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. It is more common in infants born to opioid-dependent women than in infants born to women dependent on other drugs or alcohol.1

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.2-7 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.2, 4, 5, 8-13

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</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 Syndrome14

Importance of 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.15

Diagnosis of neonatal withdrawal symptoms7, 16, 17

Fetal exposure to narcotics commonly results in decreased birth weight, increased weight loss during the early neonatal period and increased length of hospital stay.18, 19 NAS is characterised by central nervous system hyperirritability, gastrointestinal dysfunction, respiratory distress and vague autonomic symptoms that include yawning, sneezing, mottling and fever. Signs and symptoms of withdrawal include both physiologic and behavioural responses that 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. Postnatal or iatrogenic NAS may occur as a result of the abrupt withdrawal of opioids following prolonged exposure to analgesia.

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
GUIDELINES FOR THE MANAGEMENT OF THE INFANT WITH NEONATAL ABSTINENCE SYNDROME

Onset of NAS symptoms

Neonatal Abstinence Syndrome (NAS), normally begins within 72 hours of birth, but may take at least two weeks for the symptoms to become evident.17, 20, 21

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 duration of in utero 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.22, 23

Diagnostic tools

The evidence suggests that clinical studies on NAS are complicated by numerous confounding factors and polydrug use. A recent study24 by the Center for the Evaluation of Risks to Human Reproduction (CERHR) on the potential adverse 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.7 The Finnegan or Modified Finnegan Scoring System is the recommended scoring tool for use in Western Australia. It is the most commonly used scoring system25 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 summing 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.7
MANAGEMENT OF THE INFANT WITH NEONATAL ABSTINENCE SYNDROME

Factors to be considered

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

1. Maternal history of drug use during pregnancy
2. Maternal history of drug use in the seven days prior to birth
3. Drug use during labour and birth
4. Quality and quantity of antenatal care
5. Level of withdrawal symptoms
6. Competence of staff re: NAS Assessment and use of the appropriate tool
7. Birth into a Supportive Environment
8. Supportive therapies implemented by parents and staff
9. Morphine Pharmacotherapy or Phenobarbitone Pharmacotherapy if required
10. 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.26

W = withdrawal
I = irritability
T = tremors
H = hyperactive, high pitched cry, hypotonia
D = diarrhoea, disorganized suck
R = respiratory distress, rhinorrhoea
A = apnoeic attacks
W = weight loss
A = alkalosis – respiratory
L = lacrimation

Management of neonatal withdrawal symptoms7, 16, 17

Decision to treat

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.7 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 stabilise the infant's condition in the acute phase without the need for pharmacologic intervention.7 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. Infants with mild symptoms can be cared for using supportive therapy alone, the main components of which are outlined in Tables 2 and 3.
**Provision of a supportive environment** ⁷, ¹⁷

**Aim:**
To reduce the noxious physical and sensory stimulation to the infant

<table>
<thead>
<tr>
<th>RECOMMENDED CARE</th>
<th>ADDITIONAL INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Place the infant in a quiet environment with dim lighting</td>
<td>Reduces stimulation</td>
</tr>
<tr>
<td>2. Closely wrap or swaddle infant</td>
<td>Decreases sensory stimulation</td>
</tr>
<tr>
<td>3. Handle infant gently</td>
<td>Avoid jerky or sudden movements</td>
</tr>
<tr>
<td>4. Hold newborn infant firmly and close to the body</td>
<td>Increases feeling of security</td>
</tr>
<tr>
<td>5. Promote cuddling, skin to skin contact with mother and use of infant sling</td>
<td>Skin to skin contact is known to promote bonding</td>
</tr>
<tr>
<td>6. Massage infant or try relaxation baths</td>
<td>Affected infants may find these relaxing</td>
</tr>
<tr>
<td>7. Rock gently, talk, sing or hum softly</td>
<td></td>
</tr>
<tr>
<td>8. Play heart beat audiotapes</td>
<td></td>
</tr>
<tr>
<td>9. Decrease stimulation at first signs of distress</td>
<td></td>
</tr>
<tr>
<td>10. Give frequent small feeds with rests between sucking Support cheeks and jaw if necessary</td>
<td>Small frequent feeds minimise the risk of vomiting and the loss of medication</td>
</tr>
<tr>
<td>11. Consider need for hypercaloric formula</td>
<td></td>
</tr>
<tr>
<td>12. When feeding, assess coordination of suck/swallow reflex</td>
<td></td>
</tr>
<tr>
<td>13. Consult with mother on the use of a pacifier for excessive sucking</td>
<td>Other than nipple confusion between breast and bottle, no evidence has been located which contraindicates the use of pacifiers</td>
</tr>
<tr>
<td>14. Use mittens to prevent trauma to fingers and wrists</td>
<td>Agitation may result in scratching of the skin. Use of mittens will minimise sucking of the fists</td>
</tr>
<tr>
<td>15. Use short-haired sheepskin with soft cotton sheet</td>
<td></td>
</tr>
<tr>
<td>16. Change nappy frequently Use of barrier cream to protect the skin/prevent damage</td>
<td>Frequent passage of stools will excoriate the skin</td>
</tr>
<tr>
<td>17. If nasal secretions cause obstruction, use gentle suction to clear the airways</td>
<td>Ensure adequate respiratory function</td>
</tr>
<tr>
<td>18. Monitor sleeping habits, temperature stability, weight gain or loss</td>
<td>These and other changes in clinical status may suggest another disease process</td>
</tr>
</tbody>
</table>
### 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, 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 stuffness / 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

Background information

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.7

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.7, 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.25 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.25 Only 70% of respondents always use a scoring system when deciding whether to start, titrate or cease pharmacologic treatment for neonatal withdrawal.25

Complications, advantages and disadvantages of pharmacotherapy**

**Complications of excessive pharmacotherapy:**35

- Diminished or absent reflexes - Moro, sucking, swallowing, Galant, Perez, tonic neck, corneal, grasp (palmar or plantar)
- 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), and cardiac arrest

Morphine

**Advantages:**35

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

**Disadvantages:**35

- Respiratory depressant
- Hypotension
- Delayed gastric emptying
- Ileus or loss of bowel motility
- Urinary retention

Phenobarbitone35

**Advantages:**35

- Drug of choice for polydrug use
- Controls irritability and insomnia

**Disadvantages:**35

- Does not prevent loose stools
- May mask the severity of NAS symptoms

**Caution should always be used when treating neonates or infants with morphine and/or phenobarbitone. If uncertain, consult the Paediatric Registrar at King Edward Memorial Hospital (available 24/7 on (08) 9340 2222).**
PHARMACOLOGICAL TREATMENT OF OPIOID INDUCED WITHDRAWAL SYMPTOMS IN THE NEONATE

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:

- 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]
- Diazepam

The American Academy of Pediatrics recommends that drug selection should match the type of agent causing withdrawal. 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 phenobarbitone for management of symptomatic NAS when maternal opioid use is prevalent. 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. The opioid of choice is morphine. 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. If an infant has signs of NAS and the drugs used by the mother are unknown, an experienced person should make a full assessment of maternal drug use. In addition, infant urine and meconium may be used for toxicological analysis.

Absolute indications
- Evidence of acute withdrawal (e.g. seizures)

Relative indications
- Three consecutive NAS scores ≥ 8
- Average of three consecutive scores is ≥ 8
- Two consecutive NAS scores are ≥ 12
- Average of two consecutive scores is ≥ 12.

Note:
Scoring should be undertaken:
- By experienced personnel to ensure consistency
- Four-hourly until the infant has been stabilised.

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 the control of symptoms is difficult the morphine daily dose should be administered in 6 divided doses rather than 4.
Morphine regime

<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>

Weaning infants from morphine

1. There is little evidence on how to wean infants from morphine so all decisions are empirical. When scores fall below treatment level (score ≤ 8) for 48 hrs, reduce the dose by 0.05 mg per dose every 4 days or longer, depending on the scores.

2. Given the half-life of morphine it is more appropriate to reduce the dose rather than the frequency.

3. 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

- Administer the morphine before the feed
- Give small feeds frequently
- Ensure that the infant is not being overfed
- Posture the infant appropriately postured during and after feeding.
- If the infant has a large vomit after being given morphine:
  - If vomit within 10 minutes of dose, re-dose
  - If vomit after 10 minutes, give ½ dose
  - If vomit occurs after feed, do not give further morphine (always err on side of caution).

* Opioids in high doses are powerful respiratory depressants
PHARMACOLOGICAL TREATMENT OF NON-OPIOID INDUCED WITHDRAWAL SYMPTOMS IN THE NEONATE

This guideline relates to non-opioid CNS depressant withdrawal (benzodiazepines, barbiturates, alcohol)

Background information

If the mother uses central nervous system depressants rather than opioids, then phenobarbitone is the drug of choice for the management of NAS.\textsuperscript{32} In one study infants treated with a loading dose regimen of phenobarbitone had a significantly reduced time to control of symptoms than infants treated with no loading dose and titration only (33 versus 64 hours).\textsuperscript{40}

King Edward Memorial Hospital for Women and the Royal Prince Alfred Hospital recommend the following phenobarbitone regimen for non-opioid CNS depressant withdrawal:\textsuperscript{38, 39}

<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\textsuperscript{*}</td>
</tr>
</tbody>
</table>

Barbiturate withdrawal:

When scores fall below treatment level (score consistently ≤ 8) for 48 hours reduce the dose by 2mg per dose every 4th day or longer depending on scores.\textsuperscript{39}

Non-barbiturate withdrawal (e.g. benzodiazepines):

The dose may be reduced more rapidly after withdrawal symptoms settle.\textsuperscript{39}

\textsuperscript{*} Phenobarbitone in high doses is a powerful respiratory depressant
DISCHARGE PLANNING AND FOLLOW-UP

Based on clinical practice guidelines for the management of neonates and infants of substance using mothers at Royal Women's Hospital, Sydney; Royal Prince Alfred Hospital, Sydney; King Edward Memorial Hospital, Perth; Mater Hospital, Brisbane; Royal Women's Hospital, Brisbane.

Background information

Discharge planning with the pregnant women should ideally begin during the antenatal period as identified in Antenatal Care for the Substance Using Mother Guideline and Algorithm. The timing of discharge may depend on a number of factors including family, social and treatment issues surrounding the mother. Involvement of the multi-disciplinary 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. An effective and well coordinated discharge plan is essential to ensure an adequate continuum of care. A non-judgmental, supportive atmosphere is likely to help ensure future compliance with paediatric follow-up.41

Discharge Criteria for Drug-Exposed Infants:

1. Both mother and baby will have been appropriately stabilised and managed from a medical perspective
2. A plan is in place to address any child protection concerns
3. Referrals to appropriate community support agencies have been made and are in place
   In addition:
4. Infants with a of identified opioid-using mothers will have been observed for at least 48 hours for signs of withdrawal.42
5. The infant will be at least 5 days old
6. The infant will be feeding well and will have gained weight over two consecutive days
7. The parent or carer will be actively involved in caring for the infant
8. The infant has not progressed to NAS
Discharge checklist - infants discharged on medication
The infants requiring medication for control of NAS symptoms can be discharged into the care of parents/carer if the infants

☐ Modified Finnegan Neonatal Abstinence score remains consistently below 8
☐ Respiratory/apnoea monitor, if used, has been removed for 48 hours and is no longer required
☐ Pharmacotherapy has been deemed effective
☐ Weaning from medication has commenced
And
☐ A Case Team meeting has been held with all team members and parents/carer to ensure all aspects of discharge planning have been completed
☐ Proposed discharge care of the neonate/infant to parent/carer has been agreed to by the Multi-disciplinary Case Management Team
☐ Visiting Nurse/Child Health Nurse/Community Nurse visits have been arranged while on medication
☐ General Practitioner and Child Health Nurse provided with a copy of the infant's discharge medication schedule and summary of care
And the parent/carer
☐ Has received information on Neonatal Abstinence Syndrome (NAS)
☐ Has received information regarding the medication dispensing schedule
☐ Has demonstrated ability to dose the infant
☐ Understands the possible timeframe for withdrawal symptoms to persist in the infant
☐ Has demonstrated both the ability and the confidence to care for the infant
☐ Has been deemed competent to score NAS
☐ Has agreed to attend scheduled outpatient clinic appointments
☐ Has completed the contact sheet with contact numbers and addresses of possible locations she will be staying in the community
☐ Understands when to seek medical assistance for the infant
☐ Has been provided with telephone numbers of hospital and community resources
☐ Has been provided with mother-crafting education on techniques such as swaddling, settling, massage, relaxation baths and dummies/pacifiers
☐ Has attended infant resuscitation education
☐ Has attended SIDS education

Discharge from the Outpatient Clinic or General Practitioner when neonate/infant stable and off medication and there are no further concerns for the welfare of mother and neonate/infant.
GUIDELINES FOR THE MANAGEMENT OF THE INFANT WITH
NEONATAL ABSTINENCE SYNDROME

References


