Queensland Clinical Guidelines

Translating evidence into best clinical practice

Maternity and Neonatal **Clinical Guideline**

Neonatal abstinence syndrome

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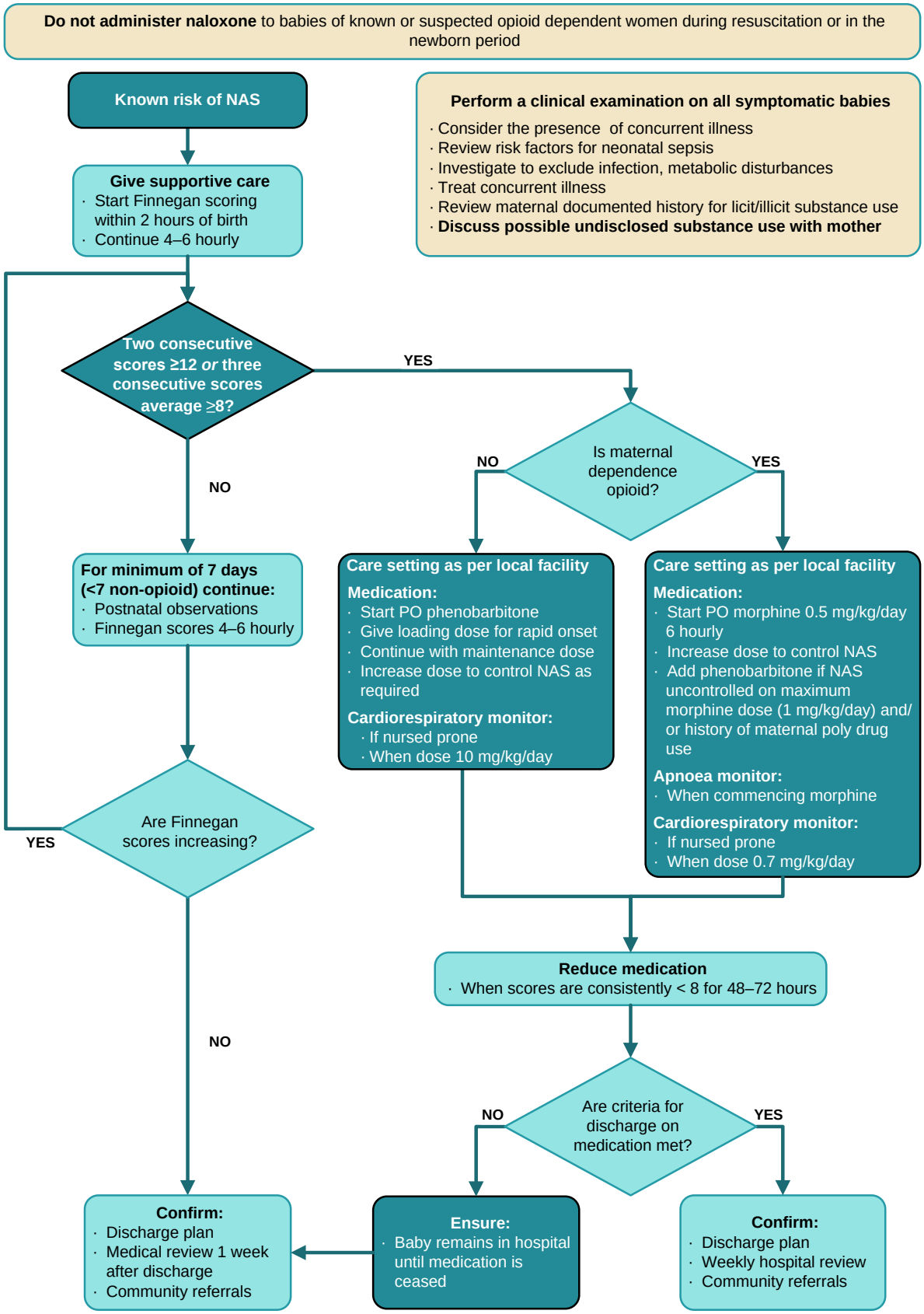
Clinical care carried out in accordance with this guideline should be provided within the context of locally available resources and expertise.

This Guideline does not address all elements of standard practice and assumes that individual clinicians are responsible to:

- Discuss 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
- Advise consumers of their choice and ensure informed consent is obtained
- Provide care within scope of practice, meet all legislative requirements and maintain standards of professional conduct
- Apply standard precautions and additional precautions as necessary, when delivering care
- Document all care in accordance with mandatory and local requirements

Flow Chart: Neonatal abstinence syndrome assessment and management



Queensland Maternity and Neonatal Clinical Guideline: Neonatal Abstinence Syndrome MN10.10-V4-R15

Abbreviations

ATODS	Alcohol Tobacco and Other Drug Services
CNS	Central nervous system
CPLO	Child Protection Liaison Officer
DoC (CSS)	Department of Community (Child Safety Services)
GP	General Practitioner
HBV	Hepatitis B virus
HBsAg	Hepatitis B surface antigen
HCV	Hepatitis C virus
HIV	Human immunodeficiency virus
IU	International units
IUFD	Intrauterine fetal death
IUGR	Intrauterine growth restriction
IV	Intravenous
LFT	Liver function test
NAS	Neonatal abstinence syndrome
NHMRC	National Health and Medical Research Council
PCR	Polymerase chain reaction
RNA	Ribonucleic acid
RANZCOG	The Royal Australian and New Zealand College of Obstetricians and Gynaecologists
RSQ	Retrieval Services Queensland
SIDS	Sudden Infant Death Syndrome
SNRI	Serotonin noradrenaline reuptake inhibitor
SSRI	Selective serotonin reuptake inhibitor
SUDI	Sudden and Unexpected Death of an Infant

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Clinical practice points

Table 1. Clinical practice points for the management of NAS

Key point	Recommendation
Drugs causing NAS	Opioids such as methadone, heroin and increasingly buprenorphine are most frequently the cause of NAS, but any antenatal drug ingestion, including prescription medications, has the potential to cause withdrawal symptoms in the newborn. Poly drug exposure may be present.
Antenatal assessment to identify risk	A detailed antenatal history of maternal drug use and psychosocial assessment will help to identify those babies at risk of NAS.
Antenatal support of parent(s)	Parents should be offered an antenatal appointment with a paediatric service to discuss NAS and implications for care of the baby, including length of stay, monitoring and potential for medication.
Labour and birth	Routine management of labour and birth should occur. The use of antagonistic drugs such as Naloxone (Narcan) are contraindicated in the neonatal period, **including for resuscitation** if there has been maternal opioid use during pregnancy.
Monitoring	Use of a validated assessment tool (Finnegan score) helps to determine which babies have NAS and should be used to monitor and record symptoms of withdrawal.
Supporting breastfeeding	In most cases, breastfeeding should be encouraged and supported if it is the mother's choice. The severity of NAS and requirement for medication may be reduced by the provision of breast milk.
Setting for care	Initial care may be provided on the postnatal ward with the mother. Symptomatic babies require a higher level of care and this may require transfer to a special care nursery for closer observation and assessment.
Choices of treatment	Non-pharmacological management (supportive therapy) is the first line of treatment for all babies exposed to maternal substance use in pregnancy. If medication is required for withdrawal, morphine is the drug of choice for opioid withdrawal and phenobarbitone should be prescribed for non-opioid withdrawal.
Discharge planning	Discharge planning and follow-up should involve a multi-disciplinary approach including the Paediatrician, Social Worker, GP, Child Health, Indigenous Health and other appropriate community supports.

1 Introduction

NAS is more common in babies born to opioid dependent women particularly methadone, heroin and buprenorphine.[1] It may also occur in babies following prolonged post-natal drug exposure e.g. post-operative analgesia.

This guideline is applicable to neonatal drug withdrawal from any substance, licit or illicit.

1.1 Definition

Neonatal abstinence syndrome (NAS) is a syndrome of drug withdrawal with non specific signs and symptoms that may occur in babies following in-utero drug exposure.[1]

1.2 Substances used or misused

A large variety of substances may be used or misused by women of childbearing age.[2] Many are known to cause neonatal behaviour consistent with drug withdrawal.[2]

In-utero fetal exposure to the following major classes of drugs [refer to Table 2. Substances used or misused] may lead to neonatal withdrawal:

- opioids (methadone, heroin)
- central nervous system (CNS) stimulants (amphetamines, cocaine, selective serotonin reuptake inhibitors (SSRIs), serotonin noradrenaline reuptake inhibitors (SNRIs)) [refer to Appendix F: Maternal and neonatal SSRI/SNRI exposure, effect and management]
- CNS depressants (alcohol, barbiturates, benzodiazepines)
- hallucinogens including inhalants (glues, paint thinner, petrol)

The incidence and severity of NAS varies depending on the type of drug. Some babies may have had in-utero exposure to multiple drugs.[3]

1.3 Incidence

Different definitions, screening, assessment and diagnostic tools used in different countries complicate the reporting of substance use[4] and the variety and subtlety of clinical presentation makes recognition difficult.

- In Queensland in 2007, the reported incidence of NAS in newborn babies was 0.3%,[5] however incidence may be higher than reported[3]
- If screened some pregnant women who deny drug use may have positive urine screens for non-prescribed substances[6]
- An Australian survey reported illicit drug use in 6% of women who were pregnant and/or breastfeeding in the preceding 12 months[7]
- The IDEAL study in the United States reported 10.7% of mothers had used illicit drugs during pregnancy[8]
- Alcohol use in Australia was reported in almost half of pregnant women and women who were breastfeeding up to 6 months postpartum.[9] In the USA, 4.5% of pregnant women reported binge drinking in the past month[10]

Table 2. Substances used or misused

Opiods	CNS stimulants	CNS depressants	Hallucinogens
Agonists Codeine[11] Fentanyl Heroin (Diacetyl morphine)[11] Hydromorphone Morphine[11] Methadone[11] Meperidine Oxycodone[11] Propoxyphene **Antagonists** Naltrexone **Mixed agonist-antagonists** Buprenorphine (Subutex)[11] Butorphanol Nalbuphine Pentazocine	**Amphetamines** Amphetamine Dextroamphetamine Methamphetamine **Amphetamine related** Benzphetamine Diethylpropion Ephedrine Fenfluramine Mazindol Methcathinone Methylphenidate (Ritalin) Pemoline Phendimetrazine Phentermine Phenylpropanolamine **Caffeine** **Cocaine[3,11]** **Nicotine** **Dissociative anaesthetics** Phenylcyclidine (PCP) Ketamine **Selective serotonin reuptake inhibitors (SSRIs)[3,11,12]** Citalopram (Cipramil, Celapram, Talam) Escitalopram oxalate (Lexapro, Esipram) Fluoxetine (Prozac, Lovan) Fluvoxamine maleate (Luvox, Voxam) Sertraline (Zoloft, Zydep, Septrone) **Serotonin-noradrenaline reuptake inhibitors (SNRIs)[3,11,12]** Venlafaxine hydrochloride (Efexor)	**Alcohol[3,11]** **Barbiturates** **Benzodiazepines[3]** Alprazolam Clonazepam Diazepam Flunitrazepam Oxazepam Temazepam **Cannabinoids** Cannabis/marijuana Hashish	**Alkaloids** Lysergic acid diethylamide (LSD) Psilocin Psilocybin Dimethyltryptamine (DMT) Diethyltryptamine (DET) **Inhalants[3]** **Solvents and aerosols** (glues, gasoline, paint thinner, cleaning solutions, nail polish remover, freon)) **Phenylethylamines** Mescaline Peyote **Stimulant with hallucinogenic properties** Methylenedioxyamphetamine (MDA) 3-methoxy-4,5-methylenedioxyamphetamine (MMDA) 3,4-methylene dioxyamphetamine (MDMA)(Ecstacy) 3,4-methyl-enedioxyamphetamine (MDEA) **Nitrites** **Nitrous oxide**

1.4 Antenatal care

The primary and most reliable method used to determine the extent of substance use during pregnancy which may help to identify babies at risk of NAS, is a structured maternal interview during antenatal assessment.[1]

The baby's outcome is partly dependent on the quality of antenatal care the mother receives during pregnancy[1]:

- Coordinated antenatal assessment and management including the development of a care plan can have a positive impact and inform the development of a coordinated plan for discharge[13]
- Inadequate antenatal care or late presentations may have a negative impact

These women should be offered an holistic midwifery and obstetric model of care that includes[1]:

- alcohol and drug use support and liaison with community alcohol and drug agencies:
  - enrollment in an opioid treatment program (methadone or buprenorphine)as standard treatment for opioid dependent pregnant women
  - education regarding the safety of opioid replacements in pregnancy/lactation
  - drug use relapse prevention and supportive counselling
  - QUIT tobacco program
- psychosocial assessment and response to:
  - parental mental health
  - preparedness for baby
  - supportive home environment
  - child safety
- paediatric consultation to discuss the risk of NAS, symptoms, treatment options and the possibility of an extended hospital stay after baby's birth
- effective intrapartum and postpartum pain management strategies
- antenatal blood borne viral screening as per The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) recommendations.[14] A history of past or present maternal intravenous drug use increases the risk for Hepatitis C infection, and is an indication for maternal antenatal screening:[15]
  - support for women seropositive for human immunodeficiency virus (HIV), Hepatitis B virus (HBV) and Hepatitis C virus (HCV)
  - re-screening of women who continue high risk drug behaviour at 36 weeks
- information and education regarding NAS assessment (Finnegan score), supportive care, sudden infant death syndrome/sudden and unexpected death in infancy (SIDS/SUDI) and safe sleeping

1.5 Labour and birth

Babies born to women receiving usual doses of opioid for pain relief during labour and birth, are not considered to be at risk of withdrawal from that exposure.[1]

- Women should be encouraged to present to hospital early after the onset of spontaneous labour[1]
- Dose and time of the most recent drug use should be recorded[1]
- Women acutely affected by drugs (e.g. intoxication or acute withdrawal), will require further assessment. Management should include consultation with a drug and alcohol medical specialist[1]
- Birth suite staff should be fully aware of the appropriate management protocol for women on an opioid treatment program

1.5.1 Pain relief

- The usual methadone/buprenorphine (subutex) dose will not provide any analgesia during labour[1]
- Opioids including Pethidine, will be less effective in those receiving treatment with methadone or buprenorphine. Regional anaesthesia may be more appropriate in these women[1]
- Women should be reassured that all routine pain relief will be offered during labour and this will be escalated when indicated or required[1]
- Specialist consultation may be required for post-partum pain management (e.g. post caesarean section)[1]

For further information regarding management of labour and birth [refer to: National clinical guidelines for the management of drug use during pregnancy, birth and the early development years of the newborn. (section 2.3 Labour and birth and section 2.4 Postnatal care)].[1]

1.5.2 Resuscitation

Do not administer Naloxone (and naltrexone) to babies of known or suspected opioid dependent women during resuscitation or the neonatal period.[1] Use may precipitate severe rapid onset of withdrawal associated with seizures.[1]

For further information regarding resuscitation [refer to Guideline: Neonatal resuscitation]

1.5.3 Immunisation

National Health and Medical Research Council (NHMRC) recommends that if mother's are[16]:

- Hepatitis B surface antigen (HBsAg) positive **or**
- Hepatitis B status is unknown and urgent serology is unavailable or you are unable to determine antigen status

Then

The following immunisation should be given to babies[16]:

- Hepatitis B immunoglobulin 100 IU (preferably within 12 hours of birth) **and**
- Hepatitis B vaccination (preferably within 24 hours of birth, definitely within 7 days)

1.5.4 Inter-hospital transfer

At any time, if the birth facility is unable to provide an appropriate level of care, transfer the **mother and baby** to an appropriate higher level facility.

Once the decision has been made to transfer the baby to a higher level facility, this will be coordinated by Retrieval Services Queensland (RSQ) and a Neonatal medical coordinator, by calling 1300 799 127.

2 NAS assessment and diagnosis

A detailed maternal antenatal drug history is essential to identify babies at risk of developing NAS.[1,3] Withdrawal has been documented in babies even if methadone is stopped one month prior to birth (but not more).[1]

Maternal factors that suggest an increased risk of fetal substance exposure and the onset of NAS include:

- inadequate antenatal care
- perinatal infections
- previous unexplained intrauterine fetal death (IUFD)
- previous baby with NAS
- placental abruption[2,17]

Neonatal factors that are known to be associated with maternal drug use include:

- low birth weight[1]
- intrauterine growth restriction (IUGR)[1]
- unexplained prematurity[1,2,18]

2.1 Onset of withdrawal

Onset of withdrawal symptoms varies and is dependent on the:

- dose
- half-life and
- timing of last drug dose prior to birth

Exposure to some substances (e.g. cocaine, alcohol) close to the time of birth may result in signs of neonatal intoxication.

Withdrawal from:

- heroin may be clinically apparent within 24 hours from birth but is usually observed between 24 and 72 hours
- methadone/buprenorphine may be delayed until 3 – 7 days after birth, or beyond
- SSRI/SNRI is variable in onset and may occur within 2 days of birth[12], but may not begin until late in the first week of life

2.2 Clinical presentation:

Clinical presentation of NAS is non-specific. If maternal drug history is unknown, it may not be suspected. Clinical presentation depends on many factors including:

- maternal dose
- class of drug
- time of most recent use
- unknown factors which influence maternal and infant metabolism[2]
- impact of neonatal immaturity or illness
- poly drug use may further complicate the clinical presentation[19]

There is no consistent relationship between maternal methadone dose and the incidence or severity of NAS.[3] However evidence is emerging that indicates the incidence of NAS increases with higher maternal doses.[20]

[refer to Table 3 below for clinical signs of opiate withdrawal][1,2]

Table 3. Clinical signs and symptoms of NAS

System	Signs and symptoms
Central nervous system	· Tremors · Irritability · Increased wakefulness[1] · High pitched crying · Increased muscle tone · Hyperactive deep tendon reflexes · Exaggerated Moro reflex · Seizures[1] · Frequent yawning and sneezing
Gastrointestinal	· Poor feeding[1] · Uncoordinated and constant sucking · Vomiting[1] · Diarrhoea · Dehydration[1] · Poor weight gain[1]
Autonomic	· Increased sweating · Nasal stuffiness · Fever · Mottling · Temperature instability

2.3 Differential diagnosis

Due to the non-specific nature of the signs and symptoms of drug withdrawal in the baby, it may be difficult to differentiate NAS from other neonatal conditions such as:

- infection[1]
- hypoglycaemia[1]
- hypocalcaemia
- metabolic disorders

NAS may present with seizures. In this event, always consider other causes for neonatal seizures.

Even with a confirmed history of maternal substance use[1]:

- perform a clinical examination
- consider concurrent illness
- review risk factors for neonatal sepsis
- investigate as required to exclude infection or metabolic disturbances
- treat identified illness

While under-reporting of maternal substance use is recognised, **routine testing of mothers or their babies is not recommended.**[1,3,11,19] However:

- urine and meconium analysis can be performed in cases of significant diagnostic uncertainty to determine fetal drug exposure[1]
- fetal opioid exposure can be detected after the first trimester by meconium analysis[21]
- obtain maternal consent[1]

3 Measuring NAS

At the onset of any signs or symptoms that may be consistent with NAS, a detailed assessment using a validated assessment tool helps to determine which babies have NAS.[1] Regardless of the assessment tool chosen, use of an abstinence scoring sheet provides more objective criteria to determine[2]:

- when pharmacological treatment is necessary
- whether a drug dose should be increased or decreased

Training staff in the use of the assessment tool is essential to increase reliability and scoring consistency.

Validated assessment tools include[1]:

- Finnegan and Modified Finnegan Neonatal Abstinence Severity Score[1]
- Lipsitz tool[1,22]
- Neonatal Withdrawal Inventory[1,23]

3.1 Finnegan and Modified Finnegan Neonatal Abstinence Severity Score

The Finnegan and Modified Finnegan Neonatal Abstinence Severity Score (Finnegan score) is the most widely used tool for assessing NAS and is recognised as an Australian standard.[1,3,11]
[Refer to Appendix A: Finnegan Neonatal Abstinence Severity Score and Appendix B: Modified Finnegan Neonatal Abstinence Severity Score guideline].

The Finnegan and Modified Finnegan Neonatal Abstinence Severity Score was designed to assess opioid withdrawal in term babies.[1,3] Sedative withdrawal and stimulant intoxication share many of the neurological features of opioid withdrawal including risk of seizures and the Finnegan and Modified Finnegan Neonatal Abstinence Severity Score may also be used to assess[1]:

- withdrawal from other drugs, including benzodiazepine and alcohol
- possible stimulant intoxication in the neonatal period, if indicated by maternal history

4 Neonatal care

All babies born to drug dependent mothers should receive[1]:

- routine postnatal monitoring
- specific assessment with the Finnegan or Modified Finnegan score:
  - commence 2 hours after birth
  - continue 4 – 6 hourly
  - increase frequency in response to escalation of withdrawal symptoms:
    - The Finnegan scoring system is **dynamic**. Assessment is not of a single time point, scores should reflect all the symptoms observed between scoring times. Assessment by a consistent care giver (health professional and mother) helps to increase scoring accuracy and subsequent treatment[24]
    - Perform scores ½ to 1 hour after feeds. **Do not wake** a sleeping baby for assessment

Suspect NAS and investigate to determine diagnosis in any baby that:

- is unsettled
- is irritable
- has a high pitched cry
- has tremors/jitteriness
- does not feed well and/or has diarrhoea

If a baby is transferred to a special care nursery for clinical assessment following the onset of symptoms he/she may be returned to the postnatal ward following an appropriate period of observation if he/she does not require medication.

4.1 Preterm babies

- may have less severe symptoms of withdrawal from opioid exposure
- the onset is likely to be later
- symptoms may be confused with other manifestations of prematurity

Symptoms such as:

- respiratory distress or
- poor feeding

should assume less importance than those more specific to NAS such as:

- loose stools
- sneezing
- yawning

5 Therapy

5.1 Care setting

NAS can produce a major disruption to mother-baby attachment. Assessment and therapy can be carried out in a special care nursery or with the mother on the postnatal ward, however the choice of care setting will depend on[1,3]:

- individual circumstances
- the health care resources available
- the condition of the baby
- the ability for the mother to safely care for her baby

Avoid unnecessary separation of mother and baby.[1] Rooming in may promote more effective mothering.[25]

5.2 Parental role

To facilitate ongoing care involve parent(s) in the assessment and management.[1] Ensure parent/s receive appropriate[1]:

- feeding information and support
- parenting support and assessment
- information regarding settling techniques [refer to Appendix D: Communicating with and comforting baby]
- developmental care of baby including parent/baby attachment
- safe sleeping information especially if they are using sedating medications including methadone[26,27]
- risks of environmental tobacco smoke exposure

5.3 Supportive therapy

Non-pharmacological management is the first line of treatment for in-utero exposure to maternal substance use.[1,3,11] [refer to Appendix C: Supportive therapy for care of a baby with NAS, Appendix E: Baby stability and stress signals].

5.3.1 Environment

NAS heightens sensitivity to the external environment therefore, excessive noise, movement and lighting around babies' cots should be avoided.

5.3.2 Breastfeeding

In most cases, mothers who are drug dependent should be encouraged and supported to breastfeed[1]:

- breast milk may reduce the severity of NAS and the requirement for medication[28]
  - abrupt cessation of breastfeeding may precipitate NAS[29]
- mothers who are Hepatitis C antibody positive should be encouraged to breastfeed however:
  - milk should be expressed and discarded if the nipples are cracked or bleeding.[1,16,30] [refer to Appendix F: Management and follow-up of babies of Hepatitis C infected mothers]

Breastfeeding is rarely contraindicated, unless there is ongoing use of drugs such as heroin, cocaine or amphetamines or if the mother is HIV positive.[3]

Babies with NAS have higher caloric requirements and feeding schedules should reflect this. Provide women with education and support to ensure appropriate feeding, with particular regard to:

- feeding on demand to help initiate and establish lactation
- breast milk expression, particularly if the baby has a disorganised suck or fails to engage in nutritive sucking for a sufficient length of time
- baby behaviour, which may indicate the need for increased feeding frequency or volume. Increased feeding frequency is normal in the first few days after birth and it is important that this is not confused with the symptoms of withdrawal
- the need for supplementary feeds of expressed breast milk or formula which may be required until adequate caloric intake is achieved[1]
- baby's weight as an assessment of feeding and intake
- use of a dummy/pacifier[1]

Consider referral to a lactation consultant or Child Health feeding support services for those with complex needs or where there are problems or concerns about breastfeeding.[1]

5.3.3 Formula feeding

Some women may choose to artificially feed their babies with infant formula. This may be the primary source of nutrition for the baby or provided in conjunction with breastfeeding. Women who choose to artificially feed their babies should be given education and information regarding:

- preparation, transport and storage of (reconstituted/powdered) infant formula
- appropriate heating/reheating of prepared infant formula
- cleaning and sterilisation of feeding equipment

[refer to the Child Health Information Booklet: The first 12 months] for consistent information.

5.4 Pharmacological therapy

[refer to Table 4. Morphine dosing and weaning schedule and Table 5. Phenobarbitone dosing and weaning schedule]

- If pharmacological therapy is being considered it is recommended that:
  - consultation and discussion occur with parent(s)
  - the baby is admitted to a nursery (or as per local facility guidelines) where close observation and appropriate monitoring is available[31]:
    - commence continuous cardiorespiratory monitoring if babies are placed in the prone position to alleviate NAS symptoms[26]
    - explain the reason for prone positioning and monitoring to parent/s
- Initiate pharmacological therapy if:
  - supportive therapy does not adequately control the symptoms of withdrawal[1]
  - the average of any three consecutive Finnegan scores is 8 or more[1,11] (eg. 9-7-9) or
  - there are two consecutive scores of 12 or more[1,31]
- Use of an opioid is recommended for treatment of NAS due to in-utero opioid exposure
  - Morphine is the opioid of choice[1-3,11,32,33]
- Phenobarbitone is the preferred treatment for non opioid NAS[11] and should be primarily prescribed for withdrawal from:
  - non opioid central nervous system (CNS) depressants (eg. benzodiazepines, alcohol, barbiturates) or
  - SSRI/SNRI exposure
- Phenobarbitone may be used in conjunction with morphine where:
  - symptoms of NAS related to opioid exposure are not adequately suppressed or remain uncontrolled on the maximum morphine dose (1 mg/kg/day) or
  - NAS is due to in-utero poly drug exposure
- Reduction in medication dosage **should only be considered** when there has been 48 – 72 hours of clinical stability with Finnegan scores below treatment levels

5.4.1 Morphine

Morphine is the drug of choice for opioid withdrawal [refer to Table 4. Morphine dosing and weaning schedule].

Table 4. Morphine dosing and weaning schedule

Morphine				
Morphine hydrochloride (1 mg/mL)				
Finnegan score (every 4 hours)	**Dose**	**Route**	**Frequency**	**Considerations**
3 consecutive Finnegan scores average of 8 or more[1] ***OR*** 2 consecutive Finnegan scores of 12 or more[1]	**Commence with:** 0.5 mg/kg/day (0.125 mg/kg/dose)[1,31]	Oral	6 hourly[1]	**Monitoring:** Apnoea monitor when commencing morphine Titrate doses to control symptoms of NAS according to Finnegan scores[1,11]
Finnegan score greater than or equal to 8 despite morphine 0.5 mg/kg/day	**Increase dose to:** 0.7 mg/kg/day	Oral	6 hourly	**Monitoring:** Cardio-respiratory monitor when baby requires 0.7 mg/kg/day or more [31]
Finnegan score greater than or equal to 8 despite morphine 0.7 mg/kg/day	**Increase dose to:** 0.9 mg/kg/day	Oral	6 hourly	
Finnegan score greater than or equal to 8 despite morphine 0.9 mg/kg/day	**Increase dose to:** 1.0 mg/kg/day	Oral	6 hourly	**Consider:** Addition of phenobarbitone If Finnegan scores persist greater than or equal to 8 despite morphine 1.0 mg/kg/day
· Frequency of dose increase depends on clinical response and severity of NAS symptoms. For poorly controlled symptoms it may be necessary to reduce the dosing interval to 4 hourly as well as increasing the total daily dose · Consider the addition of phenobarbitone where there has been concurrent use of opioid and non-opioid drugs in pregnancy, particularly benzodiazepines and the symptoms of NAS are not adequately suppressed by morphine treatment alone[1]				
Weaning morphine				
· Reduce morphine dose when Finnegan scores are consistently less than 8 (when scored every 4 - 6 hours) for 48 – 72 hours · A longer period on a particular dose or even an increase in dose may be required if Finnegan scores rebound during the weaning period[1] · Weaning rate should be modified according to clinical response. **Dose should not be reduced by more than 0.1 mg/kg/day within 48 hours of a prior reduction**				
From 4 hourly dosing schedule	**From 6 hourly dosing schedule**			**Considerations**
Suggested weaning - Reduce the dose by 0.05 mg every 48 - 72 hours until 0.2 mg/kg/day ***then*** **Change dose frequency from 4 to 6 hourly**. Same total daily dose but 4 times per day (i.e. a third reduction in daily amount)	**Suggested weaning - Reduce the dose by 0.05 mg** every 48 - 72 hours			Cease respiratory monitoring when dose is less than 0.5 mg/kg/day, if the baby is able to be nursed in accordance with SIDS Guidelines[26] **Continue** Finnegan scores for 72 hours after ceasing morphine
Discontinue when daily dose is 0.10-0.12 mg/kg/day				
Dosing of the vomiting baby				
Reduce the risk of the baby vomiting the morphine dose by: · giving the dose before a feed · ensuring the baby is not overfed If the baby has a large vomit within 5 - 10 minutes of receiving the morphine dose, repeat the dose				

5.4.2 Phenobarbitone

Phenobarbitone should be the initial medication chosen for medical management of non-opioid withdrawal[1,2,11] [refer to Table 5. Phenobarbitone dosing and weaning schedule].

Table 5. Phenobarbitone dosing and weaning schedule

Phenobarbitone				
Phenobarbitone is the preferred treatment for non opioid related NAS[11] and should be used as an initial treatment if babies with signs of NAS reach treatment threshold and[1]: · maternal drugs used are unknown · maternal drugs used are non-opioid · the mother was intoxicated with alcohol or non-opioid drugs at the time of birth				
Finnegan score (every 4 hours)	**Dose**	**Route**	**Frequency**	**Considerations**
3 consecutive Finnegan scores average of 8 or more[1] ***OR*** 2 consecutive Finnegan scores of 12 or more[1]	**Loading dose:** 10-15 mg/kg[31] ***THEN*** **Maintenance dose:** 5 mg/kg/day[1]	Oral or intravenous (IV) if not tolerating oral intake[31]	**Maintenance dose 12 hours after loading dose[31]** **Continue:** 12 hourly	Loading dose is likely to achieve more rapid control of symptoms[1] Titrate doses to control symptoms of NAS according to Finnegan scores[1]
Finnegan scores greater than or equal to 8 despite 5 mg/kg/day of phenobarbitone	**Increase dose to:** 8 mg/kg/day	Oral or IV	12 hourly	
Finnegan scores greater than or equal to 8 despite 8 mg/kg/day of phenobarbitone	**Increase dose to:** 10 mg/kg/day	Oral or IV	12 hourly	**Monitoring:** Cardiorespiratory monitoring when baby requires 10 mg/kg/day or more
Weaning phenobarbitone				
· Reduce phenobarbitone dose by 10 to 20% when baby's Finnegan scores are consistently less than 8 (when scored every 4 - 6 hours) for 72 hours · Dose reductions should not occur more often than every 72 hours				
Dosing of the vomiting baby				
Reduce the risk of baby vomiting the phenobarbitone dose by: · giving the dose before a feed · ensuring baby is not overfed If the baby has a large vomit within 5 - 10 minutes of receiving the phenobarbitone dose, it is appropriate to repeat the dose				

6 Discharge planning

Consider and review ongoing needs using a multidisciplinary approach prior to hospital discharge. This may be informed by any antenatal psychosocial assessment performed by a midwife or social worker. The potential for negative outcome increases in the presence of cumulative risk factors.[34]

An individual discharge plan for mother and baby (a written plan assists with accurate information transfer) should be developed incorporating a multidisciplinary approach with referral to appropriate community services including:

- GP
- Paediatrician
- Child Health
- Indigenous Health where applicable
- maternal referral to Alcohol, Tobacco and Other Drug services (ATODS), Mental Health
- other community services as required

6.1 Length of stay

Recommended length of stay is dependent on in-utero substance exposure:

- Opioid exposed babies should not be discharged before Day 7. The onset of symptoms of withdrawal from opioid exposure may be delayed for several days, particularly in breast-fed babies[28]
- Non opioid exposed babies may be considered for discharge from Day 5 if appropriate follow up is arranged
- A minimum period of 3 days observation after birth is recommended by the Royal Australian and New Zealand College of Psychiatrists (RANZCP) for babies after in-utero exposure to SSRI/SNRI[35] [refer to Appendix F: Maternal and neonatal SSRI/SNRI exposure, effect and management]

This will allow sufficient time to assess[1]:

- development of NAS symptoms
- baby's feeding
- parenting capacity

6.2 Criteria for discharge

Discharge from hospital will be considered when the baby is:

- clinically stable
- feeding well and has begun to gain weight
- being cared for by adults in a safe environment

Discharge of the baby may be delayed in the presence of[1]:

- inadequate home support or acceptance of follow-up plans
- inadequate housing arrangements
- an inability to provide safe monitoring of the baby
- a Temporary Assessment Order (TAO)

6.3 Contraindications to discharge

Contraindications to discharge include[1]:

- excessive weight loss (greater than 10% of birth weight)
- baby less than 5 days old
- suspected baby neglect or abuse
- suspected domestic violence
- a court order preventing baby from being discharged home
- requirement for further assessment of withdrawal
- commencement of pharmacological therapy

6.4 Child safety

Consultation with the Child Protection Liaison Officer (CPLO)/Social Worker should occur if there are concerns regarding Child Safety issues.

Reporting requirements should be considered and a formal 'Report of a Reasonable Suspicion of Child Abuse and Neglect' made to the Department of Communities Child Safety Services in accordance with the provisions of the Public Health Act 2005 and the Child Protection Act 1999, if there are any child protection concerns.

Child protection concerns should be considered in the presence of:

- continued intravenous or illicit drug use
- suspected baby neglect
- suspected domestic violence
- any other issues identified by Social Work assessment

Establish a safety action plan that may be implemented in the event that parent(s) involved with DoC (CSS) fail to engage with community services.

6.5 Home medication

A well coordinated outpatient discharge plan is required before discharge on medication is considered. This may be appropriate if the:

- multidisciplinary psychosocial assessment has been completed and the team agree that the safety of the baby can be assured[1]
- baby is term and healthy and the primary reason for hospitalisation was NAS
- baby is tolerating full sucking feeds
- baby is gaining weight
- baby is considered to be stable on medication and has already tolerated a dose reduction (i.e. no increase in symptoms in the 72 hours following reduction). In the case of a baby receiving morphine, discharge should not be considered unless the daily dose is less than (<) 0.5 mg/kg/day
- parent(s)/carers are able to administer medication[1]
- required support and follow-up has been arranged and parent(s) have received education on:
  - apnoea recognition and management
  - cardiopulmonary resuscitation and emergency contacts
  - reducing the risk SIDS/SUDI.[1,26] SIDS is more common in babies exposed to opioids in pregnancy[3]
  - safe sleeping practices[1,26,27]
  - medication:
    - administration, signs of toxicity and action to be taken in this situation
    - storage and safety
    - baby vomiting following dose administration
  - NAS withdrawal symptoms

6.6 Follow-up

Babies who required monitoring and/or medication for management of NAS should receive:

- Medical review within one week of discharge

Withdrawal symptoms may continue after discharge and after medication ceases (e.g. hypertonicity and poor feeding). Parent(s) should be encouraged to engage with community services (e.g. GP, Child Health) to access support and guidance.

Babies discharged whilst still receiving medication require:

- hospital clinic follow-up at least weekly until after the medication has been ceased

6.6.1 Hepatitis C

Babies born to Hepatitis C antibody positive mothers, require follow up.
[refer to Appendix F: Management and follow-up of babies of Hepatitis C infected mothers] for neonatal investigation and follow-up.

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Appendix A: Finnegan Neonatal Abstinence Severity Score

Babies at risk of narcotic withdrawal are assessed for signs of withdrawal ½ to 1 hour after each feed. Babies who display signs of withdrawal will score from signs in each of the three sections of the scoring chart. The scoring chart is designed for term babies who are fed 4 hourly. Allowances must be made for babies who are preterm or beyond the initial newborn period. Select only one score per sign being assessed.

SYSTEM	SIGN	SCORE										
Central nervous system disturbances	High pitch/excessive cry Continuous (high pitched) cry	2 3										
	Sleeps less than I hour after feeds Sleeps less than 2 hours after feeds Sleeps less than 3 hours after feeds	3 2 1										
	Hyperactive Moro reflex Markedly hyperactive Moro reflex	2 3										
	Mild tremors disturbed* Mod/severe tremors disturbed* Mild tremors undisturbed* Mod/severe tremors undisturbed*	1 2 3 4										
	Increased muscle tone	2										
	Excoriation*	1										
	Myoclonic jerks	3										
	Generalised convulsions	5										
Gastrointestinal disturbances	Excessive sucking	1										
	Poor feeding*	2										
	Regurgitation* Projectile vomiting	2 3										
	Loose stools Watery stools	2 3										
Respiratory/vasomotor disturbances	Sweating	1										
	Fever 37.3 to 38.3°C Fever 38.4°C and above	1 2										
	Frequent yawning (> 3 – 4 in ½ hr)	1										
	Mottling	1										
	Nasal stuffiness	1										
	Sneezing (> 3 – 4 in ½ hr)	2										
	Nasal flaring	1										
	Respiratory rate > 60/min Respiratory rate > 60/min and retractions	1 2										
	TOTAL SCORE											
	SCORER'S INITIALS											

Reproduced with permission. Finnegan, LP, Kron, RE, Connaughton, JF, & Emich, JP, A scoring system for evaluation and treatment of the neonatal abstinence syndrome: A new clinical and research tool. In Basic and Therapeutic Aspects of Perinatal Pharmacology, Ed., Moriselli, PL, Garattini, S. & Sereni, F, New York:Raven Press, 139-155, 1975.

[refer to Appendix B: Modified Finnegan Neonatal Abstinence Severity Score Guideline]

Appendix B: Finnegan Neonatal Abstinence Severity Score Guideline

System	Sign	Description – should be scored if:
Central nervous system disturbances	High pitched or excessive cry	Cries intermittently or continuously for **up to 5 minutes** despite caregiver intervention. Baby is unable to decrease crying within a 15 sec period using self consoling measures.
	Continuous (high pitched) cry	Baby cries intermittently or continuously for **greater than 5 minutes** despite caregiver intervention. NB. Since a baby'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 baby slightly off the bed by the wrists or arms and allow the baby to fall back on the bed. **NB. Do not perform when the baby is crying or irritable).** Baby exhibits pronounced jitteriness of the hands during, or at the end, of the Moro reflex.
	Markedly hyperactive Moro reflex	Baby exhibits jitteriness and repetitive jerks of the hands and arms during or at the end of the Moro reflex.
	Mild tremors when disturbed	Baby exhibits observable tremors of the hands or feet whilst being handled.
	Moderate to severe tremors when disturbed	Baby 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 baby for at least 2 one - minute undisturbed periods). Baby exhibits observable tremors of the hands or feet whilst undisturbed.
	Moderate to severe tremors when undisturbed	Baby exhibits observable tremors of the arm/s or leg/s with or without tremors of the hands or feet whilst undisturbed.
	Increased muscle tone	Should be assessed when the baby is awake but not crying. There is **tight flexion** of the baby's arms and legs (unable to slightly extend the arms or legs).
	Excoriation	If occurs on **chin, knees, cheeks, elbow, toes or nose**. Score only when excoriations first appear, increase or appear in a new area. Does not include excoriated nappy area caused by loose stools.
	Myoclonic jerks	The baby 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 with or without autonomic changes) then they should be scored in this category.
Gastrointestinal disturbances	Excessive sucking	The baby shows increased (greater than 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 baby 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 the baby continuously gulps the milk and stops frequently to breathe.
	Regurgitation	Regurgitation **not associated with burping** occurs **2 or more times** during a feed.
	Projectile vomiting	**1 or more** projectile vomiting episode occurring 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 baby has soft, mushy, or hard stools that are accompanied by a **water ring** on the nappy.
Respiratory/vasomotor disturbances	Sweating	Score if perspiration is felt on forehead, upper lip or back of neck. **Do not score** if sweating is due to overheating (i.e. cuddling, swaddling)
	Fever	Score as per score sheet.
	Frequent yawning	The baby yawns **greater than 3 times** within scoring interval
	Mottling	Score if mottling is present on chest, trunk, arms or legs.
	Nasal stuffiness	The baby exhibits **noisy respirations** due to the presence of exudate with or without a runny nose.
	Sneezing	The baby 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. Score only if present without other evidence of lung or airway disease.
	Respiratory rate	**NB**. Cannot be assessed while the baby is crying.

Adapted from: D'Apolito K. A scoring system for assessing neonatal abstinence syndrome. Instruction Manual. 1994.

Appendix C: Supportive care

(Aligned with Finnegan Scoring System – only symptoms that respond to supportive therapy are included)

System	Sign	Suggested supportive measure
Central nervous system disturbances	Excessive or high pitched crying	Soothe baby with swaddling, talk quietly/sing/hum, hold baby firmly to body, rock gently use an infant sling. Reduce environmental stimuli (slow movements, reduce lighting and noise level).
	Sleeplessness	Reduce environmental stimuli, swaddle baby, minimise handling, rock gently and encourage skin to skin cuddles with parent(s).
	Excoriation (chin, knees, elbow, toes, nose)	Apply protective skin barriers to affected areas to protect skin and prevent damage.
	Myoclonic jerks, tremors, jitteriness, irritability	Prepare everything prior to disturbing the infant to minimise handling. Slow movements, reduced lighting, reduced noise levels, soft music, massage, relaxation baths.
Gastrointestinal disturbances	Excessive sucking	Agitation may result in scratching of the skin. Use of mittens will minimise sucking of the fists, keep hands clean and consult with parents about the use of a pacifier.
	Poor feeding (infrequent/uncoordinated suck)	Feed on demand. Reduce environmental stimuli during feeding. Frequent small feeds with rest between sucking. Assess coordination of suck/swallow reflex – support cheeks and jaw if necessary. Refer to Lactation Consultant as required. Monitor weight loss closely during withdrawal as feeding disturbances are common.[1,3] Assess hydration. If caloric intake appears insufficient with breastfeeding alone use supplemental expressed breast milk or formula until adequate caloric intake is achieved.[1] If insufficient fluid intake refer to medical staff
	Regurgitation/vomiting	Wind or burp baby regularly when he/she stops sucking and at end of feed. Do not over feed.
	Peri – anal excoriation due to loose stools/diarrhoea	Change baby's nappy with every feed, use barrier creams. It may be necessary to expose baby's buttocks to air to dry.
	Pain	Provide pain relief for procedures based on need as for any baby.
Respiratory/vasomotor disturbances	Sweating	Clean skin regularly, dry clean clothing and bedding to prevent skin infection
	Fever – temperature greater than 37.2°C	Ensure adequate hydration and reduce environmental temperature. Dress in light clothing and use lightweight, soft cotton fabric to swaddle or nurse skin to skin with mother. Nurse in an open cot with adequate ventilation
	Nasal stuffiness/excessive nasal secretions	Use gentle suction if nasal secretions cause obstruction to ensure adequate respiratory function
	Nasal flaring/tachypnoea	Refer to medical staff if cyanosis or mottling observed. Avoid swaddling so that respiratory rate can be closely observed. Nurse supine unless receiving cardiorespiratory monitoring in the nursery.

Appendix D: Communicating with and comforting baby

Touching and holding	· Prepare baby for touch with a soft voice · Hold baby in such a way that supports their arms and legs tucked close to their body and hands close to their face · Touch baby in a variety of ways including: o gentle steady pressure o rhythmic stroking or o patting · When moving your hands away from baby, do so gently and slowly without abrupt movements · Burp baby as needed doing so gently without vigorous patting on their back
Positioning	· Support baby's position with their arms and legs close to their body · Repositioning should be performed with slow gentle movements and without sudden changes
Communicating with baby	· Babies communicate from birth. At first their communication signs are quick and hard to spot. Some things to look for are: o a quick look for a few seconds o a sudden stillness o some other little movement · Talk or sing to baby in a soft voice · Share eye contact and let baby look at your face

Appendix E: Baby stability and stress signals

Baby stability signals	**Autonomic system** · Able to regulate colour and respiration · Reduction of tremors twitches, visceral signals **Motoric system** · Smooth well modulated posture and tone. · Synchronous smooth movements with: o hand/foot clasping o grasping o hand to mouth activity o suck/suck searching o hand holding/tucking **State system** · Clear robust sleep states · Rhythmic robust crying · Active self quieting/consoling · Focused shiny eyed alertness with intent or animated facial expression · 'Ooh' face, cooing, attentional smiling
Baby stress signals	**Autonomic system** · Respiratory pauses, tachypnoea, gasping · Colour changes (dusky, pale, mottled, cyanotic) · Tremors, startles, twitches · Yawning · Gagging, spitting up · Hiccoughing · Straining · Sneezing, coughing · Sighing **Motoric system** · Flaccidity (trunk, extremities, face) · Hypertonicity with hyperextension of legs, arms, trunk · Finger splays · Facial grimace · Hand on face, fisting · Fetal tuck · Frantic diffuse activity **State system** · Diffuse sleep-wake states · Fussing or irritability · Staring or gaze averting · Panic or worried alertness · Glassy eyed alertness · Rapid state oscillation · Irritability · Diffuse arousal

Reference: Blackburn ST, Vandenberg KA. Assessment and Management of Neonatal Neuro-behavioural Development. In: Kenner C, Lott JW, Flandermeyer AA. Comprehensive Neonatal Nursing: A physiological Perspective 2nd ed. Philadelphia: WB Saunders Co; 1998.

Appendix F: Maternal and neonatal SSRI/SNRI exposure, effect and management

Depression and other mood disorders occur in approximately 10% of pregnant women, and depression during pregnancy may be associated with an increased risk of preterm birth, low birth weight, operative birth and admission of the newborn to neonatal intensive care units.[36]

SSRI/SNRIs have become the drugs of choice for the treatment of depression and other mood and behavioural disorders such as obsessive-compulsive disorder, panic disorder and anxiety disorders.[37]

Frequent use of these drugs during pregnancy and the concerns regarding neonatal complications have resulted in a labelling caution (neonatal behavioural syndrome) associated with pregnancy exposure.[38]

Maternal effects:

- occur as a result of either discontinuation (withdrawal) or toxicity (excess of 5-HT)
- symptoms of discontinuation syndrome are primarily subjective and may:
  - occur within a few days of cessation, probably due to a hypo-serotonergic state
  - include headache, dizziness, nausea, tiredness, anxiety and low mood
- symptoms of toxicity syndrome are primarily objective and may:
  - include mental state changes (agitation, confusion), neuromuscular hyperactivity (tremor, myoclonus, rigidity, hyperreflexia), and autonomic hyperactivity (fever, sweating, tachycardia, tachypnoea)

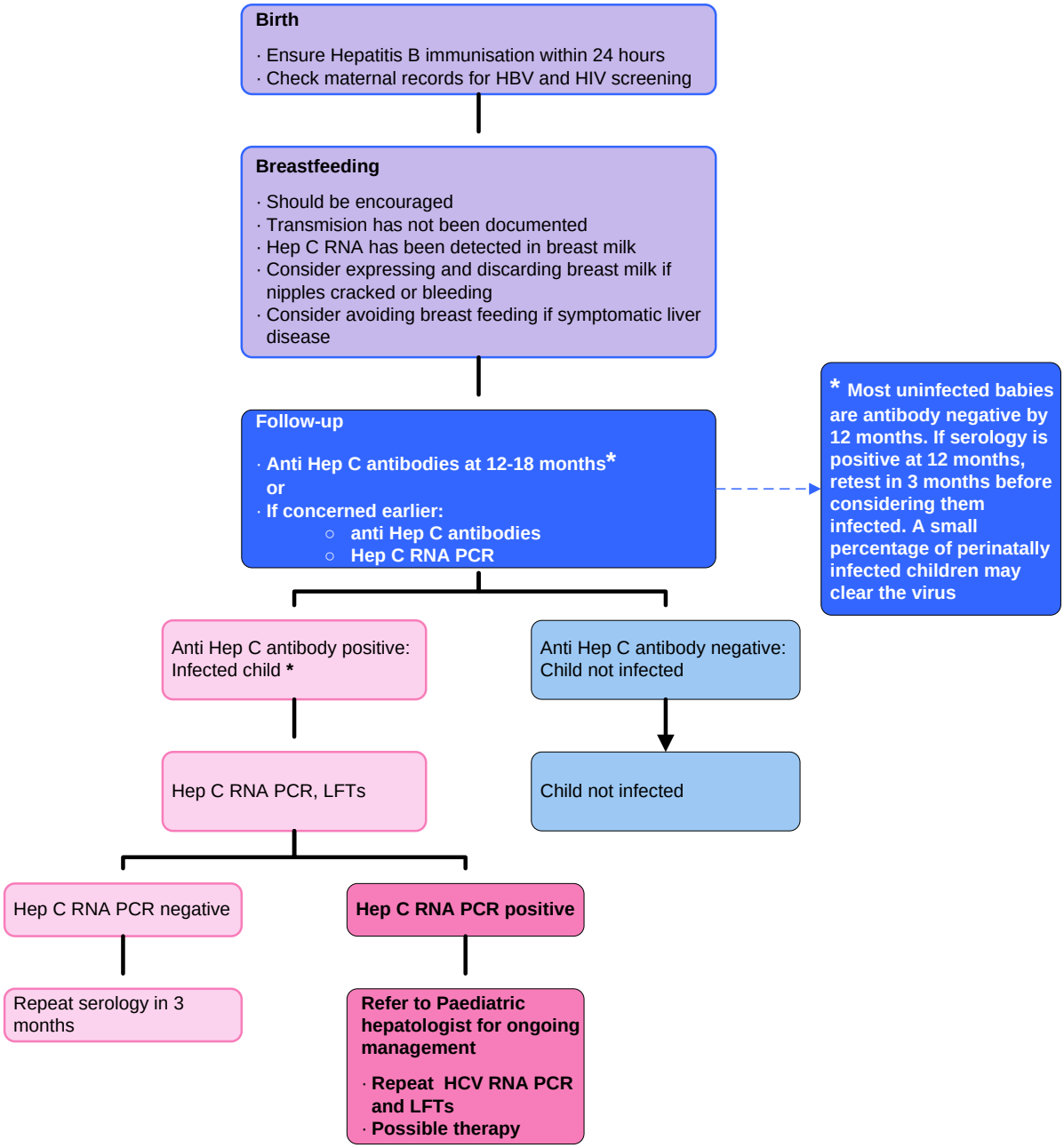
Neonatal effects:

- Evidence of adverse symptoms in babies born to mothers prescribed SSRIs during pregnancy from multiple case reports, adverse drug reaction reports including WHO database analysis, and prospective studies[36]
- Neonatal behavioural symptoms may occur in up to 30% of SSRI-exposed babies[12,35,38]:
  - Symptoms may be consistent with a severe NAS (Finnegan score ≥ 8) [12,38]
  - Timing and intensity of neonatal symptoms is influenced by maternal dose[12] and duration of treatment
  - Peak of intensity of symptoms usually on Day 2[12], but onset may not begin until 5 to 7 days. Mild symptoms and signs may continue for 2 to 4 weeks
  - Most frequently observed symptoms include[12]:
    - tremor, gastrointestinal or sleep disturbance, hypertonicity, and high-pitched cry
    - transient seizures have been reported[12,38]
  - No neonatal deaths attributable to late-pregnancy SSRI exposure reported
- An association has been found between SSRI exposure in late pregnancy and persistent pulmonary hypertension in the newborn (PPHN)[36,39] and neonatal hypoglycaemia[1,12,40-42]
- Observed symptoms in some cases such as jitteriness, tachypnoea, hypertonicity, temperature instability and diarrhoea can be attributed to serotonergic hyperstimulation (toxicity)[12]:
  - Differentiation between toxicity and discontinuation syndrome as cause of symptoms presents a dilemma for clinicians[43] and may not be possible on clinical grounds, although symptoms due to toxicity are likely to be present immediately from birth
  - Drug levels of SSRIs with short half-lives (paroxetine) may be high enough at birth to cause toxicity, and decline rapidly enough to produce symptoms of withdrawal
- Significant or prolonged withdrawal symptoms may require specialised management including:
  - fluid replacement
  - sedative (phenobarbitone) or anti-convulsant therapy

Prevention and management

- Consider maternal dose reduction in late third trimester to reduce the risk of neonatal effects. This must be approved and supervised by Psychiatric team
- Discuss SSRI/SNRI-related neonatal behavioural syndrome antenatally with pregnant women [12,43]
- Encourage Breastfeeding[12]
- Manage baby similarly to opioid exposed babies.[12] A minimum of 3 days postnatal observation is recommended[35]

Appendix G: Management and follow-up of babies of Hepatitis C infected mothers



The general recommendation for testing a well child with perinatal HCV exposure is to test the child for HCV antibodies at greater than or equal to (≥) 18 months of age as transplacental maternal HCV antibodies should clear by then.

When follow-up cannot be guaranteed, testing by HCV RNA PCR (include LFT) should be performed earlier, **but not at less than one month of age** as the sensitivity of HCV RNA PCV is 22% at less than 1 month of age. A single positive PCR result after 1 month of age gives a post-test probability of infection of 73% for a child born to an HIV negative/HCV positive woman and 90% for a child born to an HIV positive/HCV positive woman.

A positive or negative PCR result should be confirmed on a separate occasion. Negative PCR results but positive anti HCV antibody in a child less than (<) 18 months of age usually suggests that the child is not infected. However HCV antibody (with accompanying liver function tests) should be retested at or beyond 18 months of age too confirm this, as occasionally it represents infection of the child in the absence of HCV viremia.

Reference: Palasanthiran P, Starr M, Jones C, editors. Management of Perinatal infections. Sydney:Australian Society for Infectious Diseases (ASID); 2002.

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