

South Australian Perinatal Practice Guideline

Neonatal Abstinence Syndrome (NAS)

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Note:

This guideline provides advice of a general nature. This statewide guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach. The guideline is based on a review of published evidence and expert opinion.

Information in this statewide guideline is current at the time of publication.

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Health practitioners in the South Australian public health sector are expected to review specific details of each patient and professionally assess the applicability of the relevant guideline to that clinical situation.

If for good clinical reasons, a decision is made to depart from the guideline, the responsible clinician must document in the patient's medical

record, the decision made, by whom, and detailed reasons for the departure from the guideline.

This statewide guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for discussing care with consumers in an environment that is culturally appropriate, and which enables respectful confidential discussion.

This includes:

- The use of interpreter services where necessary,
- Advising consumers of their choice and ensuring informed consent is obtained,
- Providing care within scope of practice, meeting all legislative requirements, and maintaining standards of professional conduct, and
- Documenting all care in accordance with mandatory and local requirements

Note: The words woman/women/mother/she/her have been used throughout this guideline as most pregnant and birthing people identify with their birth sex. However, for the purpose of this guideline, these terms include people who do not identify as women or mothers, including those with a non-binary identity. All clinicians should ask the pregnant person what their preferred term is and ensure this is communicated to the healthcare team.

Explanation of the Aboriginal artwork:

The Aboriginal artwork used symbolises the connection to country and the circle shape shows the strong relationships amongst families and the Aboriginal culture. The horse shoe shape design shown in front of the generic statement symbolises a woman and those enclosing a smaller horse shoe shape depicts a pregnant woman. The smaller horse shoe shape in this instance represents the unborn child. The artwork shown before the specific statements within the document symbolises a footprint and demonstrates the need to move forward together in unison.



Australian Aboriginal Culture is the oldest living culture in the world yet Aboriginal people continue to experience the poorest health outcomes when compared to non-Aboriginal Australians. In South Australia, Aboriginal women are 2-5 times more likely to die in childbirth and their babies are 2-3 times more likely to be of low birth weight. The accumulative effects of stress, low socio-economic status, exposure to violence, historical trauma, culturally unsafe and discriminatory health services, and health systems are all major contributors to the disparities in Aboriginal maternal and birthing outcomes. Despite these unacceptable statistics the birth of an Aboriginal baby is a celebration of life and an important cultural event bringing family together in celebration, obligation, and responsibility. The diversity between Aboriginal cultures, language and practices differs greatly and so it is imperative that perinatal services prepare to respectfully manage Aboriginal protocol and provide a culturally positive health care experience for Aboriginal people to ensure the best maternal, neonatal and child health outcomes.

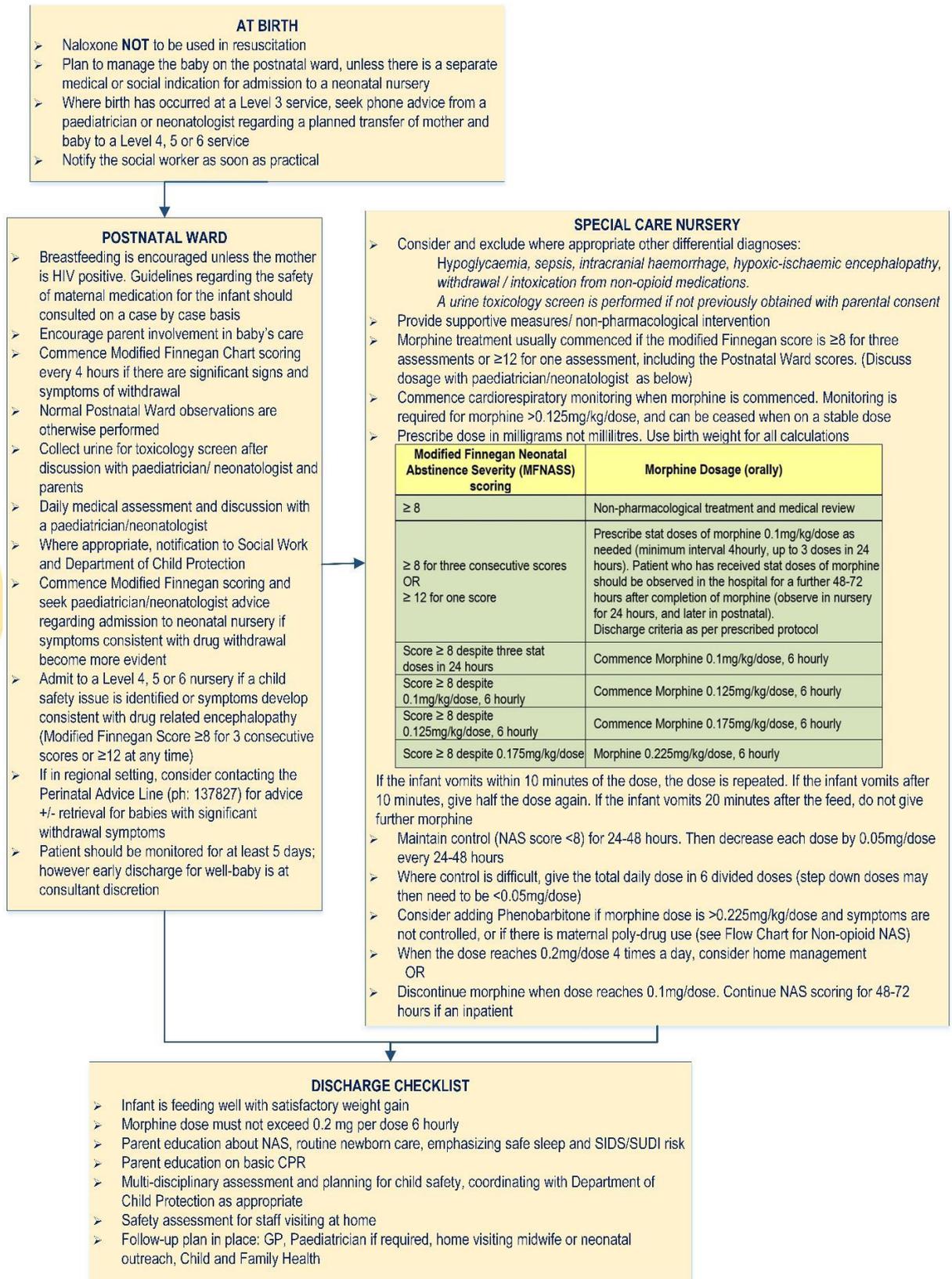
Purpose and Scope of Perinatal Practice Guideline (PPG)

The purpose of this guideline is to provide clinicians with information for the assessment and management of neonatal abstinence syndrome. It includes use of the Modified Finnegan Neonatal Abstinence Severity Scoring (MFNASS) system, non-pharmacological/supportive measures, and pharmacological intervention for babies of both opioid and non-opioid dependent mothers.



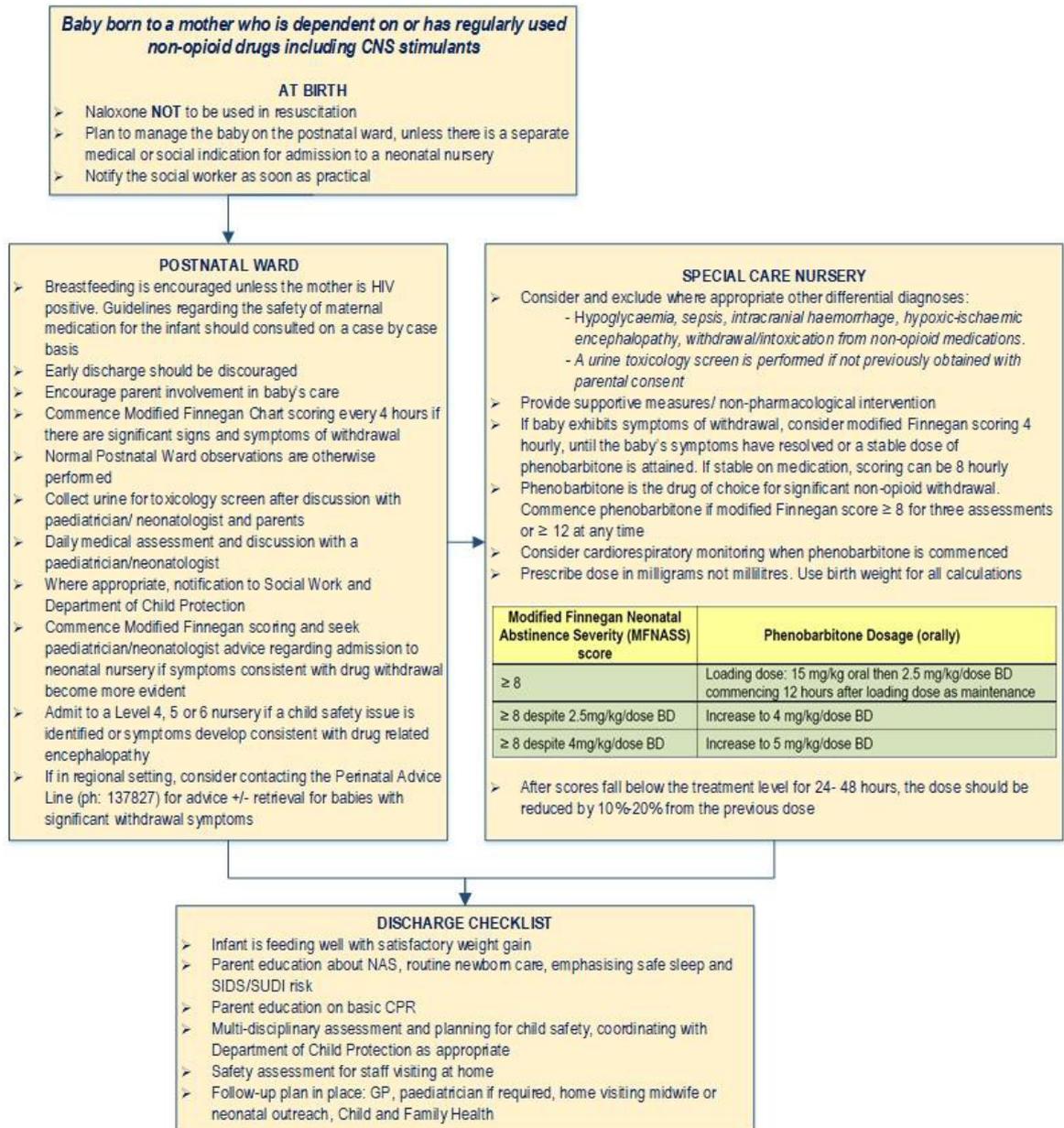
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Flowchart 1| Management of Babies Born to an Opioid Dependent Mother.



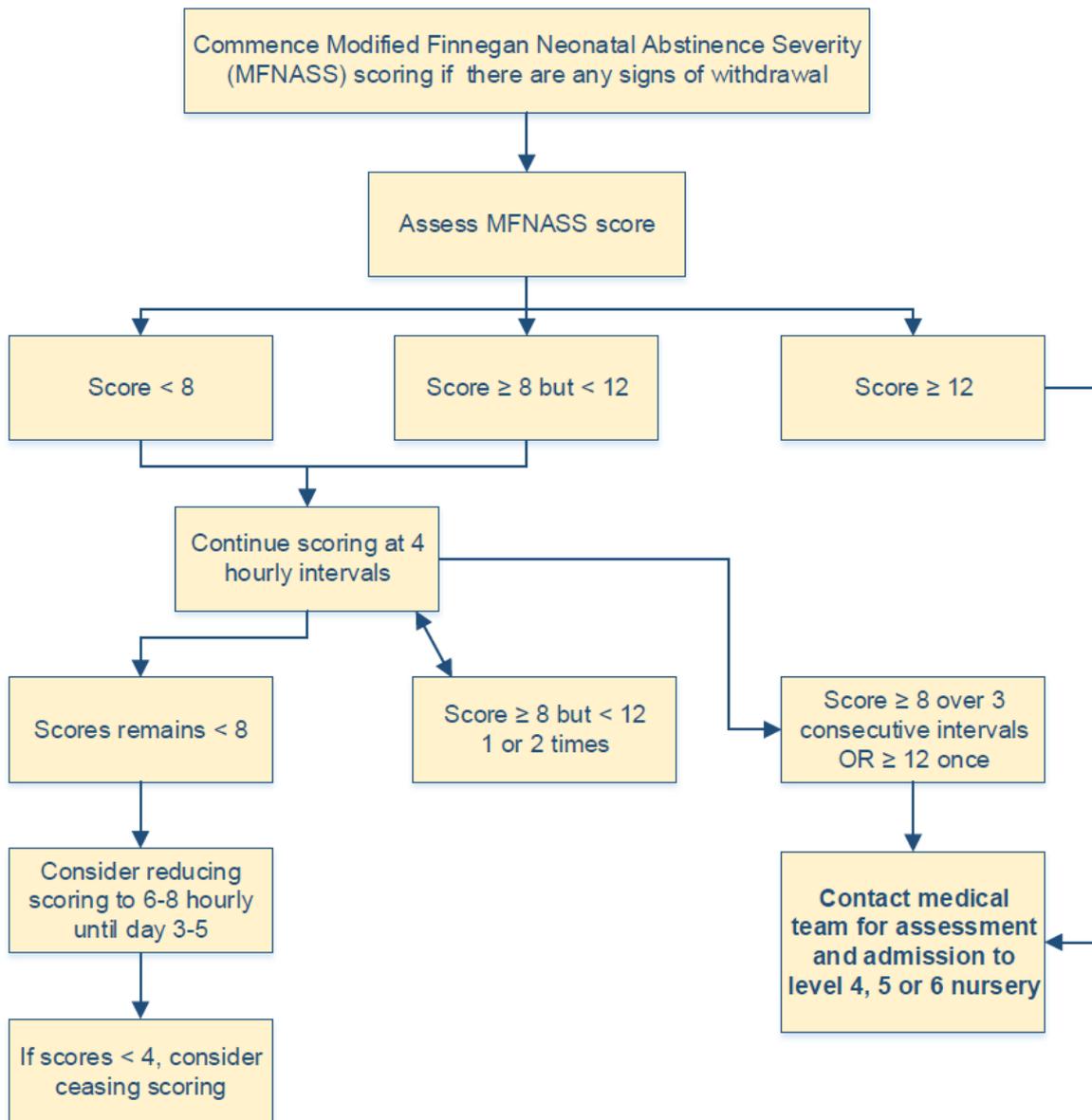
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Flowchart 2| Management of Babies Born to Non-Opioid Dependent Mother.



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Flowchart 3| Modified Finnegan NAS Scoring Frequency



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Summary of Practice Recommendations

Most infants with signs and symptoms of neonatal abstinence syndrome do not require medication.

Optimise non-pharmacological intervention first with parental involvement/ support.

If medication is to be commenced, consider PRN or “as needed” dosing and re-evaluate.

Wean regular doses as quickly as possible (e.g., consider daily weaning of medication).

Definition

Neonatal abstinence syndrome (NAS)

A constellation of signs and symptoms of drug withdrawal in infants after birth. Other terms include opioid withdrawal syndrome or neonatal withdrawal syndrome.



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Abbreviations

BD	12 hourly
CPR	Cardiopulmonary resuscitation
CAFHS	Child and Family Health Service
DASSA	Drug and Alcohol Services South Australia
DDU	Drugs of dependence unit
EMR	Electronic medical records
GP	General practitioner
HIV	Human immunodeficiency virus
kg	Kilogram(s)
mg	Milligram(s)
MFNASS	Modified Finnegan Neonatal Abstinence Severity Score
NAS	Neonatal abstinence syndrome
NNP	Neonatal nurse practitioner
NHMRC	National Health and Medical Research Council
SIDS	Sudden infant death syndrome
SNRIs	Serotonin and noradrenaline reuptake inhibitors
SSRIs	Selective serotonin reuptake inhibitors
SUDI	Sudden unexpected death in infancy

Introduction

The incidence of NAS in Australia has decreased and is estimated to be 3 per 1000 live births.¹ Not all women will divulge their drug use to health practitioners, partners, or relatives. If an infant has symptoms consistent with opioid withdrawal, a history should be taken from the mother in a sensitive manner and in a private setting.²

Infants suspected of opioid withdrawal should be examined thoroughly and other possible causes excluded. Care planning (including screening, treatment, and management) should be family-centred, individualised with frequent evaluation.

Signs and symptoms of NAS can involve the central nervous system (irritability, increased muscle tone, tremors, high-pitched cry, and disturbed sleep), can be autonomic (sneezing, fever, yawning, sweating, mottling), and can include the gastrointestinal system (disorganised sucking, vomiting, loose/watery stools or hyperphagia).

Withdrawal symptoms occur because of a variety of drugs such as opiates, stimulant and antidepressant medications. The onset of withdrawal varies and is dependent on the drug, dose, half-life, gestational age of the infant, and when the drug was last consumed.

Associations with Maternal Use of Drugs

More than 50% of maternal drug use have co-existing psychiatric morbidity; most commonly depression.³ Whilst there is no documented increase in congenital abnormalities in infants of opiate, marijuana using mother, infants born to mothers using illicit drugs are also at risk of adverse neonatal outcomes such as growth restriction, birth defects, sudden infant death and preterm birth.^{4,5} There is no increase in fetal abnormality in mothers who use opioids, amphetamines, or marijuana.

Antenatal Care Planning

If a woman is known to be dependent on opioid or non-opioid substances during pregnancy, a multidisciplinary team meeting should be arranged for around 32 weeks gestation to undertake an assessment of risk to the unborn child and to develop a family support plan. The woman and her partner, maternity care providers (obstetrician, GP, midwife, AMIC worker), Drug and Alcohol Services South Australia (DASSA) clinician (if relevant), neonatologist/paediatrician, hospital social worker/case coordinator and local Department for Child Protection (DCP) case manager (if allocated), should be involved in this team meeting.



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Non-Opioid Agents and Presentation

Table 1: non-opioid agents, presentation, and management considerations.

Agent	Presentation	Management Considerations
Amphetamine/ Methamphetamines	Lethargy, somnolence, and poor feeding	<ul style="list-style-type: none"> • Most amphetamine-exposed infants require only minimal supportive treatment. • Few require pharmacological treatment Avoid early discharge after birth. • Ensure: <ul style="list-style-type: none"> ○ early discharge planning and referral to relevant community support agencies ○ psychosocial assessment and liaison with child safety services prior to discharge ○ provide midwifery support with particular emphasis on breastfeeding support and parenting skills ○ family and social supports are in place ○ paediatric team are involved in the neonate's hospital discharge and follow-up.
SSRI/SNRIs (Antidepressant medication)	<p>Symptoms are usually mild, and most develop within 48 hours of birth and resolve without treatment within two to six days. They include:</p> <ul style="list-style-type: none"> • increased muscle tone • mild or marked tremors while undisturbed • exaggerated Moro reflex (i.e., startle) • loose or watery stools • poor feeding • poor sleep (less than 1-2 hours sleep after feeding) • poor feeding 	<ul style="list-style-type: none"> • Avoid early discharge after birth. • Non-pharmacological measures to support infant through withdrawal. • Encourage breastfeeding.
Cocaine	Autonomic stability Jitteriness Irritability/high-pitched cry Excessive sucking and agitation	<ul style="list-style-type: none"> • Avoid early discharge after birth. • Non-pharmacological measures to support infant through withdrawal.
Alcohol	<ul style="list-style-type: none"> • Jitteriness • Irritability • Poor feeding • At moderate risk of hypoglycemia • Seizure (rare) 	<ul style="list-style-type: none"> • Avoid early discharge after birth. • Non-pharmacological measures to support infant through withdrawal.
Benzodiazepines	<ul style="list-style-type: none"> • May be floppy and lethargic • May be jittery with increased tone • Irritability • Poor feeding 	<ul style="list-style-type: none"> • Extended stay with observation for signs of withdrawal. • Should have outpatient review in first weeks of life. • Educate parents to observe for signs of withdrawal after hospital discharge may be helpful, with instructions to present earlier if indicated by the infant's behaviour. • Non-pharmacological measures to support infant through withdrawal. • Phenobarbitone may be required.
Cannabis	<p>Mild withdrawal signs:</p> <ul style="list-style-type: none"> • Tremors • Exaggerated startle • Lethargy • Poor sleep 	<ul style="list-style-type: none"> • Avoid early discharge after birth. • Non-pharmacological measures to support infant through withdrawal. • Breastfeeding encouraged.



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Early Management after Birth

- **Do Not** give Naloxone in resuscitation of babies born to opioid dependent mothers as it has the potential to cause life-threatening withdrawal symptoms including seizures.
- Ineffective breathing or apnoea in the newborn is managed by positive pressure ventilation in accordance with [Australian Resuscitation Council](#) guidelines.
- The mother's hepatitis B, C and HIV status should be checked if not already done. (See *Hepatitis B in Pregnancy* PPG found in the A to Z index at www.sahealth.sa.gov.au/perinatal and *Hepatitis B Immunoglobulin NNMG* found in the A to Z index at www.sahealth.sa.gov.au/neonatal).
- Urine toxicology screening is useful to determine which drugs the infant has been recently exposed to in utero where this is unclear from maternal history. Verbal consent for the urine toxicology screen is required and consent should be documented in the Medical Record. The test should not be taken if parental consent is not obtained unless there is a legal directive to do so.
- If the infant is otherwise well with no child safety issues are identified, he/she should room in and be observed with mother on the postnatal ward.
- NAS is likely to be more severe in infants that have been exposed to opioid derivatives and multiple substances during antenatal period. The infant should be reviewed daily by a medical officer or neonatal nurse practitioner.
- **Do Not Routinely** score infants born to maternal opioid dependence using a Neonatal Abstinence Score chart (modified Finnegan chart) unless they are symptomatic.
- The NAS scoring system is a guide and not a precise measure of the infant's clinical course.
- Parents are to be educated with the scoring tool and be encouraged to participate in scoring.
- Encourage breastfeeding or expression of breast milk.
- Daily assessment for withdrawal signs and symptoms, adequacy of feeds and weight gain will enable early recognition and appropriate intervention for the infant.
- Liaise with medical team, social work services and involvement of [Department for Child Protection | Department for Child Protection](#) should there be any indication of child-at risk.

Diagnosis of NAS

- Evaluation of signs of neonatal withdrawal should commence using the Modified Finnegan Neonatal Abstinence Severity Score (MFNASS); the Australian standard designed for assessment of opioid withdrawal in term infants.⁶⁻¹¹
- Scoring should occur if signs of withdrawal are evident and then subsequently every 4 hours (see [flowchart 3](#)).
- The Neonatologist or Paediatrician should consider and exclude where appropriate other differential diagnoses (e.g., hypoglycaemia, sepsis, intracranial haemorrhage, and hypoxic-ischaemic encephalopathy).
- Urine toxicology may be clinically helpful to determine the source of substance exposure and risk of abstinence (with documented maternal informed consent or a legal directive).
- The MFNASS has only been validated for opioid NAS yet can still be helpful in assessing non-opioid NAS.^{6,7}
- The MFNASS has limited use in the premature infant who may display fewer signs of withdrawal.
- Evaluation and scoring occur every 4 hours. Scoring is based on the infant's behaviour and symptoms exhibited over the previous 4 hours (see [Instructions for scoring using the MFNASS - Appendix 1](#)). This can also be scored in the EMR.
- The clinician should be well educated on the use of the MFNASS and have directly cared for the infant over the previous 4 hours.
- Scoring is performed 30 minutes to 1 hour after the infant has been fed by experienced medical staff/midwives/nurses.



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- Infants with an abstinence score of 8 or more for three consecutive scores or ≥ 12 at any time should be discussed with a Neonatologist or Paediatrician and the infant transferred to a Level 4, 5 or 6 Special Care Unit for continuous monitoring.
- If there are inconsistencies in the scores, the infant may be observed for a period in a level 4, 5 or 6 Special Care Unit to ensure morphine treatment is justified.
- It is important that the mother is actively involved in the scoring process to facilitate family participation in care. Staff should discuss each sign as it is assessed with the mother.

Non-Pharmacological Intervention

- Most infants with signs and symptoms of abstinence **Do Not Require** medication but respond well with non-pharmacological intervention.
- Non-pharmacological measures are the first-line treatment of NAS and should then be continued as an adjunct to pharmacological treatment. Parents and staff should be educated on these interventions (see [Appendix 2](#)).¹²⁻¹⁹

Environmental Control

- Dimmed room lighting, quiet setting, position, and comfort measures (e.g., swaying and rocking, swaddling, non-nutritive sucking, clustered care, bathing, music therapy, massage)

Feeding Strategies

- Small, frequent feeds, infant-led feeding, breast milk.²⁰
- Encourage the establishment and continuation of breastfeeding if the mother is HIV negative and no other contraindications for breastfeeding exist.
- Breastfeeding has been demonstrated to significantly reduce NAS symptoms, the need for treatment, treatment duration and length of hospital stay.¹⁹
- Provide education to the mother about these benefits of breastfeeding or providing expressed breast milk.

Functioning of the Mother-Infant Dyad

- Fostering parental presence, rooming in, skin to skin contact, direct parental support from clinicians.
- Infants should room in with their mothers if it is safe and feasible. Evidence suggests that rooming-in is associated with a decreased need for pharmacological treatment and length of hospital stay.¹⁴
- Non-judgmental care based on trauma-informed care principles should be provided to mothers to foster maternal involvement and parental well-being.²¹

*New family-centred model of care for the treatment of Neonatal abstinence syndrome (Eat, Sleep, Console Approach) has been developed and practiced.²²⁻²⁶ This method focuses on maximising non-pharmacological intervention, with encouragement of family involvement and morphine use only as needed.

*There is growing evidence that this model of care for infants with NAS reduces the length of stay, reduces medication use, and is cost-effective.²² However, the research evidence is still evolving, and the efficacy of this novel model has not been rigorously researched.

Pharmacological Interventions

Morphine Treatment for Opioid Withdrawal

- Only commence after reassessing and maximising non-pharmacological management.^{8-11, 26-30}
- Commence cardiorespiratory monitoring when morphine is prescribed.



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- Where control is difficult give the total daily dose in 6 divided doses e.g., 4 hourly (step-down doses may then need to be < 0.05 mg).⁸⁻¹⁰
- Consider adding adjunct treatment of phenobarbitone if morphine dose is >0.225mg/kg/dose or if there is maternal poly-drug use.^{8-11,31}

Note: All doses for the entire period of withdrawal management are calculated based on birth weight and not on current weight.

- Once symptoms have been controlled (three consecutive scores of < 8), using this dosage regimen, implement the following:
 - maintain control for 24–48 hours
 - initiate the weaning process by decreasing each dose by 0.05mg every 24-48 hours 4 hourly dose may be reduced to 6-hourly
 - when dosage levels reach 0.2 mg/dose, maintain this dose for 48 hours. At this dose, consideration can be given to home management
 - discontinue morphine when dose 0.1 mg/dose.
- When oral morphine treatment is discontinued, the NAS scoring should continue for a further 48–72 hours if an inpatient.

Table 2: Morphine dose based on MFNAS score.

MFNAS Score	Morphine Dosage (oral) (Calculate to the closest 0.05 mg/dose)
≥ 8	Non-pharmacological treatment and medical review
≥ 8 for three consecutive scores Or ≥ 12 for one score	Prescribe stat doses of morphine 0.1 mg/kg/dose as needed (minimum interval of 4-hourly, up to 3 doses in 24 hours). Continue non-pharmacological intervention (observe in the nursery for 24 hours)
Score ≥ 8 despite three stat doses in 24 hours	Commence Morphine 0.1 mg/kg/dose 6-hourly orally
Score ≥ 8 despite 0.1 mg/kg/dose, 6-hourly	Commence Morphine 0.125 mg/kg/dose 6-hourly orally
Score ≥ 8 despite 0.125 mg/kg/dose, 6-hourly	Commence Morphine 0.175 mg/kg/dose 6-hourly orally
Score ≥ 8 despite 0.175 mg/kg/dose, 6-hourly	Morphine 0.225 mg/kg/dose 6-hourly orally

Vomiting in Association with Morphine Dosing

- Ensure infant is not being overfed.
- Ensure infant is appropriately postured during and after feeding.
- Give morphine before the feed.

If infant has a large vomit after being given morphine:

- re-dose if infant vomits within 10 minutes after a dose
- give ½ dose if infant vomits 10–20 minutes after a dose
- if infant vomits > 20 minutes after feed, do not give further morphine.

Regulation of the Prescription of Morphine Syrup

The Drugs of Dependence Unit regulates the prescription of morphine for treatment of neonatal abstinence in the context of maternal opioid dependence. The following points should be noted:

- Authority for prescription of morphine syrup for NAS is restricted to qualified consultants/registrars/NNP.



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- Authority to prescribe requires written application to the [Drugs of dependence | SA Health](#) (DDU) from the treating paediatrician in the following circumstances:
 - where inpatient therapy exceeds 14 days
 - pre-discharge, where treatment is to be continued in the community for longer than 14 days and inpatient treatment is less than 14 days
 - where treatment is commenced in a private hospital
 - where treatment is continued in a private hospital by a paediatrician other than the authorised paediatrician who commenced treatment in the public hospital
- Authority is given for the period that the treating specialist requests on the application form.
- An individual authority with a unique number is required for each new patient.
- Authority is given subject to the use of morphine syrup in accordance with this guideline or a hospital approved guideline for abstinence treatment.
- Authority can be obtained irrespective of parental consent, although consent is desirable.
- Exemptions to the requirement for authority are as follows:
 - where inpatient treatment is less than 14 days AND where treatment on discharge following inpatient treatment does not exceed 14 days
 - where morphine is prescribed as an inpatient or outpatient as part of a pain or palliative care treatment plan, in which circumstances authority is not required for a period of up to 2 months.
- Under the legislation, other paediatricians employed at the same or another public hospital, or a community general practitioner where a paediatrician considers this appropriate, may be a locum prescriber for the authorised prescriber provided this locum:
 - undertakes due care in assessing the infant's treatment including practicing within approved guidelines and consulting appropriately with a paediatrician
 - complies with the conditions of the authority
 - refers to a paediatrician if three or more consecutive doses of morphine are missed.
- Application forms are available from [SA Health website](#)
- Once an application is received an authority can be issued (if approved) to the paediatrician/consultant and a copy forwarded to the hospital pharmacist.

Phenobarbitone Treatment for Non-Opioid Withdrawal

If the mother does not use opioid drugs but uses central nervous system stimulants (amphetamines, cocaine, SSRIs, SNRIs) or depressants (e.g., benzodiazepines and alcohol) the infant is observed for evidence of NAS on the postnatal ward.

- The NAS chart is not validated for the assessment of non-opioid withdrawal but can still be of use in clinical decision-making.
- Neonatal abstinence syndrome is not routinely scored with NAS score chart, but scoring is commenced if the infant exhibits signs consistent with NAS (persistent crying/poor settling following feeds, tremors/jerks/seizures, poor feeding, diarrhoea/vomiting, fever > 37.5°C per axilla, tachypnoea, sleepy behaviour).
- The assessment procedures using the NAS chart are as described under opioid NAS.
- Babies with NAS score of > 8 should be discussed with a neonatologist/paediatrician and consideration given to transferring to a Level 4, 5 or 6 nursery for observation and further management.
- Phenobarbitone is the drug of choice for significant non-opioid NAS.³¹⁻³³
- If there are inconsistencies in the scores, the infant may be observed for a period of time in a level 4, 5 or 6 nursery to ensure phenobarbitone treatment is truly indicated.
- It is important that the mother is actively involved in the scoring process to facilitate ongoing care for the infant. Staff should discuss each sign as it is assessed.



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- Commencement of phenobarbitone should only occur in a level 4, 5 or 6 nursery with supervision by paediatrician or neonatologist.
- Cardiorespiratory or oximetry monitoring is routinely required at the commencement of phenobarbitone as respiratory depression, including apnoea, may occur following a loading dose.
- Where a mother is on a combination of methadone and benzodiazepines and the infant is not settling with morphine treatment alone, the addition of phenobarbitone treatment may be helpful in the management of withdrawal symptoms.

Table 3: Phenobarbitone dosa based on MFNAS score.

MFNAS Score	Phenobarbitone Dosage (oral)
≥ 8	<ul style="list-style-type: none"> • Loading dose: 15 mg/kg oral • Followed by 2.5 mg/kg/dose orally BD (commencing 12 hours after loading dose as maintenance)
≥ 8 despite 2.5 mg/kg/dose BD	Increase to 4 mg/kg/dose orally BD
≥ 8 despite 4 mg/kg/dose BD	Increase to 5 mg/kg / dose orally BD

After scores fall below treatment level for 24–48 hours, the dose should be reduced by 10%–20% from previous dose.

Discharge Criteria

- Duration of hospitalisation may be tailored according to the type of substance used and other factors such as social circumstances.
- Infants at risk of NAS caused by opioid withdrawal (including methadone and buprenorphine) and/or benzodiazepine should be monitored in hospital for at least 5 days.
- Most infants will exhibit signs and symptoms by 72 hours; however, some infants may have a delayed onset if they have been exposed to long-acting substances or prolonged benzodiazepines in utero.
- Earlier discharge for infants who are well (with short exposure of opioids) and has an appropriate safety discharge plans/ follow up could be considered at consultant's discretion.
- Outpatient management of neonatal abstinence may be considered when morphine doses are < 0.2 mg/dose **and** infant's symptoms are well controlled with satisfactory weight gain **and** families for whom home management is appropriate.
- Parents and caregivers are educated on NAS withdrawal symptoms, routine newborn care, basic CPR, and instruction regarding administration of medications given to parents.
- Parents and caregivers are provided with information on safe sleeping practices (as according to [Safe Infant Sleeping Standards | SA Health](#)) and the risk of SIDS/ SUDI.
- Multi-disciplinary planning for safe care has occurred with social worker or coordinating with local Department for Child Protection service as appropriate.
- Rooming in for 24–48 hours is encouraged to assist with assessment of parenting skills, psychological stability and general education and specific instruction regarding administration of medications.
- [Follow up](#) plan in place (see follow up section in this guideline).
- Safety assessment for staff visiting at home has been performed.



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Follow Up

- General Practitioner review within 2 weeks.
- Weekly Paediatrician outpatient review is required for infants discharged on medications for NAS.
- Other follow up plans as per multidisciplinary plan:
 - maternity outreach,
 - neonatal outreach and [Child and Family Health](#), or
 - [Department for Child Protection](#).
- The parents should be counselled regarding the need for hepatitis C screening of their child at 12–18 months where the mother is hepatitis C positive. Referral to paediatric infectious disease specialist if appropriate.



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MODIFIED FINNEGAN WITHDRAWAL SCORE (TERM INFANTS)

URN:
Family name:
Given name(s):
Address:
Phone:
Date of birth:

Sex: M F I

Facility / Unit:

NEONATAL WITHDRAWAL SCORING CHART (TERM INFANT)

SYSTEM	SIGNS & SYMPTOMS [Score]	SCORE																			
		TIME	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME	DATE										
CENTRAL NERVOUS SYSTEM DISTURBANCES	Cry	Normal [0] Excessive high-pitched cry < 5 min [2] Continuous high-pitched cry > 5 min [3]																			
	Sleep	Normal [0] Sleeps < 3 hours after feeding [1] Sleeps < 2 hours after feeding [2] Sleeps < 1 hour after feeding [3]																			
	Tremors	None [0] 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	No [0] Yes [2]																			
	Excoriation	(e.g., chin, knees, cheeks, elbow, toes, or nose) No [0] Yes [1]																			
	Myoclonic Jerks	(Twitching/ferking of limbs) No [0] Yes [3]																			
	Generalised Convulsions	No [0] Yes [5]																			
METABOLIC / VASOMOTOR / RESPIRATORY DISTURBANCES	Hyperthermia	Afebrile (36.5 °C - 37.4 °C) [0] (37.5°C – 37.9°C) [1] (38°C and higher) [2]																			
	Frequent Yawning	(> 3-4 times per scoring interval) No [0] Yes [1]																			
	Nasal Stuffiness	No [0] Yes [1]																			
	Sneezing	(> 3-4 times per scoring interval) No [0] Yes [1]																			
	Nasal Flaring	No [0] Yes [2]																			
	Respiratory Rate	Normal [0] > 60 breaths/min, no retractions [1] > 60 breaths/min, with retractions [2]																			
GASTROINTESTINAL DISTURBANCES	Excessive sucking	No [0] Yes [1]																			
	Poor Feeding	(Infrequent/uncoordinated suck) No [0] Yes [2]																			
	Regurgitation	No [0] Yes, ≥ 2 times during/post feeding [2]																			
	Projectile Vomiting	No [0] Yes [3]																			
	Stools	Normal [0] Loose (curds/seedy) [2] Watery (water ring on diaper around stool) [3]																			
(Max Score: 40) TOTAL SCORE																					
SCORER'S INITIALS																					

MODIFIED FINNEGAN WITHDRAWAL SCORE

INSTRUCTIONS FOR SCORING

- The score should be based on the infant's behaviour/symptoms exhibited over the previous 4 hours.
- Select one score per sign/symptom at each assessment.
- Modifications for prematurity are mainly necessary in the sections on sleeping, (e.g., an infant who needs three-hourly feeds can only sleep at most 2.5 hours between them). Scoring should be 1 if the infant sleeps less than two, 2 if sleeps less than one hour, and 3 if the infant does not sleep between feeds.
- Many premature infants require tube feeding. Infants should not be scored for poor feeding if tube feeding is routine for their gestation

CENTRAL NERVOUS SYSTEMS DISTURBANCES	Cry: If the infant can be consoled and ceases crying within 5 minutes, the score would be 2 for a high-pitched crying. If the infant continues to cry for longer than 5 minutes despite consoling measures, the score would be 3 for continuous crying
	Sleep: Scored based on the longest time the infant sleeps without being disturbed
	Disturbed tremors: Occurs when the infant is handled. Mild tremors of the hands or feet should score 1, tremors involving the entire arm/leg (moderate/severe) score 2
	Undisturbed tremors: Examined after the infant has been disturbed and has 20 to 30 seconds of being undisturbed. If tremors of the hands or feet continue score 3. Tremors of the entire extremity (moderate/severe) score 4.
	Increased muscle tone: Assessed using the pull-to-sit manoeuvre when the infant is not crying. Score if the infant has increased muscle tone; meaning their arms are straight and their body and head are raised without any head lag
	Excoriation: Score if excoriation is present during the scoring period
	Myoclonic jerks: Involuntary spasms or twitching movements of muscles in the face or extremities, often stimulation-induced
METABOLIC / VASOMOTOR / RESPIRATORY DISTURBANCES	Fever: Ensure sweating or fever is not related to overheating from being overdressed or overwrapped
	Yawning/sneezing: yawns or sneezes occurring more than 3 times in the 4-hour scoring interval
	Nasal stuffiness/flaring: Flaring occurring during inspiration
	Respiratory rate: Count for 1 minute when the infant is not crying
	Respiratory rate with retractions: The presence of an indentation of the chest wall during breathing
GASTROINTESTINAL DISTURBANCES	Excessive sucking: Score if the infant cannot attach properly to a pacifier or teat whilst turning the head from side to side
	Poor feeding: Infrequent sucking during the feeding, taking small amounts of formula or breast milk, or uncoordinated sucking, or prolonged time to complete the feed (> 20 minutes)
	Regurgitation: Effortless return of gastric contents from the mouth. Score if frequent (≥ 2 times) and not associated with burping.
	Projectile vomiting: Ejection of the stomach contents from the mouth under force. Score if 1 or more episodes occur during or after feeding
	Loose stools: May or may not be explosive, curdy, or seedy stool
Watery stools: Water circulating the stool in a ring	

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Neonatal Abstinence Syndrome

Appendix 2| NAS Symptoms and Suggested Techniques

Symptom	Techniques
Prolonged and/or high-pitched crying	<ul style="list-style-type: none"> • Holding/containment techniques: <ul style="list-style-type: none"> ◦ <i>Swaddling</i>: tightly wrap the infant with a light muslin wrap ensuring not to over-heat • <i>Holding</i>: Hold the infant's hands against their chest in a supine position, providing firm but gentle pressure to the trunk or head. Handle in a soft, slow manner. • Decrease environmental stimulus (e.g., reduce loud noises, provide dim lighting). • Avoid rocking beds which may increase NAS symptoms and ensure sleep practices are in accordance with safe sleeping guidelines. • Pacifiers can have a soothing and state-organising effect.
Sleeplessness	<ul style="list-style-type: none"> • Decrease environmental stimuli. • Cluster care to avoiding unnecessary tactile stimuli. • Encourage skin-to-skin contact. • Demand feed.
Difficult or poor feeding	<ul style="list-style-type: none"> • Provide frequent, small volume, on-demand feeding. • Feed in a quiet, calm environment with minimal noise or stimulus. • Pause the feed if the infant is becoming tired, needs to reposition or requires self-organisation.
Regurgitation and/or vomiting	<ul style="list-style-type: none"> • To wind, rub the back instead of patting (which may provoke hyperactive Moro reflex in some infants). • Some infants may require a pacifier during winding if they become distressed when the feed is paused.
Excessive sucking of fists	<ul style="list-style-type: none"> • Cover hands with mittens.
Hyperactivity	<ul style="list-style-type: none"> • Reduce environmental stimuli including sound and light. • Gentle vertical rocking, swaying, swaddling, and containment of hands. • Avoid unnecessary tactile stimuli by clustering care and providing skin-to-skin. • Visual stimulation with black and white objects may prevent overstimulation.
Trembling	<ul style="list-style-type: none"> • Avoid excessive handling. • Gentle handling and containment, positioning, non-nutritive sucking, and swaddling.
Fever (Temperature over 37.5°C)	<ul style="list-style-type: none"> • Fold a blanket across the chest to contain the arms if they cannot tolerate being wrapped due to fever. • Reduce clothing and blankets. • Monitor temperature as clinically indicated.



Neonatal Abstinence Syndrome

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Neonatal Abstinence Syndrome

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