Nurse Practice Committee
Guidelines for opioid infusions

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Issue Date: September 2011 3rd Edition
Review Date: September 2014

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Introduction:

This guideline is intended for children receiving opioids for acute pain. The care of children requiring IV opioids with severe pain due to complex medical or surgical conditions may need to be modified from these guidelines on the advice of a consultant or Clinical Nurse Specialist (CNS) Acute Pain.

Patient-controlled Analgesia (PCA) or Nurse Controlled Analgesia (NCA) allows children or nursing staff to titrate the amount of analgesic medication needed to achieve comfort which decreases the large peaks and troughs in blood analgesic levels seen when drugs are given on an as needed basis (PRN). This decrease in fluctuation provides more consistent level of pain relief and may potentially cause less sedation, respiratory depression or gastro-intestinal side effects. (Czarnecki et al, 2008).

NCA and PCA have been shown to provide a safe and effective technique for the administration of intravenous opiates for pain relief. (Bray et al 1996, Kelly et al, 2006, Voepal-Lewis et al, 2008, Morton and Errera 2010)
PCA refers to a method of pain relief in which an infusion device connected to a timing mechanism allows a child to self-administer analgesic drugs. (Alaris Medical UK). When the handset is operated and the demand button is within parameters set by the clinician, the pump will administer a precise bolus dose of medication. The child may also receive a continuous infusion of an opioid and the pump is programmed with a lock-out interval. (Schechter et al. 2003, Kelly et al 2006, Pasero and McCaffery, 2011)

NCA for children who are too young or who are cognitively unable to understand the concept of PCA, nurse controlled analgesia is an option. A nurse can assess the child and deliver a bolus dose of an opioid if the child is in pain or in anticipation of a painful event. (Voepal-Lewis et al, 2008, Twycross, Dowden, Bruce, 2009; Morton and Errera, 2010)

Although there are potential advantages to the use of PCA/NCA there are risks as well. If a child is not monitored or if a parent or nurse pushes the PCA/NCA to prevent a sleeping child from experiencing pain or waking up in pain there is a risk of over-sedation, respiratory depression and even death.(Hicks et al, 2008, Morton and Errera, 2010). Equally, if a nurse is unavailable or reluctant to push the NCA button, there is a risk of inadequate treatment of the child’s pain.

Success of IV PCA/NCA depends on prescribing an adequate bolus dose that can be self-administered frequently enough for the patient to manage their pain effectively. The optimal dose should provide consistent satisfactory analgesia without excessive or dangerous adverse effects. (Pasero and McCaffery, 2011)

**Indications for use of opioid infusion**
- Post-operative pain management
- Medical and surgical conditions requiring pain management, e.g. Sickle Cell Crisis, trauma, burns, pancreatitis
- Cancer related pain
- Palliative care

**Contraindications for use of PCA**
- Inability of the child to understand the concept
- Age less than 6 years
- Inability to push the button
- Child/parental refusal (every effort should be made to explain to children and parents the importance of good pain management)

**Adverse effects associated with opioid infusions:**
- Sedation
- Respiratory depression, hypoxia
- Pruritis
- Nausea and Vomiting
- Urinary retention
- Constipation

**Key points when preparing and administrating an opioid infusion.**
- The opioid infusion must be prepared in accordance with the hospital medication policy and the hospital IV policy, and labelled and dated appropriately with an IV additives’ label. (OLCHC 2007). Opioid infusions are prescribed on the pink IV prescription sheet.
- The staff who prepare the opioid infusion must sign the prescription chart and MDA register as per the hospital IV policy and medication policy. (OLCHC 2007)
- One of the individuals preparing the infusion must connect the infusion to the patients IV cannula as per medication policy which should be witnessed by a second nurse or medical doctor.
- Opioid infusions must be changed every 24 hours unless the infusion is due to be stopped in the next few hours.

**Opioid Infusion is prepared and replaced by:**
- Registered Nurse who has completed OLCHC IV Certificate and who is competent in preparing and programming an opioid infusion device.
- Medical Staff who are competent in preparing and programming an opioid infusion device.
All clinical areas have been issued with keys for these infusion pumps. The keys must be kept with the MDA keys at all times.

Concurrent medication

- When opioid infusions are used, **NO oral/rectal/intravenous or intramuscular opioids or sedative agents** should be given without prior consultation with an anaesthetist or the pain/palliative care service or a consultant physician.
- Paracetamol, Non-Steroidal-Anti-inflammatory drugs (NSAID’s) and adjuvants such as clonidine, ketamine, regional analgesia and tramadol may be used concurrently with opioid infusion to optimise analgesia and reduce opioid requirements and associated side effects.

Programming pump

- Pumps should be kept locked while on an open ward i.e. outside of intensive care setting or at the direction of the palliative care or acute pain service.
- Only staff that are competent should programme the infusion device.
- It is the responsibility of registered nurse caring for children receiving opioid infusions to determine his/her competency in relation to the use of opioid infusions and where necessary to seek additional training and support. (see appendix 3 for self-assessment of competency)
- Nursing staff can alter the pump programme within prescribed limits.
- Alterations must be documented and witnessed by two staff members as per Medication and IV Policy (OLCHC, 2007).

Terminology

| **Loading Dose** | A loading dose can be administered to patients prior to the commencement of opiate infusions. This ensures the child’s pain is relieved to an acceptable level. |
| **Bolus Dose** | Is the amount of drug the child receives when the handset or demand button is pressed to deliver the programmed bolus dose of analgesia. |
| **Lockout Period** | The time from the end of delivery of one successful bolus until the machine will allow the child to receive another bolus. The PCA will not deliver a dose during the lockout time even if the button is pressed. This allows the bolus dose to reach peak effect before the patient has another bolus. (Twycross, Dowden, Bruce, 2009) It is set to avoid overdosing (bolus too frequent) or inadequate analgesia (infrequent bolus). (RCPCH 1997) |
| **Demands/Good Demands/Bad** | Each time the handset is activated the device will record this as a demand, each time the patient presses the handset and receives a bolus this will be recorded as a Good Demand. |
| **Continuous Background Infusion** | A continuous infusion can be added to provide a more steady blood concentration of analgesic. NCA/PCA in children can be enhanced by the addition of a background infusion which enhances sleep patterns. (Bray et al 1996) |
| **Hourly Or Four Hourly Limit** | Prevents the child receiving more than an identified amount of opioid over a given time period, and allows for reassessment if child reached 4 hourly limit early. |

Equipment:

- Locked infusion pumps.
- (Stored in Recovery and/or HSSD).
- Pink drug kardex and prescribed opioid
- 50ml Braun perfusor syringe
- 2ml syringe and filter Needle
- 5% dextrose w/v or 0.9% Normal saline w/v 50 ml
- Alcohol wipes
- 2 ml and 50 ml syringe + medication additive label + MDA register
- Extension tubing incorporating anti-siphon valve available from HSSD
- Extension tubing incorporating anti-siphon valve and an anti-reflux valve must be used if other fluids are to be administered through the same IV site.
- Fluid Balance Chart and observation chart incorporating pain assessment
**Opioid Tolerant Patient** (a patient that has been receiving IV or oral opioids)
- The starting prescription for IV PCA or NCA is based on the patient’s current total opioid dose.
- This initial prescription is an estimate and must be adjusted according to the patient’s pain and any adverse effects.
- Larger bolus doses with longer lockout intervals are commonly required and are usually well tolerated by opioid tolerant patients with cancer or persistent non-cancer pain. (Pasero and McCaffery, 2011)

**Opioid naïve patient:**
- The starting dose is again only an estimate of the patient's needs and must be adjusted on the basis of the patient’s response.
- Small doses of analgesia and short lockout intervals are best for opioid-naïve patients to prevent excessive sedation at peaks and prevent breakthrough pain at troughs. (Pasero and McCaffery, 2011)

<table>
<thead>
<tr>
<th>ACTION</th>
<th>RATIONALE &amp; REFERENCE</th>
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<tbody>
<tr>
<td><strong>Preparation</strong></td>
<td></td>
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<tr>
<td>The child and family should be prepared for the opioid infusion, PCA/NCA</td>
<td>To gain co-operation. Promotes child’s understanding and trust. (Trigg and Mohammed, 2010)</td>
</tr>
<tr>
<td>• The nursing staff and/or play specialist should explain the technique to the child and family.</td>
<td>To ensure consent for procedure. Parents can support their child in the use of PCA. (Voepal-Lewis et al, 2008; OLHSC 2011)</td>
</tr>
<tr>
<td>• The family should be made aware that if the child is unable to use PCA the programming can be changed to NCA</td>
<td>The safety of PCA/NCA is dependent on the fact that unauthorised persons do not press the demand button. (Voepal-Lewis et al, 2008, Hicks et al, 2008, Morton and Errera, 2010, Trigg and Mohammed, 2010)</td>
</tr>
<tr>
<td>• NCA may be changed to PCA at any time if the child is able and willing to press the demand button and understands the concept</td>
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<tr>
<td>• If the family have any questions that staff feel unable to answer they should contact the CNS, Acute Pain Service, bleep 8300 or the on call anaesthetist, bleep 8652</td>
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<tr>
<td>• Parents and carers <strong>must be</strong> instructed not to press the demand button.</td>
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<tr>
<td>• Encourage the child and parents to report any side-effects or inadequate analgesia promptly.</td>
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<tr>
<td><strong>Nursing staff should ensure that a developmentally appropriate pain assessment tool is available. (See appendix 2)</strong></td>
<td>To ensure that the child understands and can use the tool prior to any painful experience. (RCN, 2009; Twycross et al 2009)</td>
</tr>
<tr>
<td>• Explain the assessment tool to be used to the child on admission.</td>
<td>To ensure good communication between child, parent and nurse and to enable staff to provide appropriate and timely analgesia (Czarnecki et al, 2008).</td>
</tr>
<tr>
<td>• The child can practice by scoring previous painful experiences to determine whether they are able to use the tool.</td>
<td></td>
</tr>
<tr>
<td>• Document the words children used to describe pain in the care plan.</td>
<td></td>
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<tr>
<td>• Involve parents/carers of infants and children with special needs and document child’s normal pain behaviours if these are known to parent/carer.</td>
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</tr>
<tr>
<td><strong>Prepare opioid infusion as per OLCHC policies.</strong></td>
<td>(OLHSC, 2001; OLCHC, 2007; OLCHC, 2011)</td>
</tr>
<tr>
<td><strong>A second nurse or medical doctor must check the pump programming</strong></td>
<td>To confirm that the pump has been programmed correctly. (Hicks et al, 2008, Pasero and McCaffery 2011)</td>
</tr>
</tbody>
</table>
Load syringe into infusion pump and program the appropriate information as per pump manufacturers’ guidelines.

Before commencing the infusion establish if the child has already received opioid analgesia. If not a loading dose of opioid should be prescribed and administered.

**Improper loading can result in uncontrolled emptying (siphoning) of the syringe into the infusion tubing.** (Vincente et al. 2003, Alaris Medical UK)

**Incorrect programming of the pump can result in adverse events such as over-sedation, hypoxia.** (Hicks et al, 2008; Voepal-Lewis et al, 2008; Morton and Errera, 2010)

A loading dose is given to achieve adequate analgesia. The infusion then maintains analgesia. (RCPCH, 1997; APA, 2008, OLCHC, 2011)

On collecting a child from theatre or other clinical area a verbal report should be obtained from the nurse to include:

- Details of analgesia administered.
- Details of opioid solution and rate of infusion.
- Any pain or opioid related complications that have been experienced.

**To provide adequate information**

**To ensure continuity of care**

**To prevent medication administration errors.**

The following should be checked when taking over the care of a child receiving intravenous opioid analgesia:

- The infusion pump is working and the pump programming is correct
- The drug and dosage being administered corresponds with the prescription.
- The child’s pain is well controlled
- The child is not excessively sedated.
- Drugs to prevent side effects such as anti-emetics have been prescribed
- Additional analgesia such as paracetamol, a non steroidal Anti-inflammatory drug e.g. ibuprofen, clonidine has been prescribed
- Naloxone is available in the clinical area.

**To ensure continuity of analgesia.**

**To ensure the prescription infusion rate and solution are the same as has been prescribed to prevent medication errors.** (Vincente et al. 2003; Hick et al, 2008; Morton and Errera, 2010, OLCHC, 2011)

**To prevent side effects.** (OLCHC, 2011)

Pain control can be enhanced by using a multimodal approach using a combination of analgesics which may also reduced incidence of side effects. (Trigg and Mohammed, 2010)

**To allow for prompt treatment of opiate induced respiratory depression (OLCHC, 2011)**
### Monitoring and Assessment

<table>
<thead>
<tr>
<th>Monitor and document vital signs including pain assessment as per OLCHC Analgesia and Sedation guideline, 2011</th>
<th>This has a dual role</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physiological Monitoring in the post operative setting</strong></td>
<td>1. To assess adequacy of pain relief</td>
</tr>
<tr>
<td>• One hourly respiratory assessment.</td>
<td>2. To ascertain that no detrimental side effects related</td>
</tr>
<tr>
<td>• 4 hourly heart rate, blood pressure, temperature</td>
<td>to pain management or other ongoing pathophysiological processes are occurring. (Voepal-Lewis et al, 2008; Hicks et al, 2008; Twycross et al 2009; OLCHC, 2011)</td>
</tr>
<tr>
<td>• Apnoea monitoring for all infants &lt; 1 year</td>
<td></td>
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<tr>
<td><strong>Oxygen saturation monitoring MUST</strong> be implemented continuously:</td>
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<tr>
<td>• In high-risk patients with any co-morbidities e.g. cardio respiratory disease, prematurity, respiratory disease etc:</td>
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<tr>
<td>• Sedation score&gt;3</td>
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<tr>
<td>• Significant cardio respiratory impairment</td>
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<tr>
<td>• Sleep apnoea, snoring, or airway obstruction</td>
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<tr>
<td>• Spot oximetry less than 94% SaO₂ or patients’ receiving supplementary oxygen</td>
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<tr>
<td>• Children receiving concurrent sedative agents.</td>
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<tr>
<td><strong>Clinical indicators for ‘spot’ pulse oximetry</strong></td>
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<tr>
<td>• Respiratory distress, tachypnoea or decreased Respiratory Rate.</td>
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<tr>
<td>• Suspected cyanosis or impaired oxygenation</td>
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<td>• Confusion or agitation</td>
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<td>• Hypotension</td>
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<tr>
<td>• Nurse concerned</td>
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<tr>
<td><strong>Monitor and document child’s level of sedation</strong> hourly whilst the opioid infusion is in progress.</td>
<td></td>
</tr>
<tr>
<td>0= Awake and alert</td>
<td>To prevent further sedation, that may potentially result in respiratory depression.</td>
</tr>
<tr>
<td>1=Minimally Sedated: Tired, sleepy, responds to sounds, verbal conversation</td>
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</tr>
<tr>
<td>2=Moderately sedated: Sleeping. Arouses easily</td>
<td></td>
</tr>
<tr>
<td>3=Deeply Sedated: Deep Sleep. Aroused only with significant physical stimulation.</td>
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<tr>
<td>4=Unrousable: Unrousable to stimuli</td>
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<tr>
<td><strong>If sedation score &gt;3 or there is respiratory depression</strong></td>
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</tr>
<tr>
<td>• STOP infusion</td>
<td></td>
</tr>
<tr>
<td>• Provide BLS if necessary</td>
<td></td>
</tr>
<tr>
<td>• Contact on call anaesthetist /doctor/CNS Acute Pain</td>
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</tr>
<tr>
<td>• Recomence infusion once sedation score returns to 2 or on instruction from the pain service/physician.</td>
<td></td>
</tr>
<tr>
<td><strong>IF MEDICAL EMERGENCY IS INDICATED BLEEP 2222.</strong></td>
<td></td>
</tr>
<tr>
<td>• Administer basic life support</td>
<td>To prevent further deterioration. (Twycross et al 2009; OLCHC 2011)</td>
</tr>
<tr>
<td>• Prepare and administer Naloxone (This may need to be repeated)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>• Contact pain service</td>
<td></td>
</tr>
<tr>
<td>• Document actions in child’s medical records.</td>
<td>To summon help and provide prompt treatment.</td>
</tr>
<tr>
<td>Naloxone is an opioid antagonist. A small dose will reverse narcotics side-effects, whilst maintaining some pain relief. Naloxone has half-life of 30minutes, thus it is necessary to continue to monitor for side effects. To inform pain service of the incident so that appropriate treatment and follow is provided (Schechter et al. 2003; OLCHC, 2011)</td>
<td></td>
</tr>
</tbody>
</table>
### Pain Assessment

Assess and document pain scores using developmentally appropriate pain tool (FLACC, Wong-Baker faces, Numeric, FLACC revised, Comfort Score (PICU only)):  
- At least 4-hourly at rest and on movement or more frequently if child reporting pain score >4, or  
- Within 10-15 minutes of IV bolus or 60 minutes of oral/PR analgesic.

<table>
<thead>
<tr>
<th>If the child is in pain:</th>
<th>To determine whether good pain control is being achieved. (RCN, 2009; Analgesia Guideline OLHSC, 2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assess the child and out rule anxiety</td>
<td>To determine whether the intervention has been successful or whether other pain relief measures need to be taken. (RCN, 2009; Pasero and McCaffery, 2011)</td>
</tr>
<tr>
<td>Assess IV site for infiltration</td>
<td></td>
</tr>
<tr>
<td>Check pump is functioning correctly, check for kinked or damaged tubing</td>
<td></td>
</tr>
<tr>
<td><strong>For PCA:</strong> encourage the child to self-administer bolus and evaluate effectiveness after 5-10 minutes.</td>
<td>Children with high levels of anxiety will have higher pain scores, and more frequent unsuccessful PCA demands</td>
</tr>
<tr>
<td><strong>For NCA:</strong> Administer a bolus and evaluate effectiveness after 5-10 minutes.</td>
<td>To improve pain relief (Bray et al. 1996; Peters et al 1999; Mannitto et al 2000; Kelly et al 2006; Tywcross, Dowden, Bruce, 2009)</td>
</tr>
<tr>
<td>Modify infusion within prescribed parameters.</td>
<td>Multimodal analgesia is more effective than single agent analgesia. (Schechter et al. 2003, Czarnecki et al, 2009)</td>
</tr>
<tr>
<td>Administer prescribed simple analgesics, e.g. paracetamol or ibuprofen/diclofenac, if appropriate</td>
<td>To help manage the emotional component of pain</td>
</tr>
<tr>
<td>Consider using other comfort measures to relieve pain e.g. repositioning, distraction, play therapy etc.</td>
<td>To enable PCA/NCA prescription to be altered or supplemental bolus analgesia to be administered to provide prompt pain relief. (OLCHC, 2011)</td>
</tr>
</tbody>
</table>

If pain score is ≥ 7 contact the CNS, Acute Pain, bleep 8300 or the on call Anaesthetist, bleep 8652)

**Note:** Children who are not opiate naive (i.e. children receiving opiates prior to commencing IV infusion) need careful consideration and their previous opiate requirements must be taken into account.

If the pain is indicative of surgical or trauma complications (e.g. intestinal obstruction, compartment syndrome), or other cause, the surgeons, medical staff or anaesthetist on call or CNS Acute Pain should be contacted for advice.

To avoid the potential for masking complications which may need alternative interventions. (Schechter et al. 2003)

**Note & document the following hourly on the IV fluid balance sheet**

- Number of demands (tries) made and the number of demands delivered.  
- Amount infused (hourly and running totals).  
- Document Total dose (in mg) delivered each 24 hours.

To promptly detect side effects and deal with any that may occur in a timely manner. If the number of demands is high it may be necessary to adjust the pump settings to achieve better pain control and avoid side effects. (McNeely & Trentadue, 1997; Manitto et al 2000)
### Management of Adverse Effects of opioid infusions

**IF patients’ IV infusion has infiltrated:**
- Arrange for re-site if less than 36 hours postop
- Avoid re-siting of IV cannula and consider alternative analgesia e.g. Paracetamol or NSAID, oral opioid.

**Child may still require IV opioid infusion**
**Child may no longer require IV opioid infusion**

**Monitor for sign of pruritis** at least 4-hourly or 1-2 hourly if itching becomes problematic.
- Administer an anti-histamine (Chlorphenoramime) as prescribed
- Consider reducing the opioid infusion
- Consider switching to an alternative opioid.

To ensure early detection and treatment of opiate induced pruritis. Antihistamine will act as an antagonist to the itching. (RCPCH 1997)

**The child should be monitored and assessed for nausea and/or vomiting** at least 4-hourly or 1-2 hourly if they experience nausea or vomiting

If child feels nauseated or has vomited:
- Administer anti-emetic as prescribed
- Consider using an additional anti-emetic if the nausea and vomiting has not improved after an hour.
- Aspirate naso-gastric/ gastrostomy tube if appropriate

If nausea/ vomiting is not reduced contact pain service / medical or surgical team.

Nausea may be associated with bolus administration. Vomiting may be due to surgery or the anaesthetic (RCPCH 1997; Analgesia Guidelines OLHSC, 2011) Reducing or switching to an alternative opioid may prevent opioid induced nausea and vomiting. (Rose and Watcha 1999; Schechter et al. 2003)

**Monitor urinary output** at least 4 hourly.
- If a child has not passed urine 12-hours after surgery check fluid intake check to determine if the child has a palpable bladder
- Ensure child is pain free
- Contact surgeons or medical staff to determine whether the child needs to be catheterised.

To ensure early detection and treatment of urinary retention. (RCPCH 1997)
To determine whether the child is dehydrated or has urinary retention.
If the child is tense due to pain they will be less likely to pass urine spontaneously.
To allow for drainage of the bladder

### WEANING INFUSION

**Criteria for stopping PCA/NCA/continuous infusion:**
- The child is able to take analgesia via an alternative route
- The background infusion has been reduced or stopped
- The child is no longer requiring bolus doses.
- Prior to weaning the opioid infusion, ensure the child has received adequate supplemental analgesia and continue to administer regular analgesia for pain relief thereafter.

To ensure effective analgesia is maintained once the opioid infusion has been stopped.

- Wean child from PCA/NCA infusion by stopping the continuous infusion initially, leaving PCA/NCA in situ.
- Wean and discontinue background infusion when the numbers of demands made are less than 4 per hour and when the child is pain free at rest and on movement.

To enable the child to return to return to normal self care without the need for an IV opioid infusion (Schechter et al. 2003; Kelly et al. 2006)
- Codeine/tramadol or oral morphine/oxycodone may be given at the time the infusion is discontinued.
- If a sustained release opioid is to be given orally the infusion must remain in situ for up to 6 hours, please seek advice from the CNS pain, bleep 8300 or Palliative care CNS, bleep 8301
- Record total amount of morphine administered on the IV fluid balance sheet. This information can be found on the infusion pump

To ensure that adequate levels of analgesia are maintained.
It may take up to 6 hours before the child receives sufficient analgesia in the case of MST. (Pasero and Mc Caffery, 2011)
To provide accurate documentation for audit purposes.

**NOTE:** if a child has been receiving an opioids IV for some time they must be weaned slowly off their opioid, this may be done via IV or oral route. Support from the CNS Acute Pain, bleep 8300 is advised.

Weaning score chart is available to help detect withdrawal symptoms.

To avoid withdrawal symptoms developing due to abrupt discontinuation of opioid.

The use of a scoring chart to monitor for signs of opioid withdrawal can help to minimize adverse withdrawal symptoms. (Ista et al, 2009)

### PUMP PROBLEMS

**If the pump alarms:**
- Stop the infusion and check the pump display to identify the source of the alarm.
- Check the IV catheter is not kinked or trapped.
- Flush the cannula and restart the infusion.
- Check whether the pump is faulty – if the pump is faulty, it will need to be replaced and returned to biomedical engineering with a label describing the fault.
- If the child has reached their 4 hourly limit, or the cause of the alarm is unknown contact the CNS acute pain or anaesthetist on call to ensure that the child is reviewed promptly as the pump will need reprogramming.

To determine and correct the cause of the alarm. (Lynn *et al*, 2000; Vincente *et al*. 2003; Alaris Medical UK)
To prevent administration errors due to faulty equipment. (Lynn *et al*.; 2000; Vincente *et al*. 2003; Hicks *et al*, 2008; Alaris Medical UK)
If the 4 hourly limit is reached early it may indicate severe anxiety in the child who may need an anxiolytic medication e.g. diazepam or it may indicate that the child’s pain is not well controlled and an additional clinician bolus may be required.

Document in the child’s notes the effectiveness of therapy, side effects or any problems encountered.

Maintains accountability through accurate recording of nursing intervention An Bord Altranais (2002)

The infusion pump **MUST** be cleaned and returned to recovery or HSSD when it is no longer required.

**DO NOT store Pumps at ward level**

If there are any adverse events noted due to pump malfunction. Please retain the syringe, tubing, document the malfunction and send the infusion pump to biomedical engineering.
REFERENCES


Our Lady’s Children’s Hospital Crumlin (2007) Intravenous Guidelines for Nursing Staff. OLCHC, Dublin


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**APPENDIX 1**

**ALGORITHM FOR THE CARE OF A CHILD RECEIVING AN OPIOID INFUSION**

### PREPARATION

Prepare the child and parents in the preoperative period in relation to:
- Pain assessment using developmentally appropriate pain assessment tools.
- The technique of PCA/NCA
- Importance of reporting pain, nausea and/or vomiting, pruritis
- Principles of multimodal analgesia (Paracetamol +/- NSAID, with opioid)

### MONITORING

**Physiological Monitoring**

One Hourly Respiratory rate (acute pain) x 24 hours, then review 4 hourly HR, B/P/ Temp

Apnoea monitoring for all children <1 year

Sedation level hourly

Routine oxygen saturation monitoring is not required

**Oxygen saturation monitoring MUST be implemented continuously** in high-risk patients with any co-morbidities e.g. cardio respiratory disease, prematurity, respiratory disease etc:
- Sedation score ≥ 3
- Significant cardio respiratory impairment
- Sleep apnoea, snoring, or airway obstruction
- Spot oximetry less than 94% SaO₂ or patients receiving supplementary oxygen
- Children receiving concurrent sedative agents.

**Clinical indicators for ‘spot’ pulse oximetry**
- Respiratory distress, tachypnoea or decreased RR
- Suspected cyanosis or impaired oxygenation
- Confusion or agitation
- Hypotension
- Nurse concerned

**Pain Assessment**

Assess and document pain scores on movement and at rest, using developmentally appropriate pain tool (FLACC, Flacc Revised for children with cognitive intellectual disabilities; Wong-Baker faces, Numeric; Comfort (PICU)):
- At least 4-hourly or
- More frequently if child reporting pain score >4, or
- Within 10-15 minutes of IV bolus or 60 minutes of oral/PR

**Monitor for Nausea and vomiting, Pruritis and urinary retention** at least 4 hourly:
- Administer antiemetic(s) if child experiences Nausea or vomiting
- Administer anti histamine for pruritis
- If child experiences urinary retention urinary catheterisation may be necessary

**DOCUMENTATION**

- IV Fluid Balance sheet
- Hourly demands (tries) and number of successful demands
- Hourly volume of opiate infused (continuous + PCA/NCA)
- 24 hourly total of morphine infused mls/mgs at 12 midnight Observation chart /Nursing Notes
- Pain Score at rest and on movement
- Response to analgesia
- Sedation Level
- Nausea and/or vomiting
- Evidence of Pruritis
# APPENDIX 2: MANAGEMENT OF OPIOID SIDE EFFECTS

<table>
<thead>
<tr>
<th>SIDE EFFECT</th>
<th>MANAGEMENT OF SIDE EFFECTS</th>
<th>ACTION</th>
</tr>
</thead>
</table>
| SEDATION SCORE > 4 (UNROUSABLE) | 4: Very Sedated. Unrrousable | • Stop Infusion opioids if applicable  
• Assess Breathing  
• Call for urgent medical review  
• Provide BLS  
• Prepare I.V. Naloxone. |
| RESPIRATORY DEPRESSION | < 1 year  
< 15 breaths/min  
< 8 breaths/min  
>12 years  
< 8 breaths/min | • Stop pump  
• Assess breathing and deliver Oxygen if necessary  
• Assess sedation level  
• Easily roused? ⇒ Observe every 15 minutes⇒ Restart pump when R.R. and SaO₂ normal⇒ if in doubt call for medical assessment and prepare to administer I.V. Naloxone if Respiratory Rate falls.  
• Unrrousable? ⇒ See Sedation |
| NAUSEA AND VOMITING | Self report nausea  
Pallor  
Retching  
Vomiting  
Unwillingness to use P.C.A. when in pain. | • I.V. Ondansetron  
• I.V Dexamethasone  
• Consider stopping PCA/NCA if severe on advice from pain service CNS, bleep 8300, or anaesthetist bleep, 8528. |
| PRURITIS | Itching  
Rash | • I.V. Chlorpheniramine  
• Reduce infusion rate if possible  
• Consider change to alternative opioid e.g. Oxycodone on advice from CNS pain service or palliative care service, |
| URINE RETENTION | Inability to pass urine | • Consider catheterisation |
| CONSTIPATION | Assessment of child’s normal and current bowel activity | • Regular Laxative  
• Good fluid/fibre intake |
| MIOSIS AND EUPHORIA | Pupil constriction/ euphoria | • Close monitoring  
• May require additional fluids  
• May require reduction in rate of opioid infusion |
APPENDIX 4

PAIN ASSESSMENT

The Golden Rule is to ASK the patient

Wong-Baker FACES Pain Rating Tool (ages 4 years)

0 - 10 Numeric Pain Intensity Scale*

In Intensive the COMFORT SCORE is used in ventilated patients who are unable to communicate.
# FLACC Behavioural SCALE (0 to 4 years)

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACE</td>
<td>No particular expression or smile</td>
<td>Occasional grimace or frown, withdrawn, disinterested.</td>
<td>Frequent to constant quivering chin, clenched jaw.</td>
</tr>
<tr>
<td>LEGS</td>
<td>Normal position or relaxed</td>
<td>Uneasy, restless, tense</td>
<td>Kicking, or legs drawn up,</td>
</tr>
<tr>
<td>ACTIVITY</td>
<td>Lying quietly, normal position, moves easily</td>
<td>Squirming, shifting back and forth, tense.</td>
<td>Arched, rigid or jerking.</td>
</tr>
<tr>
<td>CRY</td>
<td>No cry (awake or asleep)</td>
<td>Moans or whimpers; occasional complaint.</td>
<td>Crying steadily, screams or sobs, frequent complaints.</td>
</tr>
<tr>
<td>CONSOLABILITY</td>
<td>Content, relaxed</td>
<td>Reassured by occasional touching, hugging or being talked to, distractible</td>
<td>Difficult to console or comfort</td>
</tr>
</tbody>
</table>

Each of the 5 categories (F) Face; (L) Legs; (A) Activity; (C) Cry; (C) Consolability is scored from 0-2, Resulting in a total score between 0 & 10.

# (REVISED) FLACC Scale for Children with Cognitive Impairment

<table>
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<tr>
<td>CONSOLABILITY</td>
<td>Content, relaxed</td>
<td>Reassured by occasional touching, hugging or being talked to, distractible</td>
<td>Difficult to console or comfort Pushing caregiver away, resisting care or comfort measures</td>
</tr>
</tbody>
</table>

Each of the 5 categories (F) Face; (L) Legs; (A) Activity; (C) Cry; (C) Consolability is scored from 0-2, Resulting in a total score between 0 & 10.

**How to Use the FLACC**

In patients who are awake: observe for 1 to 5 minutes or longer. Observe legs and body uncovered. Reposition patient or observe activity. Assess body for tenseness and tone. Initiate consoling interventions if needed.

In patients who are asleep: observe for 5 minutes or longer. Observe body and legs uncovered. If possible, reposition the patient. Touch the body and assess for tenseness and tone.

Whenever feasible, behavioural measurement of pain should be used in conjunction with self-report. When self-report is not possible, interpretation of pain behaviours and decisions regarding treatment of pain require careful consideration of the context in which the pain behaviours are observed.
### APPENDIX 4

**Competency Statement**

**3300 PCA Pump**

**Self Assessment**

*High Risk Device - STOP Do not use this item unless you are competent to do so*

**Surname:**

**Forename(s):**

**Title (Mr/Mrs/Miss/Dr etc):**

**Job Title/Designation**

**Dept/Directorate & Ward/Unit:**

**Extension No:**

---

**Self-verification of competence is undertaken by assessment against the following statements:**

These statements are designed to indicate competence to use this device. Responsibility for use remains with the user, so if you are in any doubt regarding your competence to use the device, you should seek education to bring about improvement. Various methods including self-directed learning, coaching & formal training may be initiated. (Consider local resources, product operating manual, IV study day, Pain study days & discussion with Clinical facilitator, colleagues or the CNS Acute Pain)

Carry out an initial assessment. You must be able to answer "yes" to all the questions before considering yourself to be competent.

If you are not competent, instigate learning & then repeat self-verification.

---

**Questions to ask yourself:**

<table>
<thead>
<tr>
<th>Question</th>
<th>Initial assessment date</th>
<th>Final assessment date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you safe using this device? Do You Know:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. What is the purpose of the self test when the pump is first switched on?</td>
<td>1. Yes/No</td>
<td>1. Yes/No</td>
</tr>
<tr>
<td>2. How to load the syringe into the pump?</td>
<td>2. Yes/No</td>
<td>2. Yes/No</td>
</tr>
<tr>
<td>3. Do you know how to programme the pump?</td>
<td>3. Yes/No</td>
<td>3. Yes/No</td>
</tr>
<tr>
<td>4. Do you know how to alter the name of the drug to be infused?</td>
<td>4. Yes/No</td>
<td>4. Yes/No</td>
</tr>
<tr>
<td>5. Why should you purge the pump before connecting the infusion to the patient?</td>
<td>5. Yes/No</td>
<td>5. Yes/No</td>
</tr>
<tr>
<td>6. Do you know the code for a clinician (Medical doctor) bolus?</td>
<td>6. Yes/No</td>
<td>6. Yes/No</td>
</tr>
<tr>
<td>7. Do you know how the hand set operates?</td>
<td>7. Yes/No</td>
<td>7. Yes/No</td>
</tr>
<tr>
<td>8. Do you know how long it will take for a bolus dose (NCA/PCA) to be effective?</td>
<td>8. Yes/No</td>
<td>8. Yes/No</td>
</tr>
<tr>
<td>9. What should you do if a child makes excessive PCA demands?</td>
<td>9. Yes/No</td>
<td>9. Yes/No</td>
</tr>
<tr>
<td>10. Do you know why what to do if the 4 hourly maximum dose is reached early?</td>
<td>10. Yes/No</td>
<td>10. Yes/No</td>
</tr>
<tr>
<td>11. What you should do first if an occlusion occurs?</td>
<td>11. Yes/No</td>
<td>11. Yes/No</td>
</tr>
<tr>
<td>12. How to alter pump settings to either increase or wean the opioid infusion?</td>
<td>12. Yes/No</td>
<td>12. Yes/No</td>
</tr>
<tr>
<td>13. What potentially dangerous event might occur if the syringe plunger or barrel were not secure and a giving set without an anti-siphon valve was used?</td>
<td>13. Yes/No</td>
<td>13. Yes/No</td>
</tr>
<tr>
<td>15. Do you know where to access the hospital guidelines for PCA/NCA?</td>
<td>15. Yes/No</td>
<td>15. Yes/No</td>
</tr>
<tr>
<td>16. How you would clean and store the pump after use?</td>
<td>16. Yes/No</td>
<td>16. Yes/No</td>
</tr>
</tbody>
</table>

**Statement:** Having answered "yes" to all the questions above & taken into account my personal assessment of my competence with the product, I declare that:

I am competent to use this product without further training

Signature: ___________________________ Date: ____________

I require further training to before I can use this product in a competent manner

Signature: ___________________________ Date: ____________

Indicate how you plan to meet your learning needs:

---

*Keep this form in your personal portfolio or training record. Send a copy of this form to CNF/CNS Acute Pain.*