

## Clinical Guideline: Pain Management Version 4.0

**Authors:** East of England Benchmarking Group members

**For use in:** EoE Neonatal Units  
Guidance specific to the care of neonatal patients.

**Used by:** East of England Regional Neonatal Units Healthcare professionals giving direct care to neonatal patients

**Date of Ratification:** September 2021

**Review due:** September 2024

**Registration No:** NEO-ODN-2021-4

**Approved by:**

Neonatal Clinical Oversight Group	
East of England ODN Clinical Lead	<b>Matthew James</b>

### Audit Standards:

1. There is an evidence based assessment tool used for Pain management
2. There is information and education to support parents in understanding the pain needs of their infant
3. Pain is continually evaluated and reassessed
4. Practice is benchmarked annually and action plans formulated

# Pain Management Guideline

## 1. Scope

For use in neonatal units within the East of England Neonatal ODN

## 2. Purpose

- To minimise the intensity, duration and physiological impact of the pain experience.
- To maximise the infant's ability to cope with and recover from the painful experience.
- To standardise practice across the region.

## 3. Key recommendations

- All infants will be assessed for pain using an appropriate validated tool (see appendix one, two & three).
- To accurately record pain scores, staff will be trained on induction to use the pain assessment tools.
- Staff will be aware of the environment in which the infant is nursed and its effect on the infants coping mechanisms.
- Staff should be aware of the potential side effects of any pharmacological interventions used on the neonate.
- Staff should educate parents on pain behaviours and encourage them to participate in the pain assessment and management of their baby.

## 4. Background

It has long been known that the fetus/newborn perceives and subsequently responds to pain<sup>[1]</sup>. However, the management of pain for neonates in the neonatal intensive care unit (NICU) continues to be a challenge<sup>[2, 3]</sup>. The gap between theory and practice in managing pain is closing and the benchmarking scores compiled by the East of England Benchmarking Group are a good reflection of this although there has been no new published literature to support this.

Babies in the hospital setting are often routinely subjected to painful procedures. For the sick or preterm infant, exposure to repeated procedural painful events could interfere with normal growth and development if pain is not adequately controlled. Infants show the same and sometimes exaggerated responses to pain when compared with older children<sup>[4]</sup>. Where infants are nursed with specific developmental care procedures in place they have:

- Improved short term growth and feeding outcomes.
- Decreased requirement for respiratory support.
- Decreased stay in hospital.
- Improved neurodevelopmental outcomes.

## 5. Assessment of pain

Behavioural and physiological measures are valid and reliable indicators of acute pain in infants (including preterm infants), the assessment of these will facilitate effective pain management.

Using the N-Pass assessment tool <sup>[5]</sup> (see Appendix 1, 2, & 3) assists documentation and management of pain and increases the effectiveness of pain relief interventions.

Pain should be assessed and findings documented not only to measure the intensity, site and duration but also to determine effectiveness of the interventions implemented.

Pain scoring is less reliable in extremely preterm infants therefore adjustments for gestational age and sleep state are accounted for within the NPASS tool.

### 5.1. Assessment of pain on the Neonatal Unit

Every neonate admitted to the unit should be assessed for pain as per section 5.2. It is important to remember that sources of pain are not always obvious; if an infant still appears to be in pain after reasonable comfort measures then further examination and investigation is needed.

Where muscle relaxants are used, such as Pancuronium, it will not be possible to behaviourally evaluate for pain but physiological parameters must be assessed.

The assessment should monitor the effectiveness of any current pain management strategies.

All assessment and findings should be recorded in the patient notes.

### 5.2. Timing of pain assessment

The pain score used should assess both physiological and behavioural indicators as well as recognising the gestational age of the infant assessed. Pain should be assessed using the neonatal pain and sedation score (NPASS) tool (appendix 1):

- On admission to the neonatal unit.
- At shift changes.
- At any point during a shift if the nurse or parent considers it necessary.
- Pre and post invasive procedures.

- Four hourly/ as required if the infant is receiving analgesic support.
- 30-60 minutes after analgesia or comfort measure is administered to assess the effectiveness of the intervention.
- Post-operatively at least every 2 hours for 24-48 hours, then every 4 hours until off pain medications.

### **5.3. Action following assessment**

The assessment of pain should indicate whether measures need to be undertaken. The treatment may be non-pharmacological or pharmacological depending on the clinical situation. The purpose of any intervention is to keep the pain score at the minimum level. A record of assessment and any intervention whether pharmacological or non-pharmacological is required to be recorded in the patient notes.

## **6. Painful procedures**

Before embarking on a procedure (see appendix four) consider the following points and refer to the East of England Developmental Care Guideline<sup>[6]</sup>:

- Does this procedure need to happen?
- Is it the most appropriate time for the procedure?
- Is another procedure more appropriate, e.g. venepuncture instead of heel prick, intravenous injection instead of intramuscular/ subcutaneous?

## **7. Non-pharmacological measures in reducing pain and stress in the infant.**

### **7.1. Goal**

To minimise the pain and distress experienced by babies' using non-pharmacological measures, these should be implemented to give immediate relief during and following painful procedures.

### **7.2. The Environment**

Over-stimulation from the environment can be a source of extra stress and amplify pain perception e.g. temperature, light, noise and handling. Reducing noxious environmental stimuli and providing supportive care can reduce the pain experienced from painful procedures.

### **7.3. Containment holding**

Containment holding, also known as supportive or comfort holding, is the use of gentle continuous physical boundaries and has been shown to speed the recovery from certain procedures e.g. suction with:

- Less desaturation,
- Slower heart rate,

- Fewer behavioural stress cues.

Normal boundaries can be extended by placing the hands gently but continuously over the infant's head and legs (with the limbs in a flexed midline position to provide comfort).

#### **7.4. Non-nutritive sucking**

Non-nutritive sucking, whereby an infant is given a pacifier with no fluid or nutrition being delivered, has been shown to have beneficial physiological effects in neonates including:

- Reduction in crying/ grimacing
- Normalisation in heart rate
- Lowered pain scores.

The behavioural effects induce a feeling of calm which are limited to the length of the intervention).

Parental consent should always be obtained prior to use and documented.

#### **7.5. Breast feeding**

Breast feeding in the term infant has been shown to be as effective a method of pain relief as oral sucrose.

Breastfeeding was more effective than sucrose for reducing pain from heel lance in term neonates. It is recommended that breastfeeding, when available, should be used to reduce procedural pain in neonates who are exposed to single painful procedures.

#### **7.6. Skin-to-skin contact (kangaroo care)**

Infants nursed skin to skin for the painful procedure cry less, grimace less and have more stable heart rates. Kangaroo care can also reduce the recovery time following a painful procedure.

Research has shown that where mothers were present during painful procedures, the infants were more likely to receive effective pain management strategies than those whose mothers were not present, highlighting a positive influence of parents. These parent driven strategies, however require nursing staff to enable them, so staff need to be aware of their responsibility to facilitate such beneficial interactions between parent and baby <sup>[7]</sup>

#### **7.7. Sucrose**

Oral sucrose is a non-pharmacological intervention that reduces pain responses in the newborn which has been found to have an enhanced effect when combined with a pacifier. Research has shown that it is effective in stable

premature infants (>27weeks and usually several weeks old) and term infants but there is little evidence about the effects on more preterm infants.

The greatest analgesic effect occurs when sucrose is administered approximately two minutes before the painful stimulus. This interval is thought to coincide with the release of endogenous opioids. This peak effect appears to occur at two minutes and lasts approximately four minutes. Repeating doses at two minute intervals throughout painful procedure has been found to have an increased analgesic effect.(Taddio 2008)

Factors such as the infant's postnatal age may influence the effectiveness of sucrose.

Small volumes only are required; the aim is not to use sucrose inappropriately for ongoing distress.

It has been suggested a maximum of 4 doses per day: one with routine morning bloods and the others kept for procedures that may need to be done.

If a neonate requires an excess of the recommended maximum dosage in 24 hours, review the neonate's current procedural pain management plan .

Discuss with the nursing and medical team re; additional sucrose dosing or alternative management.

Sucrose is contraindicated in:

- Infants less than 27 weeks gestation.
- Infants being treated for NEC.
- If there are any neurological concerns affecting the suck, swallow or gag reflex.
- Critically ill neonates receiving appropriate intravenous analgesia and sedation who have low pain scores on handling.
- Neonates who are receiving muscle relaxant medication.
- Infants with a known fructose or sucrose intolerance.
- It should be used with caution if the infant has an endotracheal tube in situ.

And should be used with caution in:

- Babies at high risk of NEC.
- Babies with hyperglycaemia.
- Infants of diabetic mothers (during the initial post-delivery stabilisation period).

**Dose:**

<b>Infant gestation</b>	<b>Dose</b>
27+1 – 32 weeks gestation	0.1 – 0.5ml 24% Sucrose solution
32+1 weeks gestation	0.5 – 1ml 24% Sucrose solution

**Using sucrose 24% ampoules**

Drops	Millilitres
1 drop	0.03mls
3 drops	0.11mls
6 drops	0.2mls
9 drops	0.3mls
11 drops	0.4mls
13 drops	0.5mls

**The drops are calculated by gently squeezing and keeping a constant pressure on the ampoule to allow one drop to fall per time.**

**Note: excessive pressure on the ampoule will expel excess drops/mls than the required amount.**

Using a cotton bud to administer sucrose **seven drops or 0.22mls completely saturates the cotton bud.**

**Procedure for administration:**

- Discuss with parents or caregivers if available that you would like to offer the baby sucrose and the rationale for doing so.
- Wash hands and use alcohol gel as per local unit policy.
- Check the sucrose prescription, as per network guideline..
- Ascertain whether sucrose is to be given with a pacifier.
- Check 24% sucrose pack is undamaged and within shelf life.
- Check patient identity as per unit protocol.
- Ensure baby is awake to reduce the risk of choking/aspiration.
- Ensure that the baby is positioned appropriately to maintain a clear airway.
- Employ environmental and behavioural strategies to assist baby, utilise methods of swaddling, comfort holding, Kangaroo Care (skin to skin) or breastfeeding to potentiate the effectiveness of the sucrose and comfort the baby.
- The dose to be administered will be based on the gestation of the infant. Give the dose by either: dropping the prescribed dose onto the pacifier and gently place in their mouth or carefully drop the prescribed dose onto the tip of the baby's tongue in a graduated manner. **Sucrose is ineffective if given via a naso/orogastric tube.**

**Or:**

- Using a cotton bud saturated in sucrose 24% solution according to the dosing table above deliver the prescribed dose onto the anterior of the tongue because 90% of the taste buds are close to its tip; (see taste bud diagram below)



- **Wait** two minutes following administration of the sucrose 24% prior to commencing the painful procedure.
- Continue environmental and behavioural strategies during the procedure.
- Observe baby's cues and allow "time out" to recover if possible.
- Record administration of sucrose on the prescription chart.
- Document administration in nursing notes.
- Discard residual sucrose.

Documentation should record the rationale for use and an evaluation of effectiveness along with any adverse reaction should they occur.

### 7.8. Caregiver / infant interaction

Developmentally appropriate soothing conversation can provide an alternative distraction, which has the beneficial side effect of increasing the interaction between nurse and infant<sup>[9]</sup> .

### 7.9. Other measures

- Assisting with hand-to-mouth.
- Cuddling, swaddling/wrapping, holding in an upright position.
- Decreased handling with increased rest periods between procedures.
- Prevent unnecessary painful procedures.
- Use minimal amounts of adhesive tape and remove gently and carefully using adhesive remover.

## 8. Pharmacological measures in reducing pain and stress in the infant.

### 8.1. Goal



To minimise the pain and distress experienced by babies' using pharmacological measures, these should be administered as per the medicine chart with guidance from the BNF for children to give relief during and following painful procedures.

## 8.2. Morphine

Morphine is an opioid analgesic agent that is widely used in neonatal patients. Its role in post-operative pain management is well-established and it is commonly used as an analgesic and sedative agent in ventilated infants. The effect of morphine in very preterm infants will vary because of their pharmacokinetic ability and limited morphine clearance. Morphine clearance increases with gestational age.

Effects of Morphine:

- Decreases stress hormones, stabilises blood pressure,
- Increases ventilator synchrony and
- Improves oxygenation in preterm neonates.

Recent evidence suggests that morphine should not be started routinely in ventilated infants but considered according to clinical need. According to NICE (2019), morphine should be considered if the baby is indicating the need after being assessed using the locally agreed protocol, which in this case is the NPASS tool. Babies on morphine infusions should be regularly assessed to ensure that it is stopped as soon as possible <sup>[10]</sup>.

Whilst pain scores are generally reduced in babies receiving morphine, little is known regarding its long term effects on neurodevelopment. Adverse effects such as respiratory depression, hypotension and increased time to reach full feeds have been demonstrated in very preterm infants. Morphine should therefore be used cautiously in this group, when non-pharmacological measures are judged to be insufficient. When extubating early to non-invasive ventilation is planned, morphine should be avoided unless there is a strong clinical indication. All newly ventilated neonates will be assessed as to their need for pharmacological management.

### 8.2.1. Tolerance

Resistance to morphine may occur in the preterm infant who is unable to metabolise morphine to morphine-6-glucuronide (M6G). Opioid tolerance occurs less frequently within the first 72 hours of an infusion commencing, although a continuous infusion is more likely to produce tolerance to morphine than intermittent doses. Where doses have needed increasing it may be necessary to give a bolus dose (e.g. 50 micrograms/kg) to increase the morphine plasma levels within 20 minutes. Increases may need to be made where tolerance has developed (>72 hours)

## 8.3. Paracetamol

Paracetamol is a non-opioid analgesic with antipyretic properties. It does not cause respiratory depression. Clearance in neonates is reduced therefore multiple doses should be given with a longer time interval:

Paracetamol can be administered orally, rectally and intravenously. Care should be taken when administering as dosages vary depending on route. NB: NHS Signal - Overdose of intravenous paracetamol in infants and children

#### **8.4. Postoperative analgesia**

- The effect of opioids can be enhanced with paracetamol for postoperative management.
- Regular assessments of pain (two-hourly for 24 hours then four-hourly) and include:
  - Intensity of the pain,
  - Response to analgesics and non-pharmacological measures.
- Administer prescribed morphine via an infusion.
- Loading dose should be administered slowly to limit any hypotensive reaction.
- Give paracetamol concurrently as this has a dose sparing effect.
- If epidural is in situ then refer to NPASS and local specific guidance.

### **9. Pain management for infants who are receiving neuromuscular blocking agents**

Muscle paralysis or neuromuscular blocking agents do not provide analgesic qualities therefore infants who are receiving these agents should also receive analgesia as their sensation of pain remains intact and may be highlighted.

### **10. Ventilated Infants**

- Distressed ventilated neonates are more likely to breathe asynchronously increasing the risk of pneumothorax and subsequent intracranial haemorrhage.
- All newly ventilated neonates will be assessed as to their need for pharmacological management.
- Effective treatment of pain is an important part of the supportive care of ventilated infants, because pain and stress can lead to ventilator asynchrony, suboptimal ventilation and cardiovascular instability.
- Non-pharmacological measures such as careful positioning/ handling, use of synchronised ventilation modes and clearing of secretions may be very effective in minimising pain and stress in ventilated infants (as per developmental care guideline <sup>[5]</sup>).

- Suctioning should be kept to a minimum, but if needed then swaddling or containment should be used during the procedure by a second person (as per suction guideline <sup>[11]</sup>).
- If an infant is already on an infusion of morphine for ventilation or post-surgery it is important to still consider alternative methods to relieve pain when further procedures are required.
- Optimise ventilation as babies become agitated when they are not being adequately ventilated therefore this should be corrected as necessary by checking endo-tracheal tube position, auscultation of chest and assessing the blood gas status. Altering the ventilation accordingly and suctioning if required <sup>[11]</sup>.

## 11. Family Education

- Enable parents to feel confident that everything possible is being done for their baby's pain:
- Assess the family's knowledge and perception about pain in infants and its management.
- Answer their questions honestly.
- Guide parents in how they can touch and interact with their baby.
- Encourage parents to comfort their baby.
- Teach the family to understand their baby's signs of attention and stress.
- Explain the side-effects of pain medication.
- Support their decisions; empower them to make good decisions for their baby.

## 12. Documentation

Document:-

- Pain assessment
- Type of pain intervention
- Family involvement.
- One hour post intervention to determine effectiveness of the strategy.
- All pharmacological pain relief should be recorded.

The documentation should establish the:

- Reason for its initiation
- Response to the medication
- Rationale for continuing or weaning
- Rationale for discontinuing.

Document and report any adverse side-effects from pharmacological interventions including:

- Any deviation from baseline pain assessment/ measurement.
- Assessment showing no pain relief.
- Tolerance or dependence to pharmacological agents.
- Respiratory depression.
- Apnoea requiring stimulation and/or neopuff.
- Desaturation – refer to network saturation targeting guidance (2016) <sup>[12]</sup>.
- Bradycardia.
- Hypotension.
- Muscle rigidity.
- Suspect ileus (reduced bowel sounds and/or abdominal distension).
- Urinary retention for more than eight hours.

### 13. Key recommendations

- Work together with the multidisciplinary team to provide the appropriate pain intervention.
- Assess the infant before and during the procedure for additional pain management using the NPASS tool <sup>[5]</sup>.
- Non-urgent intubations should **only** be performed following analgesia/sedation.
- Anticipate potentially painful procedures/ activities.
- Administer appropriate pain management strategies in advance of procedure.
- Allow sufficient time between non-pharmacological/pharmacological method and the commencement of the procedure.
- Morphine - Doses of continuous infusion may need to be increased as tolerance may occur without adequate pain relief.
- Wean analgesia prior to extubation if there has been a sedation effect. Tailor the weaning to suit the baby and assess pain intensity during the process.
- Assess for narcotic tolerance and withdrawal.
- Awareness that drugs given to the neonates will have pharmacodynamic implications that are dependent on maturation.

- Sleep should be protected and neonates given time to recover from painful procedures.
- Staff should educate parents in infant behaviours and encourage them to participate in their babies' pain assessment and management [7].

#### **14. Monitoring compliance/effectiveness of the guideline**

The neonatal Benchmarking group will monitor that the standards set out in this guideline are being met by reviewing case notes and charts of infants cared for on individual Neonatal Units. The results will be presented through the benchmarking group.

#### **15. Audit**

Audit will be through annual benchmarking activity and consequent action planning using infant's records to assess quality outcomes and guideline adherence. Poor scores may necessitate more frequent audits to ensure progress is being made.

## References

1. Anand KJS, Hickey PR. (1987) Pain and its effects in the human neonate and fetus. *The New England Journal of Medicine*. November; 317(21):1321-1327.
2. Bhalla T, Shepherd E, Tobias JD. (2014) Neonatal Pain Management, *Saudi Journal of Anesthesia*, Nov 2014 (8) S89-S97
3. Marchant A, (2014) 'Neonates do not feel pain': a critical review of the evidence, *Bioscience Horizons: Oxford Journals* June 2014 (7) 1-9
4. Khoza S.L.T, Tjale A.A, (2014) Knowledge, attitudes and practices of neonatal staff concerning neonatal pain management, *Curationis* 37(2) 1246-9 pages.
5. Hummel, P., Puchalski, M.L., Creech, S.D. & Weiss, M.G. (2000) N-PASS: Neonatal pain, agitation and sedation scale. Loyola University Medical Center, Maywood, IL Perinatal Center, Oncology Institute.
6. East of England ODN (2018) *Developmental Care Guideline* (Online) Available at: [file:///C:/Users/rich-/AppData/Local/Packages/Microsoft.MicrosoftEdge\\_8wekyb3d8bbwe/TempState/Downloads/Guideline%20for%20developmental%20care%20FINAL%20\(3\).pdf](file:///C:/Users/rich-/AppData/Local/Packages/Microsoft.MicrosoftEdge_8wekyb3d8bbwe/TempState/Downloads/Guideline%20for%20developmental%20care%20FINAL%20(3).pdf) (accessed 13/08/2019)
7. Gallagher, K and Franck. L (2012) Ten lessons from 10 years of research into parental involvement in infant pain management. *Infant*, 8(3):78-80.
8. East of England ODN (2018) *Sucrose guideline* (Online) Available at: [file:///C:/Users/rich-/AppData/Local/Packages/Microsoft.MicrosoftEdge\\_8wekyb3d8bbwe/TempState/Downloads/Sucrose%20guideline%20\(1\).pdf](file:///C:/Users/rich-/AppData/Local/Packages/Microsoft.MicrosoftEdge_8wekyb3d8bbwe/TempState/Downloads/Sucrose%20guideline%20(1).pdf) (accessed 13/08/2019)
9. Thames valley and Wessex neonatal operational delivery network (2018) *Pain Assessment, Minimisation and Management on the Neonatal Unit* (Online) Available at: <https://southodns.nhs.uk/wp-content/uploads/2018/10/Pain-Assessment-Management-and-Minimisation-Guideline.-V3-Dec-2017.-Final-version..pdf> (accessed 13/08/2019)
10. NICE (2019) *Specialist neonatal respiratory care for babies born preterm* (online) Available at: <https://www.nice.org.uk/guidance/ng124/chapter/Recommendations> (accessed 13/08/2019)
11. East of England ODN (2017) *Suction guideline* (Online) Available at: [file:///C:/Users/rich-/AppData/Local/Packages/Microsoft.MicrosoftEdge\\_8wekyb3d8bbwe/TempState/Downloads/Suction%20guideline%20\(3\).pdf](file:///C:/Users/rich-/AppData/Local/Packages/Microsoft.MicrosoftEdge_8wekyb3d8bbwe/TempState/Downloads/Suction%20guideline%20(3).pdf) (accessed 13/08/2019).

12. East of England ODN (2016) *Saturation Targeting Guideline* (Online) Available at: [file:///C:/Users/rich-/AppData/Local/Packages/Microsoft.MicrosoftEdge\\_8wekyb3d8bbwe/TempState/Downloads/EOE%20Saturation%20targetting%20\(3\).pdf](file:///C:/Users/rich-/AppData/Local/Packages/Microsoft.MicrosoftEdge_8wekyb3d8bbwe/TempState/Downloads/EOE%20Saturation%20targetting%20(3).pdf) (accessed 13/08/2019)
13. Asmerom, Y., Slater, L., Boskovic, D.S., Bahjri, K., Holden, M.S., Phillips, R., Deming, D., Ashwal, S., Fayard, E. and Angeles, D.M., (2013). Oral sucrose for heel lance increases adenosine triphosphate use and oxidative stress in preterm neonates. *The Journal of pediatrics*, 163(1), pp.29-35.
14. Campbell, N., Cleaver, K. and Davies, N., (2014). Oral sucrose as analgesia for neonates: How effective and safe is the sweet solution? A review of the literature. *Journal of Neonatal Nursing*, 20(6), pp.274-282.
15. Carbajal, R., Rousset, A., Danan, C., Coquery, S., Nolent, P., Ducrocq, S., Saizou, C., Lapillonne, A., Granier, M., Durand, P. and Lenclen, R., (2008). Epidemiology and treatment of painful procedures in neonates in intensive care units. *Jama*, 300(1), pp.60-70.
16. Carbajal, R., Veerapen, S., Couderc, S., Jugie, M. and Ville, Y., (2003). Analgesic effect of breast feeding in term neonates: randomised controlled trial. *Bmj*, 326(7379), p.13.
17. Carbajal, R., Chauvet, X., Couderc, S. and Olivier-Martin, M., (1999). Randomised trial of analgesic effects of sucrose, glucose, and pacifiers in term neonates. *Bmj*, 319(7222), pp.1393-1397.
18. Lago, P., Garetti, E., Pirelli, A., Merazzi, D., Bellieni, C.V., Savant Levet, P., Pieragostini, L. and Ancora, G., (2014). Sucrose for procedural pain control in infants: should we change our practice. *Acta paediatrica* (Oslo, Norway: 1992), 103(2), pp.e88-90.
19. Stevens, B., Yamada, J., Lee, G.Y. and Ohlsson, A., (2013). Sucrose for analgesia in newborn infants undergoing painful procedures. *The Cochrane Library*.
20. Wilsher, S. (2016). *Guideline: Sucrose Administration, version 2. Cambridge University Hospitals NHS Foundation Trust.*

## **Bibliography**

Anand KJ et al (1999) Analgesia and sedation in preterm neonates who require ventilatory support: results from the NOPAIN trial. Archives of Pediatric Adolescent Medicine. April; 153: 331-338.

Anand KJS, International Evidence-Based Group for Neonatal Pain. (2001) Consensus Statement for the Prevention and Management of Pain in the Newborn. Archives of Pediatric & Adolescent Medicine. February; 155(2):173-180.

BNF-C (2014-15) BNF for Children.

Bristol-Myers Squibb Pharmaceuticals Ltd (2014) Perfalgan 10mg Solution for Infusion. July. <http://emc.medicines.org.uk/document.aspx?documentId=14288>

Carbajal R, Veerapen S, Couderc S, Jugie M, Ville Y. (2003) Analgesic effect of breast feeding term neonates: randomised control trial. British Medical Journal. January 4; 326(7379):13-15.

Carbajal R, Lenclen R, Jugie M, Paupe A, Barton BA, Anand KJ. (2005) Morphine Does Not Provide Adequate Analgesia for Acute Procedural Pain Among Preterm Infants. Pediatrics. June; 115(6):1494-500. [lb]

Kart T, Christrup LL, Rasmussen M. (1997) Recommended use of morphine in neonates, infants and children based on a literature review: Part 1 Pharmacokinetics. Paediatric Anaesthetics. 7(1):5-11.

Luddington-Hoe S, Hosseini R, Torowicz DL. (2005) Skin-to-skin contact (Kangaroo Care) analgesia for preterm infant heel stick. AACCN Clinical Issues. July/September;16(3):373-87.

McCullough S, Halton T, Mowbray D, Macfarlane PI. (2008) Lingual sucrose reduces the pain response to nasogastric tube insertion: a randomised clinical trial. Archives of Disease in Childhood Fetal & Neonatal Edition. March; 93(2):F100-3. [lb]

Saarenmaa E, Neuvonen PJ, Rosenberg P, Fellman V. (2000) Morphine clearance and effects in newborn infants in relation to gestational age. Clinical Pharmacology Therapeutics. August; 68(2):160-6.

Symington A, Pinelli J. (2003) Developmental care for promoting development and preventing morbidity in preterm infants. The Cochrane Database of Systematic Reviews. Issue 4.

### **Guidelines used to assist in the development of the original guideline:**

Leeds Teaching Hospital NHS Trust. (2008) Procedural Pain in the Newborn. April





East of England Neonatal ODN

*(Hosted by Cambridge University Hospitals)*

Rosie Maternity Neonatal Unit Cambridge University Hospitals NHS Foundation Trust.  
(2009) Neonatal Pain Management.

MCN for Neonatology West Scotland. (2014) Oral sucrose for procedural pain.

## Appendix 1

### N-PASS: Neoatal Pain, Agitation & Sedation Scale

Assessment † Criteria	Sedation		Normal	Pain / Agitation	
	-2	-1	0	1	2
<b>Crying Irritability</b>	No cry with painful stimuli	Moans or cries minimally with painful stimuli	Appropriate crying Not irritable	Irritable or crying at intervals Consolable	High-pitched or silent-continuous cry Inconsolable
<b>Behavior State</b>	No arousal to any stimuli No spontaneous movement	Arouses minimally to stimuli Little spontaneous movement	Appropriate for gestational age	Restless, squirming Awakens frequently	Arching, kicking Constantly awake or Arouses minimally / no movement (not sedated)
<b>Facial Expression</b>	Mouth is lax No expression	Minimal expression with stimuli	Relaxed Appropriate	Any pain expression intermittent	Any pain expression continual
<b>Extremities Tone</b>	No grasp reflex Flaccid tone	Weak grasp reflex ↓ muscle tone	Relaxed hands and feet Normal tone	Intermittent clenched toes, fists or finger splay Body is not tense	Continual clenched toes, fists, or finger splay Body is tense
<b>Vital Signs HR, RR, BP, SaO<sub>2</sub></b>	No variability with stimuli Hypoventilation or apnea	< 10% variability from baseline with stimuli	Within baseline or normal for gestational age	↑ 10-20% from baseline SaO <sub>2</sub> 76-85% with stimulation - quick ↑	↑ > 20% from baseline SaO <sub>2</sub> ≤ 75% with stimulation - slow ↑ Out of sync with vent



- + 3 if < 28 weeks gestation / corrected age
- + 2 if 28-31 weeks gestation / corrected age
- + 1 if 32-35 weeks gestation / corrected age

## Appendix Two - Assessment

### Pain/Agitation

- Pain assessment is the fifth vital sign – assessment for pain should be included in every vital sign assessment
- Pain is scored from 0-+2 for each behavioral and physiological criteria, then totaled
  - Points are added to the premature infant's pain score based on their gestational age to compensate for their limited ability to behaviorally or physiologically communicate pain
  - Total pain score is documented as a number between 0 - +10 (or in premature infants +13)
- Treatment/interventions are indicated for scores > 3
  - Interventions for known painful stimuli are indicated before the score reaches 3
- The goal of pain treatment/intervention is a score  $\leq 3$
- More frequent pain assessment indications:
  - Indwelling tubes or lines which may cause pain, especially with movement (e.g. chest tubes) → at least every 2-4 hours
  - Receiving analgesics and/or sedatives → at least every 2-4 hours
  - 30-60 minutes after an analgesic is given for pain behaviors to assess response to medication
  - Post-operatively at least every 2 hours for 24-48 hours, then every 4 hours until off pain medications.

### Sedation

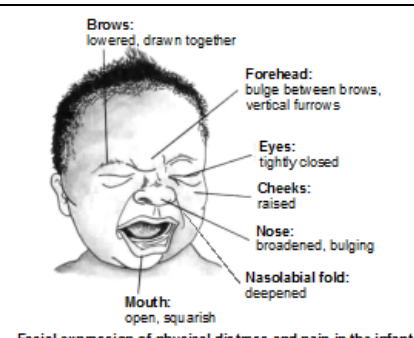
- Sedation is scored in addition to pain for each behavioral and physiological criteria to assess the infant's response to stimuli
- Sedation does not need to be assessed/scored with every pain assessment/score
- Sedation is scored from 0 → -2 for each behavioral and physiological criteria, then summed and noted as a negative score (0 → -10)
  - A score of 0 is given if the infant's response to stimuli is normal for their gestational age
- Desired levels of sedation vary according to the situation
  - "Deep sedation" → score of -10 to -5 as goal

- “Light sedation” → score of -5 to -2 as goal
- Deep sedation is not recommended unless an infant is receiving ventilatory support, related to the high potential for apnea and hypoventilation
- A negative score without the administration of opioids/ sedatives may indicate:
  - The premature infant’s response to prolonged or persistent pain/stress
  - Neurologic depression, sepsis, or other pathology

## **Paralysis**

- It is impossible to behaviorally evaluate a paralyzed infant for pain
- Increases in heart rate and blood pressure may be the only indicator of a need for more analgesia
- Analgesics should be administered continuously by drip or around-the-clock dosing
- Higher, more frequent doses may be required if the infant is post-op, has a chest tube, or other pathology (such as NEC) that would normally cause pain
- Opioid doses should be increased by 10% every 3-5 days as tolerance will occur without symptoms of inadequate pain relief

## **Appendix Three – Scoring Criteria**

<p><b>Crying / Irritability -2</b> → No response to painful stimuli, e.g.:</p> <ul style="list-style-type: none"> <li>• No cry with needle sticks</li> <li>• No reaction to ETT or nares suctioning</li> <li>• No response to care giving</li> </ul> <p><b>-1</b> → Moans, sighs, or cries (audible or silent) minimally to painful stimuli, e.g. needle sticks, ETT or nares suctioning, care giving</p> <p><b>0</b> → Not irritable – appropriate crying</p> <ul style="list-style-type: none"> <li>• Cries briefly with normal stimuli</li> <li>• Easily consoled</li> <li>• Normal for gestational age</li> </ul> <p><b>+1</b> → Infant is irritable/crying at intervals – but can be consoled</p> <ul style="list-style-type: none"> <li>• If intubated – intermittent silent cry</li> </ul> <p><b>+2</b> → Any of the following:</p> <ul style="list-style-type: none"> <li>• Cry is high-pitched</li> <li>• Infant cries inconsolably</li> <li>• If intubated – silent continuous cry</li> </ul>	<p><b>Extremities / Tone</b></p> <p><b>-2</b> → Any of the following:</p> <ul style="list-style-type: none"> <li>• No palmar or planter grasp can be elicited</li> <li>• Flaccid tone</li> </ul> <p><b>-1</b> → Any of the following:</p> <ul style="list-style-type: none"> <li>• Weak palmar or planter grasp can be elicited</li> <li>• Decreased tone</li> </ul> <p><b>0</b> → Relaxed hands and feet – normal palmar or sole grasp elicited – appropriate tone for gestational age</p> <p><b>+1</b> → Intermittent (&lt;30 seconds duration) observation of toes and/or hands as clenched or fingers splayed</p> <ul style="list-style-type: none"> <li>• Body is <i>not</i> tense</li> </ul> <p><b>+2</b> → Any of the following:</p> <ul style="list-style-type: none"> <li>• Frequent (≥30 seconds duration) observation of toes and/or hands as clenched, or fingers splayed</li> <li>• Body is tense/stiff</li> </ul>
<p><b>Behavior / State</b></p> <p><b>-2</b> → Does not arouse or react to any stimuli:</p> <ul style="list-style-type: none"> <li>• Eyes continually shut or open</li> <li>• No spontaneous criterous movement</li> </ul> <p><b>-1</b> → Little spontaneous movement, arouses briefly and/or minimally to any stimuli:</p> <ul style="list-style-type: none"> <li>• Opens eyes briefly</li> <li>• Reacts to suctioning</li> <li>• Withdraws to pain</li> </ul> <p><b>0</b> → Behavior and state are gestational age appropriate</p> <p><b>+1</b> → Any of the following:</p> <ul style="list-style-type: none"> <li>• Restless, squirming</li> <li>• Awakens frequently/easily with minimal or no stimuli</li> </ul> <p><b>+2</b> → Any of the following:</p> <ul style="list-style-type: none"> <li>• Kicking</li> <li>• Arching</li> <li>• Constantly awake</li> <li>• No movement or minimal arousal with stimulation (inappropriate for gestational age or clinical situation, i.e. post-operative)</li> </ul>	<p><b>Vital Signs: HR, BP, RR, &amp; O<sub>2</sub> Saturations</b></p> <p><b>-2</b> → Any of the following:</p> <ul style="list-style-type: none"> <li>• No variability in vital signs with stimuli</li> <li>• Hypoventilation</li> <li>• Apnea</li> <li>• Ventilated infant – no spontaneous respiratory effort</li> </ul> <p><b>-1</b> → Vital signs show little variability with stimuli – less than 10% from baseline</p> <p><b>0</b> → Vital signs and/or oxygen saturations are within normal limits with normal variability – or normal for gestational age</p> <p><b>+1</b> → Any of the following:</p> <ul style="list-style-type: none"> <li>• HR, RR, and/or BP are 10-20% above baseline</li> <li>• With care/stimuli infant desaturates minimally to moderately (SaO<sub>2</sub> 76-85%) and recovers quickly (within 2 minutes)</li> </ul> <p><b>+2</b> → Any of the following:</p> <ul style="list-style-type: none"> <li>• HR, RR, and/or BP are &gt; 20% above baseline</li> <li>• With care/stimuli infant desaturates severely (SaO<sub>2</sub> &lt; 75%) and recovers slowly (&gt; 2 minutes)</li> <li>• Infant is out of synchrony with the ventilator – fighting the ventilator</li> </ul>
<p><b>Facial Expression</b></p> <p><b>-2</b> → Any of the following:</p> <ul style="list-style-type: none"> <li>• Mouth is lax</li> <li>• Drooling</li> <li>• No facial expression at rest or with stimuli</li> </ul> <p><b>-1</b> → Minimal facial expression with stimuli</p> <p><b>0</b> → Face is relaxed at rest but not lax – normal expression with stimuli</p> <p><b>+1</b> → Any pain face expression observed intermittently</p> <p><b>+2</b> → Any pain face expression is continual</p>	 <p>Facial expression of physical distress and pain in the infant</p> <p><small>Reproduced with permission from Wong DL, Hill C.S. Wong and Whalley's Clinical Manual of Pediatric Nursing, Ed. 5, 2000, Mosby, St. Louis</small></p>

## **Appendix Four**

### **Procedure and management table**

<b>Procedure</b>	<b>Management</b>
Capillary sampling	<p>Consider venepuncture.</p> <p>Use right sized tenderfoot device for the infant. Use sucrose with pacifier.</p> <p>Consider skin-to-skin contact/ breast feeding with the mother.</p> <p>Use swaddling or comfort holding (facilitated tucking).</p> <p>Environmental measures.</p> <p>Avoid squeezing as this is the most painful part of the procedure.</p>
Venepuncture/ Cannulation/ Arterial Puncture	<p>Use sucrose with a pacifier.</p> <p>Apply topical anaesthesia for difficult cannulations and allow to sufficient time to work unless urgent. Environmental measures.</p> <p>Position extremity downward to enhance blood flow. Contain limbs to aid infant's effort to gain self-control.</p> <p>Provide boundaries.</p> <p>Second caregiver for support.</p> <p>Encourage the mother to breast feed where appropriate.</p> <p>Withdraw very slowly so that the infant will remain calm.</p>
Long line insertion	<p>Use sucrose with a pacifier.</p> <p>Administer morphine if ventilated.</p> <p>Use swaddling or comfort holding. Environmental measures.</p>
Long line removal	<p>Use adhesive remover before peeling off dressing. Comfort holding.</p>
UAC/ UVC insertion	<p>Use comfort holding. Environmental measures.</p>
Lumbar puncture	<p>Apply topical anaesthesia and allow to sufficient time to work unless urgent.</p> <p>Use sucrose with pacifier.</p> <p>Environmental measures.</p>
Intubation	<p>For non-urgent intubation follow East of England guideline.</p>
Extubation	<p>Comfort holding or swaddling/wrapping.</p>

Tracheal suctioning	Use swaddling or comfort holding. Environmental measures. Ensure second person for support.
Chest drain	Anticipate the need for intubation and ventilation in spontaneously breathing infants. Consider subcutaneous lidocaine. Consider morphine bolus or paracetamol, as clinically indicated.
Gastric tube insertion	Use swaddling or comfort holding. Environmental measures. Use a gentle technique.
Bladder catheterisation	Comfort holding. Environmental measures.
Bladder tap	Sucrose with pacifier if able to suck. Comfort holding.
Rectal biopsy	Use sucrose with a pacifier. Comfort holding.
Rectal Washout	Use pacifier. Environmental measures.
Ventricular tap	Use Sucrose with pacifier. Comfort holding. Paracetamol if symptomatic.
ROP examination	Use all appropriate developmental interventions – e.g. swaddling/ wrapping, quiet environment etc. Use sucrose and pacifier.
Immunisations	Use swaddling or comfort holding. Use sucrose and pacifier. Administer paracetamol as prescribed only <b>if symptomatic</b> . <b>DO NOT GIVE PROPHYLACTICALLY</b>
Intramuscular injection	Whenever possible use the intravenous route instead. Use sucrose and pacifier. Use swaddling or comfort holding. Environmental measures.
Dressing change	Wet any tape with warm water before removing. Comfort holding.
Suture removal	Comfort holding. Use sucrose with a pacifier.



## References

**All Rights Reserved. The East of England Neonatal ODN withholds all rights to the maximum extent allowable under law. Any unauthorised broadcasting, public performance, copying or re-recording will constitute infringement of copyright. Any reproduction must be authorised and consulted with by the holding organisation (East of England Neonatal ODN).**

**The organisation is open to share the document for supporting or reference purposes but appropriate authorisation and discussion must take place to ensure any clinical risk is mitigated. The document must not incur alteration that may pose patients at potential risk. The East of England Neonatal ODN accepts no legal responsibility against any unlawful reproduction. The document only applies to the East of England region with due process followed in agreeing the content.**

## Exceptional Circumstances Form

Form to be completed in the **exceptional** circumstances that the Trust is not able to follow ODN approved guidelines.

Details of person completing the form:	
Title:	Organisation:
First name:	Email contact address:
Surname:	Telephone contact number:
Title of document to be excepted from:	
Rationale why Trust is unable to adhere to the document:	
Signature of speciality Clinical Lead:	Signature of Trust Nursing / Medical Director:
Date:	Date:
Hard Copy Received by ODN (date and sign):	Date acknowledgement receipt sent out:

Please email form to: [mandybaker6@nhs.net](mailto:mandybaker6@nhs.net) requesting receipt.

Send hard signed copy to:  
 Mandy Baker  
 EOE ODN Executive Administrator  
 Box 93  
 Cambridge University Hospital  
 Hills Road  
 Cambridge CB2 0QQ