BACKGROUND

Neonatal abstinence syndrome (NAS) is a syndrome of drug withdrawal observed in infants of mothers physically dependent on drugs. Also known as neonatal withdrawal syndrome or passive addiction, NAS is a condition resulting from exposure in utero or postnatal exposure to opioids and other illicit drugs. Prenatal NAS, or neonatal withdrawal as a result of the mother’s dependence on drugs during pregnancy, is characterised by signs and symptoms of central nervous system hyperirritability, gastrointestinal dysfunction, respiratory distress and vague autonomic symptoms that include yawning, sneezing, mottling and fever. This syndrome normally begins within 72 hours of birth, but may take at least two weeks for the symptoms to become evident. NAS is more common in infants born to opioid-dependent women than in infants born to women dependent on other drugs or alcohol. Table 1 lists a number of drugs that are known to be associated with neonatal withdrawal problems.

<table>
<thead>
<tr>
<th>Opioids</th>
<th>Barbiturates</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buprenorphine</td>
<td>Butalbital</td>
<td>Alcohol</td>
</tr>
<tr>
<td>Codeine</td>
<td>Phenobarbital</td>
<td>Amphetamine</td>
</tr>
<tr>
<td>Heroin</td>
<td>Secobarbital</td>
<td>Chlordiazepoxide</td>
</tr>
<tr>
<td>Meperidine</td>
<td></td>
<td>Clomipramine</td>
</tr>
<tr>
<td>Methadone</td>
<td></td>
<td>Cocaine</td>
</tr>
<tr>
<td>Morphine</td>
<td></td>
<td>Desmethylimipramine</td>
</tr>
<tr>
<td>Pentazocine</td>
<td></td>
<td>Diazepam</td>
</tr>
<tr>
<td>Propoxyphene</td>
<td></td>
<td>Diphenhydramine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ethchlorvynol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fluphenazine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gamma-Hydroxybutyrate (GHB)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Glutethimide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hydroxyzine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Imipramine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inhalants and Solvents</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Meprobamate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Phencyclidine</td>
</tr>
</tbody>
</table>

Table 1   Drugs Associated with Neonatal Abstinence Syndrome

EARLY RECOGNITION

Early identification of those infants likely to require clinical or pharmacologic interventions can help to reduce the incidence of mortality and morbidity. An accurate history of maternal drug use in the antenatal period is a potentially sensitive means of detecting drug use that can assist in the early identification of newborns that are at risk. However only 40-60% of pregnant women with positive urine tests for drugs in the United States had previously been identified through self-reported drug use questionnaires and interviews.

The signs and symptoms of withdrawal include both physiologic and behavioural responses which are similar to those also observed in cases of hypoglycaemia, hypocalcaemia and sepsis. Glucose and calcium values are reported to be within normal limits for this group of infants, however. Fetal exposure to narcotics commonly results in decreased birth weight, increased weight loss during the early neonatal period and increased length of hospital stay.

SIGNS AND SYMPTOMS

It is estimated that 60-90% of infants born to substance using mothers will develop signs and symptoms of NAS, and of these 50-75% will require treatment. The severity and course of the syndrome is extremely varied. Symptoms usually begin to appear during the first 24 to 48 hours of life, onset of symptoms can range from birth to the end of the second week and beyond, with acute and subacute phases lasting for up to twelve months.

Although the time onset of symptoms may vary, 90% of infants will display symptoms within 96 hours of birth. Onset of symptoms varies according to the drug used by the mother, the quantity, frequency, and
MANAGEMENT OF THE INFANT WITH NEONATAL ABSTINENCE SYNDROME (NAS)—LITERATURE REVIEW

duration of intrauterine exposure, the timing of the withdrawal (last dose prior to delivery) and maturity of the neonate/infant. Onset and severity may be transient, mild, delayed or characterised by intermittent phases of symptoms. If a week or more has elapsed between last maternal drug use and delivery, the incidence of neonatal withdrawal will be relatively low. Symptoms of withdrawal from methadone tend to appear later than symptoms of withdrawal from heroin because of the longer half life, and in both cases the newborn appears normal at birth, both physically and behaviourally.

The effects of prenatal drug exposure and possible neonatal sequelae can be found in the Common Signs of Neonatal Withdrawal, Intoxication or Neonatal Exposure chart. Newborn infants may or may not exhibit any or all of these signs.

At birth the newborn infant may display signs related to the substance used by their mother and will need time to process and clear any free or stored illicit drugs from their system, especially if the mother has been taking large amounts of drugs for a long time. Withdrawal may be mild and transient, delayed in onset, have a stepwise increase in severity, be intermittently present or have a biphasic course which includes acute neonatal withdrawal followed by improvement and then the onset of acute withdrawal. Recovery from the abstinence syndrome is gradual and occurs as the infant's metabolism is re-programmed to adjust to the absence of the dependence-producing agent.

Clinical studies are complicated by numerous confounding factors and polydrug use. A recent study by the Center for the Evaluation of Risks to Human Reproduction (CERHR) on the potential adverse reproductive and developmental effects of methamphetamine exposure concluded that "studies that focused upon humans were uninterpretable due to such factors as a lack of control of potential confounding factors and the issue of the purity and contaminants…"

The American Academy of Pediatrics (AAP) recommends the use of an objective abstinence scoring method to measure the severity of withdrawal. The Finnegan or Modified Finnegan Scoring System is the recommended scoring tool for use in Western Australia. It is the most commonly used scoring system for assessing the infant for potentially life-threatening signs, such as vomiting, diarrhoea, weight loss, irritability, tremors, and tachypnoea. Other scoring systems include the Lipsitz and Ostrea scoring systems. The AAP favours the Lipsitz method which has a relatively simple numerical scoring method and a reported 77% sensitivity using a value >4 as an indication of significant signs of withdrawal. The AAP considers that the usefulness of the 6 criteria in the Ostrea system is limited by the use of simple ranking rather than a numeric scale which allows summation of the severity scores for multiple signs of withdrawal. They consider the Finnegan method, which uses a weighted scoring of 31 items, as possibly too complex for routine use in a busy clinical service.

TREATMENT – FACTORS TO BE CONSIDERED

A number of factors need to be considered when planning the care of drug-exposed neonates and infants:

- Maternal history of drug use during pregnancy
- Maternal history of drug use in the seven days prior to birth
- Drug use during labour and birth
- Quality and quantity of antenatal care
- Level of withdrawal symptoms
- Competence of staff re: NAS Assessment and use of the appropriate tool
- Birth into a Supportive Environment
- Supportive therapies implemented by parents and staff
- Morphine Pharmacotherapy or Phenobarbitone Pharmacotherapy if required
- Interdisciplinary health care team and parents planning for discharge and follow-up

The WITHDRAWAL mnemonic is a useful aid to recognising and remembering the clinical symptoms of withdrawal:

- W ithdrawal
- I rritability
- T remors
- H yperactive, high pitched cry, hypotonia
- D iarrhoea, disorganized suck

R espiratory distress, rhinorrhea
A pnoeaic attacks
W eight loss
A lkalosis – respiratory
L acrimation
MANAGEMENT OF THE INFANT WITH NEONATAL ABSTINENCE SYNDROME (NAS)—LITERATURE REVIEW

DIAGNOSIS AND MANAGEMENT OF NEONATAL WITHDRAWAL SYMPTOMS

A maternal history of substance use during pregnancy often forms the basis for diagnosis of subsequent symptoms of neonatal withdrawal. Use of a NAS score chart, such as the Modified Finnegan Scoring System, is frequently used to monitor the infant and exclude other possible causes for jitteriness and irritability (hypoglycaemia, hypocalcaemia, sepsis, etc). The weighted numeric score is then used in conjunction with supportive or pharmacologic treatment guidelines to monitor the infant's clinical response and provide a comprehensive and objective way of assessing the onset, progression and diminution of symptoms of abstinence.

Once diagnosed, initial treatment for neonatal withdrawal should be primarily supportive since medical interventions may prolong hospitalisation and subject the infant to drugs that may not be necessary. NAS can be a major disruption to mother-infant attachment and unnecessary separation of mother and infant should be avoided if at all possible. Parents should be provided with information regarding the use of supportive therapy and encouraged to use it as an ongoing part of the infant's care.

Any decision to treat should be based on data obtained with an objective scoring device. Infants with confirmed exposure and NO SIGNS of withdrawal do not necessarily need to be treated. Intravenous fluids and replacement electrolytes may be necessary to stabilize the infant's condition in the acute phase without the need for pharmacologic intervention. The use of supportive therapy has been shown to reduce the effects of withdrawal in neonates and should be implemented as soon as possible following birth. Babies with mild symptoms can be cared for using supportive therapy alone, the main components of which are outlined in Tables 2 and 3.

Pharmacologic intervention is indicated for evidence of acute withdrawal, such as seizures, and may be indicated if: 3 consecutive NAS scores are ≥ 8 or the average of three consecutive scores is ≥ 8, 2 consecutive NAS scores are ≥ 12 or the average of 2 consecutive scores is ≥ 12. Scoring should be applied in a consistent manner by experienced personnel, using a four-hourly scoring interval until the infant has been stabilised.

SUPPORTIVE ENVIRONMENT

- Place the infant in a quiet environment with dim lighting and reduced stimulation
- Closely wrap or swaddle infant to decrease sensory stimulation
- Handle infant gently
- Hold newborn infant firmly and close to the body
- Promote cuddling, skin to skin contact with mother and use of infant sling
- Massage infant or try relaxation baths
- Rock gently, talk, sing or hum softly
- Play heart beat audiotapes
- Decrease stimulation at first signs of distress
- Feed on demand (frequent small feeds with rests between sucking)
- Give frequent small feeds of hypercaloric formula to supply additional caloric requirements
- Assess coordination of suck/swallow reflex – support cheeks and jaw if necessary
- Consult with mother on the use of a pacifier for excessive sucking
- Use mittens to prevent trauma to fingers and wrists
- Use short-haired sheepskin with soft cotton sheet
- Change nappy frequently, use barrier cream to protect skin/prevent damage
- Use gentle suction if nasal secretions cause obstruction to ensure adequate respiratory function
- Monitor sleeping habits, temperature stability, weight gain or loss, and any other changes in clinical status that might suggest another disease process
Table 2  Supportive therapy for care of the infant with NAS (aligned with Modified Finnegan Scoring System – only symptoms that respond to supportive therapy are included)

<table>
<thead>
<tr>
<th>Central Nervous System Disturbances</th>
<th>Signs and Symptom</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Excessive or high-pitched crying</td>
<td><strong>Reduce environmental stimuli.</strong> Hold newborn infant firmly and close to the body, gentle rocking, talking/singing/humming, and use of infant sling.</td>
</tr>
<tr>
<td></td>
<td>Sleeplessness</td>
<td>Wrap or swaddle infant, minimise handling, skin to skin contact, and use of infant sling.</td>
</tr>
<tr>
<td></td>
<td>Myoclonic jerks, tremors, jitteriness, irritability</td>
<td>Prepare everything prior to disturbing the infant to minimise handling. Slow movements, reduced lighting, reduced noise levels, soft music, massage, and relaxation baths.</td>
</tr>
<tr>
<td></td>
<td>Excoriation (chin, knees, elbow, toes, nose)</td>
<td>Apply barrier creams to affected areas to protect skin and prevent damage. Bedding – short haired sheepskin covered with a soft cotton sheet.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Metabolic/Vasomotor/Respiratory Disturbances</th>
<th>Signs and Symptom</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sweating</td>
<td>Clean skin regularly, dry clean clothing and bedding to prevent skin infection.</td>
</tr>
<tr>
<td></td>
<td>Hyperthermia – temperature &gt; 37.2°C</td>
<td>Ensure adequate hydration and reduce environmental temperature. Avoid heavy bedding and use of Perspex cot. Dress or swaddle in loose light fabrics, skin to skin contact with mother.</td>
</tr>
<tr>
<td></td>
<td>Nasal flaring / tachypnoea</td>
<td>Avoid swaddling so that respiration can be observed. Refer to medical staff if cyanosis or mottling observed. Nurse in supine position unless continuously monitored.</td>
</tr>
<tr>
<td></td>
<td>Nasal stuffiness / excessive nasal secretions</td>
<td>Use gentle suction if nasal secretions cause obstruction to ensure adequate respiratory function.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gastrointestinal Disturbances</th>
<th>Signs and Symptom</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Excessive sucking – fists, fingers, thumbs</td>
<td>Apply mittens, keep hands clean, consult with mother re use of pacifier (dummy) for non-nutritive sucking to provide comfort and prevent trauma to fingers and fists.</td>
</tr>
<tr>
<td></td>
<td>Poor feeding (infrequent/uncoordinated suck)</td>
<td>Feed on demand. Reduce environmental stimuli during feeding. Frequent small feeds with rest between sucking. Weigh and assess hydration daily. Assess coordination of suck/swallow reflex – support cheeks and jaw if necessary. If insufficient fluid intake refer to medical staff.</td>
</tr>
<tr>
<td></td>
<td>Regurgitation / vomiting</td>
<td>Burp or wind when infant stops sucking and at end of feed.</td>
</tr>
<tr>
<td></td>
<td>Loose stools / diarrhoea</td>
<td>Frequent nappy changes using barrier creams Occasional skin exposure to allow buttocks to dry.</td>
</tr>
</tbody>
</table>
PHARMACOLOGICAL TREATMENT OF NEONATAL WITHDRAWAL SYMPTOMS

If pharmacologic management is necessary, the American Academy of Pediatrics recommends use of drug-specific therapy, preferably with a drug from the same class as that causing withdrawal. Benzodiazepines for alcohol withdrawal and methadone for opioid withdrawal are the only drugs approved by the US Food and Drug Administration (FDA) for the treatment of drug withdrawal. However paregoric and a number of other drugs that do not have FDA approval are also used to treat symptoms of neonatal withdrawal.14

Paregoric, a household remedy that has been widely used since the 19th Century to calm fretful children, contains ingredients that are potentially hazardous to infants (alcohol, benzoic acid, and camphor). It is no longer recommended for ameliorating withdrawal symptoms in opioid-dependent neonates and has generally been replaced by preparations such as diluted tincture of opium, morphine, clonidine, phenobarbital, chlorpromazine, and diazepam.14, 34

In the United States a national survey to determine the monitoring and treatment of NAS in neonatal intensive care units (NICUs) following opioid or polydrug exposure in utero, found that opioids (tincture of opium or morphine sulphate solution) were most commonly used for management of both opioid (63%) and polydrug withdrawal (52%), followed by phenobarbital (32%) for polydrug withdrawal and methadone (20%) for opioid withdrawal.24 Overall 70% of the respondents use phenobarbital and 25% use intravenous morphine to control opioid withdrawal seizures, with 81% of respondents using phenobarbital for polydrug withdrawal seizures.24 Only 70% of respondents always use a scoring system when deciding whether to start, titrate or cease pharmacologic treatment for neonatal withdrawal.24

Opioid withdrawal

A number of different types of drugs have been used to treat neonatal opioid withdrawal, but few studies have compared the efficacy of different treatments of neonatal drug withdrawal. Data about the relationship between the severity of withdrawal, the short-term efficacy of treatment, or, importantly, the longer-term infant outcome after different treatment regimens are not reported. Treatment regimens include:14

- Tincture of opium (morphine concentration of 10 mg/mL)
- Paregoric (morphine concentration of 0.4 mg/mL)
- Oral preparations of morphine (2 mg/mL and 4 mg/mL) with the dose calculated to deliver the same quantity of morphine equivalent usually supplied in paregoric
- Methadone (0.05 to 0.1 mg/kg every 6 hours)
- Oral clonidine (0.5 to 1.0 µg/kg in a single dose, followed by a maintenance dose of 3 to 5 µg/kg/day, divided into 4 to 6 hourly doses)
- Chlorpromazine (0.55 mg/kg every 6 hours intramuscularly or orally)
- Phenobarbitone [phenobarbital]
- Diazepam14

The American Academy of Pediatrics recommends that drug selection should match the type of agent causing withdrawal.14 Morphine is the drug of choice for managing withdrawal in infants of mothers who have used opioids such as methadone, heroin and pethidine during pregnancy. Morphine has been shown to be superior to phenobarbital for management of symptomatic NAS when maternal opioid use is prevalent.35 In addition the shorter treatment duration and lower requirement for higher intensity nursing morphine may have significant cost advantages.

In Australia an opioid should be used as the initial treatment for infants with NAS symptoms resulting from opioid withdrawal.5 The opioid of choice is morphine.4,36 The benefits of using phenobarbitone in addition to an opioid for infants with opioid-related NAS are unclear. If other drugs have been used concurrently in pregnancy, particularly benzodiazepines, and symptoms of NAS are not adequately suppressed by an opioid alone, phenobarbitone may be indicated as an additional therapy.5, 36 If an infant has signs of NAS and the type of drugs used by the mother are unknown, a full assessment of maternal drug use should be made by an experienced clinician. In addition, infant urine and meconium may be used for toxicological analysis.5
King Edward Memorial Hospital for Women (KEMH) prepares morphine as a 1.0mg/ml aqueous solution. The Royal Prince Alfred Hospital Pharmacy prepares morphine as a 0.5mg/ml aqueous solution. Both hospitals recommend the following regimen for opioid withdrawal, with KEMH also recommending that where the control of symptoms is difficult the morphine daily dose should be administered in 6 divided doses rather than 4.37

<table>
<thead>
<tr>
<th>NAS score (score every 4 hours)</th>
<th>Dose / Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score averages ≥ 8 for 3 scores</td>
<td>Morphine 0.5 mg/kg/day in 4 divided doses orally</td>
</tr>
<tr>
<td>If score persists ≥ 8 despite morphine 0.5 mg/kg/day</td>
<td>Morphine 0.7 mg/kg/day in 4 divided doses orally</td>
</tr>
<tr>
<td>If score persists ≥ 8 despite morphine 0.7 mg/kg/day</td>
<td>Morphine 0.9 mg/kg/day in 4 divided doses orally</td>
</tr>
<tr>
<td>When infants are on 0.9 mg/kg/day</td>
<td>Monitor cardiorespiratory function</td>
</tr>
</tbody>
</table>

There is little evidence on how to wean these babies from morphine so all decisions are empirical. After scores fall below treatment level (score ≤ 8) for 48 hrs, the dose should be reduced by 0.05 mg per dose every 4 days or longer, depending on the scores. Given the half-life of morphine it is more appropriate to reduce the dose rather than the frequency. The usual length of morphine treatment ranges from one to several months. Cardiorespiratory monitoring should continue for 4 days or until dose is reduced.

**Management of the vomiting baby:** ensure that the infant is not being overfed and that the infant is being appropriately postured during and after feeding. Give the morphine before the feed.

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

**Non-opioid CNS depressant withdrawal (benzodiazepines, barbiturates, alcohol)**

If the mother uses central nervous system depressants such as alcohol, benzodiazepines, and barbiturates rather than opioids, then phenobarbitone is the drug of choice for the management of NAS. In one study infants treated with a loading dose regimen of phenobarbitone have a significantly reduced time to control of symptoms than infants treated with no loading dose and titration only (33 versus 64 hours). King Edward Memorial Hospital for Women and the Royal Prince Alfred Hospital recommends the following phenobarbitone regimen for non-opioid CNS depressant withdrawal:

<table>
<thead>
<tr>
<th>NAS score (score every 4 hours)</th>
<th>Dose / Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score averages ≥ 8 for 3 scores</td>
<td>Phenobarbitone 15 mg/kg oral or IMI stat (loading dose) then 6 mg/kg/day in 2 divided doses orally (maintenance dose)</td>
</tr>
<tr>
<td>If score persists ≥ 8 despite phenobarbitone 6 mg/kg/day</td>
<td>Phenobarbitone 8 mg/kg/day in 2 divided doses orally</td>
</tr>
<tr>
<td>If score persists ≥ 8 despite phenobarbitone 8 mg/kg/day</td>
<td>Phenobarbitone 10 mg/kg/day in 2 divided doses orally</td>
</tr>
<tr>
<td>When infants are on 10 mg/kg/day</td>
<td>Monitor cardiorespiratory function</td>
</tr>
</tbody>
</table>

**Barbiturate withdrawal:**

After scores fall below treatment level (score consistently ≤ 8) for 48 hours the dose should be reduced by 2mg per dose every 4th day or longer depending on scores.

---

* Barbiturates and phenobarbitone in high doses are powerful respiratory depressants.
Non-barbiturate withdrawal (e.g. benzodiazepines):
The dose may be reduced more rapidly after withdrawal symptoms settle.38

COMPLICATIONS, ADVANTAGES AND DISADVANTAGES OF PHARMACOTHERAPY**

Complications of excessive pharmacotherapy:40
- Diminished or absent reflexes - Moro, sucking, swallowing, Galant, Perez, tonic neck, corneal, grasp (palmar or plantar)
- Truncal (central) or circumoral cyanosis or persistent mottling not associated with ambient temperature decreases
- Decreased muscle tone with passive resistance to extension of extremities or decreased neck or trunk tone
- Altered state of arousal (reduced reaction to stimuli or comatose)
- Diminished response to painful stimuli
- Inability to follow moving objects visually
- Impaired thermoregulation, particularly hypothermia
- Altered respirations - irregular (periodic breathing in term infants), shallow (decreased air entry), decreased respiratory rate (< 20 per minute) and apnoea
- Cardiac changes - irregular heart rate, distant heart sounds with weak peripheral pulses, reduced heart rate (80 to 100 beats/minute), poor peripheral perfusion (pale, grey, mottled), cardiac arrest

Morphine – advantages:40
- Reduces bowel motility and loose stools
- 20%-40% bioavailability when administered orally
- Facilitates feeding and interpersonal interaction
- Drug of choice for opioid exposure

Morphine – disadvantages:40
- Respiratory depressant
- Hypotension
- Delayed gastric emptying
- Ileus or loss of bowel motility
- Urinary retention

Phenobarbitone – advantages:40
- Drug of choice for polydrug use
- Controls irritability and insomnia
- Controls symptoms in 50% of infants regardless of the mother’s choice of drug

Phenobarbitone – disadvantages:40
- Does not prevent loose stools
- Infant needs to be closely monitored (may need transfer to the Special Care Nursery)
- May mask the severity of NAS symptoms

** Caution should always be used when treating the neonate or infant with morphine and/or phenobarbitone. If uncertain, consult the Paediatric Registrar at King Edward Memorial Hospital for Women (available 24/7 on (08) 9340 8222).
MANAGEMENT OF THE INFANT WITH NEONATAL ABSTINENCE SYNDROME (NAS)—LITERATURE REVIEW

Discharge Planning and Follow-up

Services need to be coordinated throughout the antenatal, perinatal and postnatal periods to ensure smooth transition for mother and baby. It is critical that services be maintained in the postnatal period following discharge from hospital, when infants may be at greatest risk.41 Planning for post-discharge follow-up and parenting support is ideally initiated early in the pregnancy, and should consider the health status of both mother and infant, psychosocial issues and the care-giving environment (see Antenatal Care for the Substance Using Mother Guideline and Algorithm). Consistent standards of practice that engage whole families need to be established. An effective and well coordinated discharge plan is an essential component of the continuum of care.

The timing of discharge may depend on a number of factors including family or social issues and treatment issues surrounding the mother. Involvement of the multidisciplinary care team is vital for helping the physician to assess the status of the home environment and whether it is safe to discharge the infant. The length of in-hospital observation should be determined on an individual basis. Postpartum and neonatal length of stay should be flexible and may extend beyond seven days as withdrawal symptoms may not present for 7-9 days.42 A non-judgmental and supportive atmosphere is likely to help ensure future compliance with paediatric follow-up.43

Discharge planning and after-care case management should consider:44

- Spelling out a process for discharge planning
- Identifying a case manager
- Identifying a schedule of visits
- Specialised needs of the infant if indicated
- How long the woman and her family should be followed up after delivery
- Handover to future services for follow-up

At the time of discharge there must be a formal transfer of responsibilities from the hospital to the community services that will be continuing the delivery of care, and referrals and supports must be in place. The referring provider should actively follow-up with community services to ensure that the woman has engaged with the service. Where engagement has not occurred, the referring provider should follow-up with the woman or her family.4

Early discharge of the drug-exposed infant:

Very few studies have adequately addressed the issue of early discharge of the substance exposed infant. One study45 that investigated the effect of early discharge and other factors on the readmission rates of a small sample of newborn infants reported that prenatal substance use was not related to readmission. However, this study did not address other important issues such as early weight gain and compliance with follow-up visits.

Mothers should be strongly discouraged from going home early where there is a high risk of infant withdrawal resulting from complex polydrug use or very high methadone intake, as onset of NAS is frequently delayed. If the mother insists on going home against medical advice, a community services (DoCS) notification should be considered.44

Discharge before 48 hours is contraindicated in infants of mothers with a history of opioid use, even if there is no evidence of withdrawal symptoms, due to the possibility of delayed onset.46 Early discharge is not usually appropriate for drug dependent women. Opioid and sedative-dependent women should be prepared for a postnatal stay of five or more days to allow assessment of neonatal abstinence syndrome.4

General discharge criteria for drug-exposed infants:

Prior to discharge a case conference should be convened by the multidisciplinary care team to formulate a discharge plan that defines clear responsibilities and timeframes. The discharge planning meeting should be attended by parents or carers and representatives of all organisations involved who will be involved in the provision and delivery of support and care.
All mothers and infants should be assessed adequately before discharge with respect to current drug use and psychological stability, parent-crafting abilities, social situation and the infant's wellbeing. Infants should not be discharged from hospital without a formal discharge plan or:

- If there is excessive weight loss (> 10% of birth weight)
- Before the baby is five days old
- If there is suspected infant neglect or abuse (as communicated by social worker)
- If there is suspected home violence (as communicated by social worker)
- If a court order prevents the baby from being discharged home
- If further assessment for withdrawal is required.

Additional contraindications to home discharge include:

- Inadequate home support or acceptance of assistance from external agencies
- Inadequate housing or material goods
- Erratic behaviour or continued drug or polydrug use
- Inadequate parenting skills (such as failure to consistently demonstrate the ability to feed and provide appropriate care for the infant during hospitalisation)
- Inability to participate in required paediatric follow-up program.

There are insufficient data to determine the safety of discharge of infants on morphine. Before an infant is discharged home on morphine or phenobarbitone, the treatment team must be satisfied of the safety of the home environment and of the parents’ parenting abilities and ability to administer treatment. Careful and frequent supervision by the treatment team is required.

Discharge checklists are used by a number of organisations. These vary in content but normally include discharge planning meetings, paediatric assessment and follow-up, social work or child at risk assessment, drug health assessment, information on safe sleeping, storage of drugs in the home and referral to support services.

The completed discharge plan assumes that:

- Both mother and baby have been appropriately stabilised and managed from a medical perspective
- The infant is at least five days old
- The infant is feeding well and gaining weight over two consecutive days
- The parent or carer is actively involved in caring for the infant
- There is no evidence of NAS
- There is a plan in place to address any child protection concerns
- Referrals to appropriate community support agencies have been made and are in place
- Continuing drug and alcohol management arrangements are in place for the mother following discharge
- Ongoing methadone treatment has been arranged and confirmed with the woman’s methadone prescriber or methadone clinic (for mothers on methadone maintenance)

Post-discharge management of infants discharged on medication

Infants requiring ongoing pharmacological management of opioid withdrawal may continue management in the home environment, providing that the family has access to appropriate support and follow-up. Home management of the infant helps to prevent prolonged disruption to the mother-infant relationship, and provides health care professionals with the opportunity to observe the family’s ability to provide adequate care for their infant.
Different hospitals have a range of discharge criteria that may need to be met prior to discharging the infant into the care of the parent or carer. Criteria that may be included in a discharge checklist include the following:

- **Modified Finnegan Neonatal Abstinence** score remains consistently below 8
- Respiratory or apnoea monitor (if used) has been removed for 48 hours and is no longer required
- Multidisciplinary care team agree to discharge care of the infant to the parent or carer
- Parent or carer has received information on Neonatal Abstinence Syndrome (NAS) and understands the possible timeframe that withdrawal symptoms may persist in the infant
- Parent or carer’s ability and confidence to care for the infant, and their competence to score NAS, has been demonstrated
- Parent or carer has agreed to attend scheduled Outpatient clinic appointments
- Parent or carer has completed the contact sheet and provided contact numbers and addresses
- Parent or carer understands when to seek medical assistance for the infant
- Parent or carer has been provided with emergency contact numbers
- Parent-crafting education on techniques such as swaddling, settling, massage, relaxation baths and dummies/pacifiers has been completed
- SIDS education has been completed
- Neonatal resuscitation education session has been attended by parent or carer
- Effective pharmacotherapy has commenced and a weaning program established
- Medication dispensing schedule has been explained to the parent or carer
- Parent or carer can demonstrate the ability to administer the infant’s medication
- Visiting Nurse/ Child Health Nurse/ Community Nurse visits arranged while on medication
- General Practitioner and Child Health Nurse have been provided with a copy of the infant’s discharge medication schedule and summary of care

To be eligible for the NAS Home Management Program at KEMH, the infant needs to have been stabilised on morphine, be medically stable, feeding regularly and showing consistent weight gain. Families are asked to agree to a number of program requirements. These include:

- Visiting and providing safe care for the baby throughout the baby’s stay in the nursery
- Administering the medication at home to the infant as prescribed
- Attending the hospital pharmacy every week to return empty medication bottles and collect the weekly supply of medication
- Attending the scheduled doctor’s clinic appointments and contacting the Follow-Up Coordinator to reschedule an appointment if unable to attend a scheduled appointment
- Agreeing to visits and care by the Home Visiting Nurse and/or local Child Health Nurse
- Arranging to be at home with the infant at the times arranged with the Home Visiting Nurse for home visits and contacting the Home Visiting Nurse to reschedule a home visit if necessary
- Demonstrating the ability to safely give medication, feed and care for baby by staying overnight in parent-crafting rooms for 1–2 nights prior to discharge.

Parents should be given instructions on the administration of medication in the week prior to discharge. All NAS infants discharged home on medication are referred to the Home Visiting Nurse (if discharged from the Special Care Nursery) or to Princess Margaret Hospital (PMH) Home Visiting Nurse Services for in-home support, and monitoring of weight gain and NAS symptoms.
References


44. NSW Department of Health, Intergovernmental Committee on Drugs, Ministerial Council on Drug Strategy. Background papers to the National Clinical Guidelines for the management of drug use during pregnancy, birth and the early development years of the newborn. Sydney: NSW Department of Health; 2006.
