sneezing:	Score if occurs more than 3 to 4 times in 30 minutes.
Nasal flaring - Respiratory rate:	**Score if present without other evidence of airways disease.**
Excessive sucking:	Score if more than that of the average hungry baby.
Poor feeding:	Score if baby is very slow to feed or takes inadequate amounts.
Regurgitation:	Score only if occurs more frequently than usual in newborn.

MODIFICATIONS FOR PREMATURITY

Mainly necessary in the sections on sleeping, eg; *a baby who needs 3 hourly feeds can only sleep at most 2½ hours between them.* Scoring should be:

1) if baby sleeps less than 2 hours
2) if baby sleeps less than one hour, and
3) if does not sleep between feeds;

Many premature babies require tube feeding. Babies should not be scored for poor feeding if tube feeding is customary for their period of gestation.

The content of this form is based on the modified Finnegan's score

Page 2 of 2

NO WRITING

APPENDIX 3

MODIFIED FINNEGAN NEONATAL ABSTINENCE SEVERITY SCORE GUIDELINE

System	Symptom	**Description** Should Be Scored If:
Central Nervous System Disturbances	Excessive high pitched cry	♦ Cries intermittently or continuously for **up to 5 minutes** despite caregiver intervention. ♦ Infant is unable to decrease crying within a 15 sec Period using self-consoling measures.
	Continuous high pitched cry	♦ Infant cries intermittently or continuously for **greater than 5 minutes** despite caregiver intervention. ♦ **NB:** Since an infant's cry may vary in pitch, this **should not be scored** if high-pitched crying is not accompanied by other signs described above.
	Sleep	♦ Scores based on the **longest period of sleep** within the entire scoring interval. ♦ Include light **and** deep sleep (Deep- regular breathing, eyes closed, no spontaneous activity; Light - irregular breathing, brief opening of eyes at intervals, some sucking movements.
	Hyperactive Moro Reflex	(Moro Reflex: Lift the infant slightly off the bed by the wrists or arms and allow the infant to fall back on the bed. **NB:** should not be performed when infant is crying or irritable) ♦ Infant exhibits pronounced jitteriness of the hands during, or at the end of, the Moro Reflex.
	Markedly hyperactive Moro Reflex	♦ Infant exhibits jitteriness and repetitive jerks of the hands and arms during, or at the end of, the Moro Reflex.
	Mild tremors when disturbed	♦ Infant exhibits observable tremors of the hands or feet whilst being handled.
	Moderate-severe tremors when disturbed	♦ Infant exhibits observable tremors of the arm/s or leg/s, with or without tremors of the hands or feet, whilst being handled.
	Mild tremors when undisturbed	(Undisturbed tremors should be assessed by observing the infant for at least 2 one-minute undisturbed periods) ♦ Infant exhibits observable tremors of the hands or feet whilst not being handled.
	Moderate-severe tremors when undisturbed	♦ Infant exhibits observable tremors of the arm/s or leg/s, with or without tremors of the hands or feet, whilst not being handled.
	Increased Muscle Tone	♦ Should be assessed when infant awake but not crying. ♦ There is **tight flexion** of the infants arms and legs (unable to slightly extend the arms or legs).
	Excoriation	♦ If occurs on **chin, knees, cheeks, elbow, toes or nose.** ♦ Does not include excoriated nappy area caused by loose stools.
	Myoclonic jerks	♦ The infant exhibits **twitching movements** of the muscles of the face or extremities, or if jerking movements of the arms or legs are observed.
	Generalised convulsions	♦ Generalised activity involving tonic (rigid) extensions of all limbs (but may be limited to just one limb), or manifested by tonic flexion of all limbs. ♦ Generalised jitteriness of extremities is observed. Hold or flex the limbs, if the jitteriness does not stop, it is a seizure. ♦ If **subtle seizures** are present (eye staring, rapid eye movements, chewing, fist clenching, back arching, cycling motion of limbs +/-autonomic changes) then they **should be scored** in this category.

APPENDIX 3

MODIFIED FINNEGAN NEONATAL ABSTINENCE SEVERITY SCORE GUIDELINE

Metabolic / Vasomotor / Respiratory Disturbances	Sweating	♦ If perspiration felt on forehead, upper lip or back of neck. ♦ **Do not score** if sweating due to overheating (i.e. cuddling, swaddling).
	Fever	♦ Values as outlined on MR495.
	Frequent yawning	♦ The infant yawns **greater than 3 times** within scoring interval.
	Mottling	♦ Mottling is present on chest, trunk, arms or legs.
	Nasal stuffiness	♦ The infant exhibits **noisy respirations** due to presence of exudate +/-runny nose.
	Sneezing	♦ The infant sneezed **more than 3 times** in the scoring interval. ♦ May occur as individual episodes or may occur serially.
	Nasal Flaring	♦ Present **at any time** during the scoring interval.
	Respiration rate	♦ **NB:** Cannot be assessed while the infant is crying.
Gastrointestinal Disturbance	Excessive Sucking	♦ The infant shows increased (> 3 times) rooting (turns head to one side searching for food) while displaying rapid swiping movements of hand across mouth prior to **or** after a feed.
	Poor feeding	♦ The infant demonstrates excessive sucking prior to a feed, yet sucks infrequently during feeding, taking small amounts, and/or demonstrates an uncoordinated sucking reflex. ♦ Also score if infant continuously gulps the milk, and stops frequently to breathe.
	Regurgitation	♦ Regurgitation, **not associated with burping,** occurs **2 or more** times during the feed.
	Projectile vomiting	♦ **1 or more** projectile vomiting episodes occurs either during or immediately after a feed.
	Loose stools	♦ Scored if stool, which may or may not be explosive, is curdy or seedy in appearance. ♦ A liquid stool, **without a water ring on the nappy,** should also be scored as loose.
	Watery stools	♦ The infant has soft, mushy, liquid or hard stools that are accompanied by a **water ring** on the nappy.