Best Practice Clinical Guideline

Assessment and Management of Neonatal Pain

September 2007



ANZNN Australian and New Zealand Neonatal Network

ANZNN - Uptake of Evidence Using Networks Project for Newborn Pain - September 2007

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Scope and Purpose

The Royal Australian College of Physicians Guidelines for Newborn Pain recommends that clinical units providing health care to neonates should develop written guidelines and protocols for the management of neonatal pain ¹. This document had been produced to assist clinicians in individual clinical units in developing written guidelines for their unit and to enable them to benchmark any existing guidelines on this topic. The document has been developed according to the AGREE domains ² and a search of the current best available evidence.

Forward

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage, this experience occurs from an early age and pain is defined as an 'inherent quality of life that appears early in development and serves as a signal for tissue damage ³.

Newborn infants may experience pain as a result of undergoing a single or repeated procedure for diagnostic or therapeutic and/or surgical reasons. This is true for neonates of all gestational ages in all hospital settings ⁴. Additionally, mechanically ventilated neonates are subjected to multiple invasive and procedural interventions that maybe particularly painful. Sedation alone does not alleviate pain ⁵

Key strategies for neonatal pain

- Consideration of the least painful method of undertaking specific procedures is important ⁶.
- Provide information to parents about strategies they can use to assist their infant in coping with pain, stress and discomfort in the intensive care, special care nursery, post-natal wards and other areas of the hospital where they are cared for ⁷.
- Provide information to the parents which emphasises that breastfeeding or oral sucrose is effective for short duration procedures and the administration maybe repeated for subsequent procedures ^{8, 9}.
- Comfort measures such as positioning, swaddling, a quiet environment, containment, pacifiers and a familiar odour reduce the effects of extraneous stimuli and are effective strategies for pain management ^{4, 11, 12}.
- Painful or stressful procedures should be minimised and when appropriate, coordinated with other aspects of the neonate's care. Special consideration is required for infants less than 30 weeks gestation as they may not tolerate clustered cares following a stressful intervention ^{14, 15}.
- A sweet tasting solution, such as a breastfeed or sucrose is given prior to painful procedures ^{10, 6}.
- The use of opioid for infants with ongoing pain or post-operative pain is recommended⁴ and pain assessments should be undertaken regularly.

Breastfeeds or sucrose for procedural pain

Neonatal responses to short duration, single event procedures indicate that they experience considerable pain and this is often under treated.

Breastfeeds

If the mother is present and breastfeeding is possible, place the infant on the breast to suck for two minutes prior to and if possible during a painful procedure such as a heel lance ^{13, 16, 17}.

Sucrose

When breastfeeding is not possible, oral sucrose has been found to be effective for repeated painful procedures during an infant's hospitalisation in term and preterm neonates ^{8, 9}.

- Small amounts of sweet solutions placed onto the neonate's tongue have been shown to mediate an increase in endogenous opioid release, reduce procedural pain and minimise crying following the procedure ¹⁸.
- The oral administration of sucrose is a safe and effective form of analgesia for short duration procedures¹² and may be given for repeated procedures^{8,9}.

- It is recommended that sucrose be ordered on the medication chart or as a standing order. This may be as a nurse-initiated medication. Document each dose with a precautionary maximum dose for each 24 hours.
- The recommended sucrose concentration is a 24% solution. Sucrose is available either commercially or can be produced by the hospital pharmacy at this concentration.
- The long term effects of sucrose use for short duration procedures are unknown²⁷, therefore sucrose should be used with caution for neonates hospitalised for a prolonged period of time, in particular neonates of less than 32 weeks gestation¹⁷.
- Infants of methadone addicted mothers have altered endogenous opiate systems and the analgesic effects of oral sucrose may not be as effective ⁴. For these neonates consider alternate strategies such as swaddling, reducing environmental stimuli or other pharmacological interventions.
- The small dose of sucrose or breastmilk is absorbed via the buccal wall, it is not absorbed via the gastro-intestinal tract. Therefore there is no known risk for infant's of diabetic mothers, hyperglycaemic neonates or dental caries (no teeth present)¹⁸.

Recommended sucrose dose and administration

 The effect of sucrose on pain is mediated via its gustatory effect (taste), and therefore doses are given onto the tongue (buccal). No benefit has been demonstrated when administered via a gastric tube ¹²

Gestational age	Sucrose Concentration	Volume per dose
Term and preterm	24%	0.05 to 0.5ml

Reference: Stevens et al 2004

- Two minutes prior to the painful procedure administer a small amount of the dose onto the neonate's tongue using a syringe or pacifier ^{18, 19}.
- Repeat every two minutes for the total prescribed dose ¹⁸. A total of less than 10 doses in a 24 hour period were subsequently found to have a lesser risk of poor developmental outcomes in one small study ²⁰.

Pain assessment

- Pain assessments should be carried out by health professionals at least once per shift for all neonates following surgery, those receiving mechanical ventilation and those in intensive or special care nurseries who are subjected to painful procedures ⁵.
- A baseline assessment using a pain assessment score is useful when comparing trends in assessment scores for neonates in the NICU or SCN.
- To ensure consistency in interpretation of pain assessment and scores both nurses (and or doctors) should each assess and score the neonate at handover from one shift to the next.

- A lack of behavioural responses (including crying and movement) does not necessarily indicate a lack of pain ⁴. Infants at risk of neurological impairment also respond to painful stimuli ¹⁰.
- Useful indicators of persistent pain in ventilated preterm infants include facial expression, high activity levels, poor response to routine care and poor ventilator synchrony ²¹.
- Use a pain assessment score to determine the infant's level of discomfort immediately following each potentially painful procedure and to evaluate the efficacy of behavioural, environmental, and pharmacological agents. Repeat observations at least every four hours.
- All neonates who undergo a surgical procedure should have their pain scores measured every four hours for at least 48 hours or until narcotics have been ceased for 48 hours ^{22, 23}

Analgesia

- Continuous infusions of opioid are used for postoperative or post-procedural pain, and for the treatment of painful medical conditions⁴.
- When continuous infusions of morphine are used, the addition of extra morphine is ineffective for the management pain in additional procedures²⁴
- Use infusions for administering synthetic opioid such as Fentanyl as bolus doses can cause glottic and chest wall rigidity and are not recommended ²²
- For the duration that the neonate requires treatment for pain, use a validated assessment tool to assess pain in a consistent way and document the assessment ^{25, 26, 27, 28}
- Opioid infusions are used at the lowest effective dose and minimum duration based on clinical assessment ⁶. Neonates aged 7 days or younger may require lower doses of morphine in the post-operative period than neonates who are over a week of age ²⁹
- When opioid or other sedating medications are administered for a prolonged period, physical dependence and tolerance may develop. This means that higher opioid or sedative doses are required in order to maintain patient comfort ²².
- Opioid infusions administered for greater than 4 days should be weaned over a period of days at the rate of 10% of the prescribed dose per day based on the clinical assessment of the neonate ²². Close observation is required as withdrawal symptoms may appear after 3 days of weaning ²³.
- Opioid antagonists must be used with caution in neonates who have received opioid for greater than 4 days as the antagonist may precipitate acute opioid withdrawal ^{30, 31}.
- Regional anaesthesia techniques (such as epidural) can be used to provide anaesthesia and analgesia for procedures on the trunk or limbs as an adjunct to general anaesthesia and for postoperative analgesia⁴.

Key performance indicators

- □ Invasive painful procedures are performed only when necessary
- □ The use of behavioural modifications and comfort measures* are implemented prior to all painful procedures
- □ A sweet tasting solution (breastfeed or sucrose) is used as analgesia before all heel lances and venipuncture for hospitalised neonates
- Derived at least once per shift for all ventilated neonates

* Comfort measures include repositioning, containment, swaddling, diminishing environmental noise and lighting.

Development of the document

This guideline was developed by the Practice Evidence Gap Strategy (PEGS) Project team with consultation and opportunity for input from the clinicians and consumers of the neonatal units and postnatal wards in the 23 tertiary hospitals in Australia.

This guideline was developed using the evidence provided by the Royal Australasian College of Physicians (Paediatric Division) guideline statement¹ and additional resources covering pain assessment scoring, narcotic withdrawal and family participation.

The guideline has been endorsed by:

- Australian College of Neonatal Nurses
- Australian College of Midwives Inc
- Australian and New Zealand Neonatal Network

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Search strategy

The search strategy to identify additional sources covering pain assessment scoring, narcotic withdrawal and family participation included searches of electronic databases for both published and unpublished studies, including but not limited to Systematic Reviews, randomised control trials, clinical trials, policy statements and clinical guidelines: CINAHL (1982 - 2007), Health Source: Nursing/Academic Edition (1968 – 2007), MEDLINE (1966 - 2007), EMBASE (1966 – 2007) and databases of systematic reviews and randomised controlled trials: The Cochrane Library Issue 2, 2007, including the Central Register of Controlled Trials (CENTRAL, DARE). Language restrictions were not applied.

In addition, searches of the electronic databases were based on the following search terms: The MeSH terms 'Infant, Newborn' OR 'Neonate*' OR 'Nurser*, Hospital' OR 'Intensive Care Units, Neonatal'

AND

The MeSH terms 'Pain' OR 'pain measurement' OR 'pain management' OR the text word 'diagnostic pain' OR 'therapeutic pain' OR 'post-operative pain' OR 'procedur* pain' OR 'pain assessment'

AND

The MeSH terms 'Guideline Statement' OR 'Analgesia' OR the text word 'Opioid' OR 'Sucrose' OR 'Glucose' OR 'Breastfeeding' OR 'Breast milk' OR 'Expressed Breast milk' OR 'EBM' OR 'Comfort Measures' OR 'Swaddling' OR 'Non-nutritive sucking' OR 'Positioning'

It is recommended that this guideline be reviewed every 3 years due to the current research that is in progress.

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Appendix 1: Painful procedures for neonates

Painful procedures for neonates ¹

Diagnostic	Therapeutic	Surgical
Arterial puncture Heel lancing Lumbar puncture Eye examination Suprapubic bladder tap Venipuncture	Bladder catheterization Central line insertion/removal Chest tube insertion/removal Chest physiotherapy Dressing change Gavage tube insertion Intramuscular injection Laser therapy for retinopathy Mechanical ventilation Peripheral venous catheterization Postural drainage Removal of adhesive tape Suture removal Tracheal intubation/extubation Ventricular tap	Other surgical procedures, for example, peritoneal drain, venous cut-down

Appendix 2: How to use a pain assessment tool







Appendix 3: Sample Newborn Pain Audit Tool

Audit Tool

This tool can be used as an audit to be undertaken in each clinical area (NICU, SCN, post natal ward). The charts of all the infants discharged over a one month period maybe part of the audit. The results are collated and the percentage of the responses fed back to the clinical staff. Strategies to improve or sustain the assessment and management of newborn pain can be developed for each context.

 What is the baby's main food source? Breast Artificial formula Other - please state 						
 What painful procedures has baby experienced during hospitalisation? Heel stab Intramuscular injection Venepuncture Other (refer to list in Appendix 1 of this document)- please state 						
Were co	omfort measures instituted prior to,	during or after	r the pai	nful pro yes	cedure?	no
Which of a state of the state o	comfort measures were used? swaddling (wrapping in bunny rug containment (holding/cuddling) non-nutritive sucking (dummy/pac other None used	;/sheet/muslin cifier)	wrap)			
Was bro	eastfeeding offered as analgesia for	painful procee lways 🗖	dures? Mostly		No	🗖 unsure
Comme	ents:					
e Use						
Is sucro	se available for use?			yes		no
Was su	crose administered as an analgesic?	2		yes		no
Does su	crose order appear on the medicati	on chart?		yes		no
Is sucro	se available as a standing order?			yes		no
	What is What pa What pa What pa Which of Which of Which of Was bro Comme Use Is sucro Was sucro Uoes su Is sucro	What is the baby's main food source? Breast Artificial formula Other - please state What painful procedures has baby experies Heel stab Intramuscular injection Venepuncture Other (refer to list in Appendix 1 Were comfort measures instituted prior to, Which comfort measures were used? swaddling (wrapping in bunny rug containment (holding/cuddling) non-nutritive sucking (dummy/pace) other None used Was breastfeeding offered as analgesia for A Comments: e Use Is sucrose available for use? Was sucrose administered as an analgesic? Does sucrose order appear on the medicati Is sucrose available as a standing order?	What is the baby's main food source? Breast Artificial formula Other - please state What painful procedures has baby experienced during hother Heel stab Intramuscular injection Venepuncture Other (refer to list in Appendix 1 of this docume Were comfort measures instituted prior to, during or after Which comfort measures were used? swaddling (wrapping in bunny rug/sheet/muslin containment (holding/cuddling) non-nutritive sucking (dummy/pacifier) other None used Was breastfeeding offered as analgesia for painful proceed a Always Comments: was sucrose available for use? Was sucrose administered as an analgesic? Does sucrose order appear on the medication chart? Is sucrose available as a standing order?	What is the baby's main food source? Breast Artificial formula Other - please state What painful procedures has baby experienced during hospitalisa Heel stab Intramuscular injection Venepuncture Other (refer to list in Appendix 1 of this document)- ple	What is the baby's main food source? Breast Artificial formula Other - please state What painful procedures has baby experienced during hospitalisation? Heel stab Intramuscular injection Venepuncture Other (refer to list in Appendix 1 of this document)- please state Were comfort measures instituted prior to, during or after the painful proc were comfort measures were used? swaddling (wrapping in bunny rug/sheet/muslin wrap) containment (holding/cuddling) non-nutritive sucking (dummy/pacifier) other None used Was breastfeeding offered as analgesia for painful procedures? Is sucrose available for use? yes Was sucrose available for use? yes Sucrose available for use? yes Does sucrose order appear on the medication chart? yes Is sucrose available as a standing order? yes	What is the baby's main food source? Breast Artificial formula Other - please state What painful procedures has baby experienced during hospitalisation? Heel stab Intramuscular injection Venepuncture Other (refer to list in Appendix 1 of this document)- please state Were comfort measures instituted prior to, during or after the painful procedure? yes Which comfort measures were used? swaddling (wrapping in bunny rug/sheet/muslin wrap) containment (holding/cuddling) non-nutritive sucking (dummy/pacifier) other None used Was breastfeeding offered as analgesia for painful procedures? Lis sucrose available for use? yes Is sucrose available for use? yes Is sucrose available as a standing order? yes

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Clinical Practice Guidelines (or Policy)

17.

These questions need to be asked of the staff caring for the infant during the audit period.

Was the pain assessment score documented every 4 hours

10.	Is there a clinical practice guideline available for the mayour service?		nt of pro yes	cedural j	pain available in no
11.	Is the clinical midwife/nurse (who was caring for the inf components of the guideline?	ant bein	g audited yes	l) aware □	of the specific no
12.	Is the registrar (that was caring for the infant being audit the guideline?	ted) awa □	re of the yes	specific	components of no
13.	Was the family (of the infant being audited) aware of the procedural pain?	e use of ∣ □	breastfee yes	eding or	sucrose for no
14.	Did the parent/s receive a brochure informing them of the procedural pain?	ie use of	breastfe yes	eding/st	icrose for no
NICU – Ventilated infants					
15.	Was analgesia used during mechanical ventilation		yes		no
16.	Was a pain assessment tool/score used		yes		no

yes

no

Appendix 4: Algorithms for procedural pain and assessment



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Based on Van Dijk 2002