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Bwrdd Iechyd Prifysgol  
Caerdydd a'r Fro  
Cardiff and Vale  
University Health Board

**Reference Number: UHB 153**

**Version Number:2**

**Date of Next Review: 19 May 2018**

**Previous Trust/LHB Reference Number:  
T/374**

## **PERI-OPERATIVE PAIN MANAGEMENT GUIDELINES IN CHILDREN**

### **Introduction**

These guidelines relate to paediatric peri-operative acute pain management. They aim to facilitate safe practice and manage the risks associated with the pain relieving strategies utilized.

### **Aim**

These guidelines have been produced to ensure that consistent, safe and appropriate evidence based peri-operative pain management is provided for children throughout Cardiff and Vale University Health Board.

### **Objectives**

To promote safe practice that is evidence based and standardised within the clinical areas.  
To provide clinical areas with appropriate pain management support and education.

### **General overview and key points:**

The guidelines are suitable for most children.

In some instances they may need to be adjusted by a Consultant Paediatric Anaesthetist to reflect individual cases.

The use of these guidelines for acute pain from non-surgical causes **must** be discussed with the Consultant Paediatric Anaesthetist On-Call.

**In obese children, dosing should reflect lean body mass and ideal weight for height.**

### **Scope**

This procedure applies to all of our working in **Child Health** including those with honorary contracts

### **Equality Impact Assessment**

*An Equality Impact Assessment has, been completed. The Equality Impact Assessment completed for the guideline found there to be no impact.*

### **Documents to read alongside this Procedure**

**British National Formulary for Children 2014-2015**

### **Approved by**

**Women and Children Quality and Safety Committee**

### **Accountable Executive or Clinical Board Director**

Clinical Director Anaesthetics

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<p style="text-align: center;"><b><u>Disclaimer</u></b></p> <p><b>If the review date of this document has passed please ensure that the version you are using is the most up to date either by contacting the document author or the <a href="#"><u>Governance Directorate.</u></a></b></p>	

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Summary of reviews/amendments			
Version Number	Date of Review Approved	Date Published	Summary of Amendments
1	12/11/2012	06/12/2012	Updated to replace previous Trust version reference no: 374. Addition of titratable intravenous ketamine regimen for scoliosis surgery Paracetamol dosing instruction format as per BNF for Children 2012-2013.
2	19/05/2015	24/06/2015	1) To accommodate changeover from ketamine to esketamine – section 10.00 & appendices 7&8. 2) To implement the C&V UHB SBAR recommendations restricting the use of codeine in paediatrics – section 5.0 3) Amend the oral morphine dosing guidance as per BNFC 2014-2015 – section 5.1 4) Add in “Prescribing Discharge analgesia for tonsillectomy / adenotonsillectomy” – section 4.1 – appendix 12 5) Amend the ondansetron dose to 100mcg/kg 6) Amend the oral paracetamol dosing guidance as per <u>BNF for Children March 2015</u> 7) 12.2 Management of cardiac arrest associated with LA injection: Order change of bullet points

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## THE PRINCIPLES OF POST-OPERATIVE PAIN MANAGEMENT

	<b>Intensity of Pain</b> <b>A pain assessment tool appropriate to the child's age and cognitive ability will be used to measure pain intensity at rest and on movement. The Wong and Baker faces scale, the pain thermometer and the FLACC pain assessment tool are all validated tools that are used in Cardiff and Vale University Health Board see appendix 1</b>		
<b>(Age)</b>	Mild (0-3)	Moderate (4-6)	Severe (7-10)
<1 year	Analgesia for infants < 1 year of age and any complex issues must be discussed with the on call Consultant Paediatric Anaesthetist		
1 yr - 5 yrs	<i>Simple oral/rectal analgesia prn</i> e.g. paracetamol	<i>Regular oral or rectal paracetamol</i>  +/- NSAID  Oramorph prescribed "prn" for breakthrough	Epidural or other appropriate central or regional technique + regular paracetamol + regular NSAID  or  Morphine NCA + regular paracetamol + regular NSAID
5 yrs onwards	<i>Simple oral/rectal analgesia prn.</i> e.g. paracetamol	Regular oral or rectal paracetamol  +/- NSAID  Oramorph prescribed "prn" for breakthrough	Epidural Analgesia or other appropriate central or regional technique +regular paracetamol +regular NSAID  or  Morphine PCA +regular paracetamol +regular NSAID

**Prescribing discharge analgesia for tonsillectomy/adenotonsillectomy.  
(see appendix 12)**

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## Regional Techniques

Unless contraindicated an appropriate local anaesthetic block should be used in ALL children. If specific nerve /plexus /central block is not possible please ask the surgeon to infiltrate the wound.

## Patient Controlled Analgesia (PCA)

Patient Controlled Analgesia (PCA) can be utilised for the management of acute postoperative pain in children likely to require strong opioid analgesia for at least 24-48 hours and/or who are unable to tolerate oral medication. Using a specific device the child is able to administer a pre-determined dose of strong opioid at pre-determined intervals allowing for a wide variation in analgesic requirements. Children less than 50kgs will usually have a concurrent background infusion.

Please see section 3 for further details

## Nurse Controlled Analgesia (NCA)

Nurse Controlled Analgesia (NCA) refers to a method of administering intravenous strong opioids for the relief of acute pain in infants and children who are unable to tolerate oral medication. It is an infusion with accompanying boluses. Using a specific device the nurse is able to safely administer a pre-determined dose of strong opioid at pre-determined intervals.

At times there may be circumstances where concurrent infusion should be avoided e.g. neurosurgical patients or children who may be more sensitive to strong opioids.

Please see section 4 for further details

## Epidural Analgesia

Epidural analgesia is used for acute postoperative pain management using a continuous infusion. The epidural solution contains a low concentration of local anaesthetic with or without an opioid.

Please see section 7 for further details

## 2. SIMPLE ANALGESICS

Unless contraindicated:

- All children should be prescribed regular paracetamol +/- NSAID
- Oral opioids should be prescribed for breakthrough pain in minor/moderate surgery or for weaning when epidural or PCA/NCA analgesia are discontinued.

## Paracetamol

This is useful as a mild analgesic and antipyretic following minor surgery or in conjunction with NSAIDS and opioids following intermediate and major surgery. The addition of paracetamol is known to have an opioid sparing effect. **Please note that due to differences in dose calculation intravenous paracetamol must be prescribed independently of the oral or rectal route.**

Taken from BNFC 2014-2015





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<p>Child 3 months-6 years Rectal</p>	<p>30-40mg/kg as a single dose then 15-20mg/kg every 4-6 hours. Maximum 75mg/kg daily in divided doses for 48 hours then 15mg/kg every 6 hours</p>
<p>Child 6-12 years Rectal</p>	<p>30-40mg/kg as a single dose (max 1g) then 15-20mg/kg every 4-6 hours. Maximum 75mg/kg (max 4g) daily in divided doses for 48 hours then 15mg/kg every 6 hours. <b>Do not exceed 4g in 24 hours</b></p>
<p><b>Child 12-18 years</b> Rectal</p>	<p><b>1g every 4-6 hours (max 4 doses in 24 hours)</b></p>
<p><b>Preparations</b></p> <p>Suspension: 120 mg/5 ml, 250mg/5ml Tablets:500mg Soluble tablets:500mg</p> <p>Available as suppositories: 60 mg/125 mg/240 mg/500mg/1g</p>	

### **Intravenous Paracetamol**

**Intravenous paracetamol should only be used if the oral and rectal routes are not feasible.**

**Intravenous paracetamol should always be prescribed as a single route**

<b>IV Paracetamol</b> available as 10mg/ml	<b>Dosage</b>
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<p>solution for infusion. Administer over 15 minutes as intravenous infusion, minimum time limit between doses must be 4 hours, given up to 4 times a day.</p> <p><b>50ml vial contains 500mgs</b> <b>100ml vial contains 1000mgs</b></p> <p>Preterm neonate over 32 weeks postmenstrual age</p>	<p>7.5 mg/kg every 8 hours; max 25 mg/kg daily <b>Review at 48 hours as there is potential for toxicity.</b></p>
Neonates	<p>10 mg/kg every 4-6 hours <b>Maximum daily dose must not exceed 30mg/kg/24 hours</b> <b>Review at 48 hours as there is potential for toxicity.</b></p>
Child body weight under 10kg	<p>10mg/kg every 4-6 hours, maximum 30mg/kg/24 hours</p>
Child body weight 10- 50 kg	<p>15mg/kg every 4-6 hours <b>Maximum daily dose must not exceed 60mg/kg/24 hours</b></p>
Child body weight over 50 kg	<p>1 g every 4-6 hours <b>Maximum daily dose must not exceed 4g daily</b></p>

### **Non Steroidal Anti Inflammatory Drugs (NSAID's)**

NSAID's have an opioid-sparing effect and can be particularly useful for all types of surgery. For major surgery it is suggested that NSAID's (unless contraindicated) are prescribed on the regular side of the prescription chart to ensure regular administration. This should be reviewed 48 hours postoperatively. However, if epidural analgesia is used, NSAID'S should be prescribed on an as required basis. Children who are likely to be "Nil by Mouth" following surgery should have an NSAID prescribed by an alternative route i.e. rectally.

NSAID's can be used with caution in children with asthma and should be used with caution in those children with a history of hypersensitivity to any NSAID

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- which includes those in whom attacks of asthma, angioedema, urticaria or rhinitis have been precipitated by an NSAID.  
NSAID's should not be used in children with renal insufficiency/hepatic disease, salicylate sensitivity or coagulopathy.

<p><b>Diclofenac – oral and rectal</b> Note: Diclofenac is not licensed in children under one year of age. Suppositories are not licensed for use in children under 6 years</p> <p><b>Preparations</b> Suppositories: 12.5mg/25 mg/50 mg and 100mg Dispersible tablets: 50 mg Enteric coated tablets: 25mg</p>	<p><b>Dosage. Over 1 year only</b> 1mg/kg/dose (maximum 50mg) 3 times a day, maximum 4 days.</p>
<p><b>Ibuprofen – oral</b> Can be used in children aged 3 months and over if &gt; 5 kg</p> <p>Children &gt;12years</p> <p><b>Preparations</b> Syrup: 20mg/ml Tablets: 200mg/400mg/600 mg</p>	<p>5-10 mg/kg/dose 3 - 4 times a day (maximum 30mg/kg/day)</p> <p>400mg tds (<b>maximum dose</b>)</p>

## WEAK OPIOIDS

A weak opioid may be useful when bridging the gap between an intravenous strong opioid or epidural and oral analgesia, particularly for those children who cannot be given NSAIDS. However following release of new advice from the MHRA in 2013 the use of codeine is limited:

1. Codeine should not be used in any child (under 18years of age) with a history of sleep apnoea undergoing removal of tonsils and/or adenoids.
2. Codeine should only be used in children **over 12 years of age**.
3. Codeine **should not** be used in patients known to be CYP2D6 ultra-rapid metabolisers or those with a personal or family history of adverse effects to codeine.

Please prescribe naloxone and an anti-emetic on the 'prn' side of the drug chart, (see section 2)

<b>Codeine Phosphate</b>	<b>Dosage</b>
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Oral and rectal	<b>12-18yrs old only</b> <b>30mg - 60mg every 6 hours</b> <b>Maximum 240mg daily. Maximum 3 days.</b>
<b>Preparations</b> <b>Tablets 15mg + 30mg</b> Syrup 25mg/5mls Suppositories 15mg	

### **STRONG OPIOIDS – ORAL MORPHINE**

This is useful when strong opioid analgesia is required, the child is tolerating oral fluids and when mild or moderate analgesics are insufficient. Doses adjusted within ranges indicated according to response. Please prescribe an anti-emetic on the 'prn' side of the drug chart. See section page 2.

<b>Oral Morphine</b>	<b>Dosage</b>
1 – 3 months	Initially 50-100 micrograms/kg every 4 hours, adjusted according to response
3 – 6 months	100-150 micrograms/kg every 4 hours, adjusted according to response
6 – 12 months	200 micrograms/kg every 4 hours, adjusted according to response
1 – 2 years	Initially 200 – 300 micrograms/kg every 4 hours, adjusted according to response
2 – 12 years	Initially 200 – 300 micrograms/kg (max 10mg) every 4 hours, adjusted according to response
12 – 18 years	Initially 5 – 10 mg every 4 hours adjusted according to response
<b>Preparations</b> Oral solution: 100 micrograms/1ml	

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(unlicensed).10mg/5ml (unlicensed under 1year) Tablets: Sevredol 10mg and 20 mg	BNFc 2014-2015
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## **ANTI-EMETICS –**

**Please also refer to the Association of Paediatric Anaesthetists Guidelines on the management of post operative vomiting in children (2009)**

<b>Ondansetron – first line</b>  1 month to 18 years  <b>Preparations</b> Syrup: 4mg/5ml Tablets: 4mg Injection: 2mg/ml	150 micrograms/kg IV ( <b>Single dose</b> )  100 micrograms/kg IV 8hrly then review  50mcg/kg in combination therapy with dexamethasone (single dose)
<b>Dexamethasone IV – second line and in combination therapy for severe PONV and highly emetogenic procedures</b>  <b>Preparation</b> Injection 4mg/ml	150 micrograms/kg IV intra-operatively (maximum 4 mg) NB By slow bolus over 5 minutes  150mcg/kg in combination therapy with ondansetron

## **PATIENT CONTROLLED ANALGESIA (PCA)**

### **Definition**

Patient Controlled Analgesia (PCA) refers to the self-administration of analgesia and in this instance to the self-administration of intravenous opioids for the relief of acute pain in children. Children less than 50kgs will usually have a concurrent infusion. Using a specific device, the child is able to administer a predetermined dose of strong opioid at predetermined intervals, allowing for the wide variation in analgesic requirements. These doses are calculated on the child's weight and age

### **Indications**

- For the management of acute postoperative pain in children likely to require strong opioid analgesia for at least 24-48 hrs.
- For the management of moderate to severe pain in children who are unable to tolerate oral medication.

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### **Patient Controlled Analgesia should not be offered to**

- Children less than 5 years of age.
- Children who are incapable of using the device.
- Children who appear reluctant to use the device.
- Children with head injury.
- Children with upper airway obstruction

Children and their parents should always receive preoperative preparation regarding the use of PCA in order that the child gains maximum benefit from using this technique.

The information given should include the following:

- Simple explanation regarding how PCA works which includes the use of the PCA bolus button.
- Informing child and parent that the PCA will substantially reduce pain but realistically may not completely abolish it.
- Reinforcing positive aspects of PCA, i.e. no injections.
- Reinforce the importance of parents/carers not pressing the button i.e. It must be **patient** controlled

### **Prescription**

**In addition to the child's own prescription chart, a dedicated PCA prescription chart should be completed by the prescribing anaesthetist and be available for the nurse to check against the pump settings.**

**A paediatric prescription must be used see appendix 3.**

A background infusion is an integral part of PCA in children up to 50kg. It provides more consistent pain relief than with bolus only and subsequently provides children with confidence in the technique. It also enables a better sleep pattern especially during the first postoperative night. The duration of this infusion is tailored to individual patients.

### **Children up to 50kg :-**

<b>Morphine:</b> Into a 50 ml BD Plastipak luer lock syringe draw up 1 mg/kg of morphine and dilute to 50 mls with 0.9% sodium chloride.	<b>Concentration</b> <b>20 micrograms/kg/ml</b>  <b>Bolus</b>
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Each 1 ml of solution will contain morphine 20 micrograms/kg.	<b>20 micrograms/kg</b>  <b>Lockout</b> <b>10 minutes</b>  <b>Background Infusion</b> <b>4 micrograms/kg/hour</b>  <b>4 hour limit</b> <b>400 micrograms/kg</b>
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#### Children 50kg and over:-

<b>Morphine:</b> Into a 50 ml BD Plastipak luer lock syringe draw up 50mgs of morphine and dilute to 50 ml with 0.9% sodium chloride. For clinical risk reasons a solution of morphine 1mg/ml should be used.  Each 1 ml of solution will contain morphine 1mg.	<b>Concentration</b> <b>1mg/ml</b>  <b>Bolus</b> <b>1mg</b>  <b>Lockout</b> <b>5 minutes</b>  <b>Background Infusion</b> <b>NIL</b>  <b>4 hour limit</b> <b>50mg</b>
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If morphine is contraindicated, a fentanyl PCA or Nurse Controlled Analgesia (NCA) may be set up. Please see pages 26-27 for prescribing guidance.

In circumstances where opioids are contraindicated (e.g.toxic megacolon) a regimen for esketamine infusion is available. **This must be discussed with and prescribed by a Consultant Paediatric Anaesthetist or Consultant Paediatric Intensivist.** In addition the child must be cared for on the Paediatric Intensive Care or High Dependency Unit.

Please see pages 28-30 for prescribing guidance.

No other systemic opioids should be administered whilst the child is using PCA. However there may be exceptional circumstances when a regular weak opioid may need to be prescribed to optimize analgesia in addition to a demand only PCA.

The nurse looking after the child should check that naloxone and ondansetron have also been prescribed to combat the potential side effects associated with the use of opioid drugs.



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## Equipment

- The Alaris P5000 PCA infusion device must be used.
- Set up using the “Paediatric Protocol B”. (These devices are stored in the recovery room).
- A dedicated PCA giving set incorporating an anti- reflux valve and an anti-syphon valve must always be used with these infusion devices.
- Infusion sets should be changed every 48 hours. Pumps should be attached to the drip stand at the same level as the child to reduce the risk of siphoning.
- Anaesthetic and nursing staff must have received training and assessment in the use of these devices and achieved the relevant competencies. The Acute Pain Service and the Clinical Engineering Department will provide this training.

## Designated clinical areas & responsibilities

PCA for children can only be used in PUS, Heulwen ward, Paediatric short stay unit and the Paediatric Intensive Care Unit.

### Key points to note when initiating Patient Controlled Analgesia (PCA)

With both PCA it is important to establish an initial plasma level of morphine. This can be achieved with boluses of morphine in theatre +/- increments of 20 micrograms/kg given in recovery until the child is comfortable.

The PCA must be prescribed on the appropriate specific paediatric PCA or NCA prescription chart. This should then be attached to the child's drug chart. Please also prescribe the PCA/NCA on the 'prn' side of the drug chart.

i.e."Morphine PCA or NCA IV as per PCA or NCA chart"

Pre-printed adhesive labels are available to aid this process:

Balanced analgesia - Regular paracetamol and if appropriate an NSAID should also be prescribed (see section- 4.1,4.2 and 4.3 in these guidelines for perioperative pain management in children)

Respiratory Depression:- Naloxone 4 micrograms/kg should always be prescribed on the “prn” side of the prescription chart. This should be administered if respiratory rate falls below the figures indicated in the table below. Add instruction ‘Call Acute Pain Service (bleep 5414) or obstetric anaesthetist (Bleep 5101). In children 50kg and over naloxone should be prescribed as per adult regimen; that is prescribed as 200 micrograms but usually administered in 50 microgram increments

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<b>Age (Years)</b>	<b>Give Naloxone 4 micrograms/kg if respiratory rate falls less than</b>
<1 year	20
1-5 years	15
5-12 years	10
>12 years	8

### *Contraindications*

PCA has been widely used in many centres for children as young as 5 years and has been shown to be a safe and effective form of postoperative analgesia provided that guidelines are followed:

Morphine is contraindicated in head injury and upper airway obstruction.

PCA is contraindicated if there is inability to understand or operate the device.

Under these circumstances, NCA should be initiated using the NCA regimen (see section 4).

Parents must not under any circumstances use the button for their child. This should be made clear during the pre-operative briefing.

If parents are concerned about their child's pain relief they should seek the help of the nurse looking after that child.

Careful monitoring of a child receiving PCA is essential. Observations of respiratory rate, level of sedation and nausea or vomiting should be recorded

hourly and treated appropriately. The volume of opioid remaining in the syringe,

the number of nurse/patient demands versus successful demands should be recorded on the infusion chart according to the Cardiff and Vale University Health Board Infusion policy.

Pain should be assessed and documented, using the appropriate pain assessment tool according to the age and cognitive ability of the child.

Pulse oximetry should be used continuously in all children receiving morphine (or any other opiate) PCA.

The Acute Pain Service will visit all children receiving PCA at UHW daily, more often if necessary. The Acute Pain Service will reduce or stop the PCA depending on the child's analgesic requirements.

Pain management problems:

Between 08.30-17.00, Monday – Saturday and 09:30-16:00 Sundays the Acute

Pain Service should be contacted should any problems occur.

Outside of these times please contact the following for advice:

PCA : In the first instance contact the on-call Obstetric Anaesthetist. Bleep 5101.

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If a request is made to initiate PCA for a child by a member of the medical staff who is not an anaesthetist or if a member of the pain team feels that this would be an appropriate intervention: **The Consultant Paediatric Anaesthetist on-call must be contacted for advice and be appraised of the situation.**

## **NURSE CONTROLLED ANALGESIA (NCA)**

### **Definition**

Nurse Controlled Analgesia (NCA) refers to a method of administering intravenous strong opioids for the relief of acute pain in infants and children. Using a device specifically designed for the purpose the nurse caring for the child is able to safely administer a pre-determined dose of strong opioid at pre-determined intervals.

It is an opioid infusion with accompanying boluses. At times there may be circumstances where concurrent infusion should be avoided e.g. neurosurgical patients or children who may be more sensitive to strong opioids.

This method uses the equipment of PCA (infusion device) but the bolus control is the responsibility of the nurses, the negative feedback principle of PCA is reduced, but safety is maintained by close observational assessment by the nursing staff and a longer lockout interval.

It is suitable for children below the age of five years **and** those children over five unable to use Patient Controlled Analgesia.

### **Indications**

- For the management of acute postoperative pain in infants/children likely to require strong opioid analgesia for at least 24-48 hrs.
- For the management of pain in those children who are unable to tolerate oral medication.
- For the management of pain in children unable to understand the concept of PCA.
- For the management of pain in children able to understand the concept of PCA but who may be physically incapable of using the device.

Nurse Controlled Analgesia should not be offered to:

- Children with upper airway obstruction
- Children with head injury
- Children able to understand and use PCA.

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The parents of those children receiving NCA will need information on how NCA will control their child's pain. They should be informed that they should not under any circumstances press the button themselves. The nurse looking after the child should always do this based on pain assessment.

The parents' assistance in assessing the child's pain should be emphasized in particular those who have children with learning and developmental problems.

### Prescription

In addition to the child's own prescription chart, a dedicated NCA prescription chart should also be completed by the prescribing anaesthetist and be available for the nurse to check against the pump settings. See appendices 4 and 5.

No other systemic opioids should be administered whilst the child is receiving NCA.

The nurse looking after the child should check that naloxone and ondansetron have also been prescribed to combat the potential side effects associated with the use of strong opioids.

### NCA - Children 6 months and over.

<b>Morphine</b> Into a 50 ml BD Plastipak luer lock syringe draw up 1 mg/kg of morphine and dilute to 50 ml with 0.9% sodium chloride.  Each 1 ml of solution will contain morphine 20 micrograms/kg.	<b>Concentration</b> <b>20micrograms/kg/ml</b>  <b>Bolus</b> <b>20 micrograms/kg</b>  <b>Lockout</b> <b>15 minutes</b>  <b>Background Infusion</b> <b>10 micrograms/kg/hour</b>  <b>4 Hour limit</b> <b>400 micrograms/kg</b>
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### NCA - Children under 6 months

Due to altered pharmacokinetics and pharmacodynamics, infants less than six months and particularly neonates require smaller doses of opioids because they are at more risk of accumulation. Strong opioids should only be used in this age group **after seeking advice from a Consultant Paediatric Anaesthetist**. Consideration should be given to nursing the child in a Paediatric Intensive Care or High Dependency setting.

Analgesia for neonates and particularly premature or ex-premature infants **must always** be discussed with the Consultant Paediatric Anaesthetist on call.

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<p><b>Morphine</b> Into a 50 ml BD Plastipak luer lock syringe draw up 1 mg/kg of morphine and dilute to 50 ml with 0.9% sodium chloride.</p> <p>Each 1 ml of solution will contain morphine 20 micrograms/kg. Each 0.5ml of solution will therefore contain 10 micrograms/kg</p>	<p><b>Concentration</b> <b>20micrograms/kg/ml</b></p> <p><b>Bolus</b> <b>10 micrograms/kg</b></p> <p><b>Lockout</b> <b>15 - 20minutes</b></p> <p><b>Background infusion</b> <b>10 micrograms/kg/hour</b></p> <p><b>4 Hour limit</b> <b>400 micrograms/kg</b></p>
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### Equipment

- The Alaris P5000 infusion device must be used and set up using the "Paediatric Protocol B". These infusion devices are stored in the recovery room.
- A dedicated PCA giving set incorporating an anti- reflux valve and an anti-syphon valve must always be used with these infusion devices.
- Infusion sets should be changed every 48 hours. Pumps should be attached to the drip stand at the same level as the child to reduce the risk of siphoning.
- Anaesthetic and nursing staff must have received training and assessment in the use of these devices and achieved the relevant competencies. The Acute Pain Service and the Clinical Engineering Department will provide this training.

### Designated clinical areas

NCA in children can only be used in PUS, , Heulwen ward, Paediatric short stay unit and the Paediatric Intensive Care Unit. The nursing staff within these clinical areas are familiar with the management of patients using NCA and the equipment.

### Key points to note when initiating Nurse Controlled Analgesia (NCA)

With NCA it is important to establish an initial plasma level of morphine. This can be achieved with boluses of morphine in theatre +/- increments of 20 micrograms/kg given in recovery until the child is comfortable.

The NCA must be prescribed on the appropriate specific paediatric NCA prescription chart. This should then be attached to the child's drug chart. Please also prescribe the NCA on the 'prn' side of the drug chart:

i.e."Morphine PCA or NCA IV as per PCA or NCA chart"

Pre-printed adhesive labels are available to aid this process:

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Balanced analgesia - Regular paracetamol and if appropriate an NSAID should also be prescribed (see section 2 in these guidelines for perioperative pain management in children)

Respiratory Depression:- Naloxone 4 micrograms/kg should always be prescribed on the “prn” side of the prescription chart. This should be administered if respiratory rate falls below the figures indicated in the table below. Add instruction ‘Call Acute Pain Service (bleep 5414) or obstetric anaesthetist (Bleep 5101). In children 50kg and over naloxone should be prescribed as per adult regimen; that is prescribed as 200 micrograms but usually administered in 50 microgram increments

Age (Years)	Give Naloxone 4 micrograms/kg if respiratory rate falls less than
<1 year	20
1-5 years	15
5-12 years	10
>12 years	8

### *Contraindications:*

Morphine is contraindicated in head injury and upper airway obstruction.

PCA (see section 3) is contraindicated if there is inability to understand or operate the device.

Under these circumstances, NCA should be initiated using the NCA regimen.

Parents must not under any circumstances use the button for their child. This should be made clear during the pre-operative briefing.

If parents are concerned about their child's pain relief they should seek the help of the nurse looking after that child.

Careful monitoring of a child receiving NCA is essential. Observations of respiratory rate, level of sedation and nausea or vomiting should be recorded

hourly and treated appropriately. The volume of opioid remaining in the syringe,

the number of nurse/patient demands versus successful demands should be recorded on the infusion chart according to the Cardiff and Vale University Health Board Infusion policy.

Pain should be assessed and documented, using the appropriate pain assessment tool according to the age and cognitive ability of the child.

Pulse oximetry should be used continuously in all children receiving morphine (or any other opiate) with NCA.

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The Acute Pain Service will visit all children receiving NCA at UHW daily, more often if necessary. The Acute Pain Service will reduce or stop the NCA depending on the child's analgesic requirements.

Pain management problems:

Between 08.30-17.00, Monday – Saturday and 09:30-16:00 Sundays the Acute

Pain Service should be contacted should any problems occur.

Outside of these times please contact the following for advice:

NCA: Infants <12months contact the Consultant on-call for Paediatric Anaesthesia via switchboard

NCA >12months: In the first instance contact the on-call Obstetric Anaesthetist. Bleep 5101.

If a request is made to initiate NCA for a child by a member of the medical staff who is not an anaesthetist or if a member of the pain team feels that this would be an appropriate intervention:

**The Consultant Paediatric Anaesthetist on-call must be contacted for advice and be appraised of the situation.**

## **FENTANYL PATIENT CONTROLLED or NURSE CONTROLLED ANALGESIA**

### **Indications.**

This regimen should only be used for children with renal impairment or where there are significant side effects from morphine. A background infusion is an integral part of PCA in children <50kg, giving children confidence in the technique and providing a better sleep pattern especially during the first postoperative night. The duration of this infusion is tailored for individual patients. Please see below for prescribing guidance.

Before prescribing NCA please discuss first with Consultant Paediatric Anaesthetist

### **Prescription**

**See appendices 7 & 8**

**Children up to 50 kgs:-**

<b>Fentanyl - Patient Controlled Analgesia</b> Into a 50 ml BD Plastipak luer lock syringe draw up 50 micrograms/kg of fentanyl and dilute to 50 mls with 0.9% sodium chloride.  Each 1 ml of solution will contain fentanyl 1 microgram/kg/ml.	<b>Concentration</b> <b>1 microgram/kg/ml</b>  <b>Bolus</b> <b>0.5 microgram/kg</b>  <b>Lockout</b> <b>5 minutes</b>  <b>Background infusion rate</b>
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	<b>0.5 microgram/kg/hour</b>  <b>4 hour limit</b> <b>10micrograms/kg</b>
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#### **Children 50 kgs and over:-**

<b>Fentanyl - Patient Controlled Analgesia</b> Into a 50 ml BD Plastipak luer lock syringe draw up 20 mls of Fentanyl 50 micrograms/ml and dilute with 20 mls of 0.9% sodium chloride.  Each 1 ml of solution will contain fentanyl 25 micrograms/ml.	<b>Concentration</b> <b>25 microgram/ml</b>  <b>Bolus</b> <b>10 micrograms</b>  <b>Lockout</b> <b>5 minutes</b>  <b>Background infusion rate</b> <b>NIL</b>  <b>4 hour limit</b> <b>480 micrograms</b>
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<b>Fentanyl - Nurse Controlled Analgesia</b> Into a 50 ml BD Plastipak luer lock syringe draw up 50 microgram/kg of fentanyl and dilute to 50 mls with 0.9% sodium chloride.  Each 1 ml of solution will contain fentanyl 1microgram/kg/ml.	<b>Concentration</b> <b>1 micrograms/kg/ml</b>  <b>Bolus</b> <b>1 microgram/kg</b>  <b>Lockout</b> <b>30 minutes</b>  <b>Background Infusion</b> <b>1 microgram/kg/hour</b>  <b>4 hour limit</b> <b>10 micrograms/kg</b>
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#### **Equipment**

- The Alaris P5000 PCA infusion device must be used.
- Set up using the "Paediatric Protocol B". (These devices are stored in the recovery room).
- A dedicated PCA giving set incorporating an anti- reflux valve and an anti-syphon valve must always be used with these infusion devices.
- Infusion sets should be changed at least every 48 hours. Pumps should be attached to the drip stand at the same level as the child to reduce



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the risk of siphoning.

- Nursing staff must have received training and assessment in the use of these devices and achieved the relevant competencies. The Acute Pain Service and the Clinical Engineering Department will provide this training.

### **Designated clinical areas & responsibilities**

PCA for children can only be used in PUS, , Heulwen ward, Paediatric short stay unit and the Paediatric Intensive Care Unit.

For key points and monitoring requirements please refer to section 3 (PCA) and 4 (NCA)

## **ESKETAMINE INFUSION**

### **Indications**

Esketamine is an intravenous anaesthetic which if used in sub anaesthetic doses has an analgesic action both centrally and peripherally in the nervous system. Esketamine exerts strong adjuvant analgesic properties by inhibiting the binding of glutamate to the NMDA receptor. This mode of action is different to the action of opioids such as morphine and therefore the use of esketamine in combination with opioids can improve pain relief.

Esketamine delivered as a continuous infusion in combination with morphine will have an opiate sparing effect thus minimising opiate related side effects.

### **Contraindications**

Esketamine is contraindicated in:

Hypertension  
Severe cardiac disease  
Stroke  
Raised intracranial pressure  
Head trauma  
Pre-eclampsia and eclampsia  
Epilepsy

### **Cautions**

Renal failure  
Liver failure  
Predisposition to hallucinations or nightmares  
Pregnancy  
Alcoholism  
Confirmed or suspected drug abuse

**Please see below for prescribing guidance** - N.B. In obese children, dosing should reflect lean body mass and ideal weight for height.

### **Prescription**

**Please see appendices 9 & 10**

**Children up to 50 kgs**

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<b>Esketamine continuous infusion only</b> <b>Into a 50 ml BD Plastipak luer lock syringe draw up 1mg/kg of esketamine and dilute to 50 mls with Glucose 5%.</b>  Each 1ml of solution will contain 20 micrograms/kg.	<b>Concentration</b> <b>20 micrograms/kg/ml</b>  <b>Background Infusion</b> <b>0 - 20 micrograms/kg/hr (0-1ml/hour)</b>
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#### **Children 50kgs and over:**

Esketamine continuous infusion only Into a 50 ml BD Plastipak luer lock syringe draw up 100mg of Esketamine and dilute to to 50ml with glucose 5%.  Each 1ml of solution will contain 2mg/ml	<b>Concentration</b> <b>2mg/ml</b>  <b>Continuous infusion</b> <b>1-4 mg/hr (0.5-2ml/hr)</b>  <b>4 hour limit</b> <b>25mg in 4 hours</b>
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#### **Infusion regimen post scoliosis surgery:**

Day of surgery.....mg/hr(1.5micrograms/kg/minute) **ml/hr**  
set by..... checked by.....date/time.....

Day 1 10:00a.m.....mg/hr(1 micrograms/kg/minute) **ml/hr**  
set by..... checked by.....date/time.....

Day 2 10:00a.m.....mg/hr(0.5micrograms/kg/minute) **ml/hr**  
set by..... checked by.....date/time.....

Day 3 **STOP**  
set by..... checked by.....date/time.....

#### **Equipment**

- The Alaris P5000 PCA infusion device must be used.
- **Children under 50kg:** Set up using the “Paediatric Esketamine Protocol”. (These devices are stored in the recovery room).
- **Children over 50kg:** Set up using the “Esketamine protocol”
- A dedicated PCA giving set incorporating an anti- reflux valve and an anti-syphon valve must always be used with these infusion devices.

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- Infusion sets should be changed every 48 hours. Pumps should be attached to the drip stand at the same level as the child to reduce the risk of siphoning.
- Nursing staff must have received training and assessment in the use of these devices and achieved the relevant competencies. The Acute Pain Service and the Clinical Engineering Department will provide this training.

### **Designated clinical areas & responsibilities**

Children with Esketamine infusion are to be cared for in Paediatric Intensive Care, Paediatric High Dependency or PUS only.

For key points and monitoring requirements please refer to section 4 (NCA)

## **EPIDURAL ANALGESIA**

### **Definition**

A weak solution of local anaesthetic with or without an opioid infused into the epidural space to provide pain relief, without complete loss of sensation or movement.

### **Indications**

- Acute postoperative pain.

### **Absolute Contraindications**

- Coagulopathy.
- Local sepsis.

### **Prescription**

There are seven protocols to choose from and the choice must be indicated on the dedicated yellow epidural prescription chart – see appendix 11.

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<p><b>Epidural Infusion (Continuous infusion only)</b> Bupivacaine 0.1%/ml/Fentanyl 2 mcg/ml <b>(500ml container)</b> <b>Please tick appropriate protocol box:</b></p> <p><del><b>Protocol A neonate up to 4 kgs-</b></del> <input type="checkbox"/>  <del>Infusion Rate 0.1 - 0.25 mls/kg/hour:</del>  <del>Infusion Rate Range:</del>  <del>.....to..... mls/hour</del></p> <p><b>Protocol B &gt; 4-10 kgs</b> <input type="checkbox"/>  Infusion Rate 0.2 - 0.4 mls/kg/hour:  Infusion Rate Range:  .....to.....mls/hour</p> <p><b>Protocol C &gt; 10 kgs</b> <input type="checkbox"/>  Infusion Rate 0.2 – 0.4 mls/kg/hour :  Infusion Rate Range not to exceed 10 mls/hr:  .....to.....mls/hour</p> <p><b>Protocol D Rescue Protocol</b> <input type="checkbox"/>  Infusion Rate maximum 15 mls/hour  Infusion Rate Range:  .....to.....mls/hour</p> <p>Air sensitivity - on</p>	<p><b>Epidural Infusion (Continuous infusion only)</b> Bupivacaine 0.1% <b>(250ml container)</b> <b>Please tick appropriate protocol box:</b></p> <p><b>Protocol E neonate up to 4 kgs-</b> <input type="checkbox"/>  Infusion Rate 0.1 - 0.25 mls/kg/hour:  Infusion Rate Range:  .....to..... mls/hour</p> <p><b>Protocol F &gt; 4-10 kgs</b> <input type="checkbox"/>  Infusion Rate 0.2 - 0.4 mls/kg/hour:  Infusion Rate Range:  .....to.....mls/hour</p> <p><b>Protocol G &gt; 10 kgs</b> <input type="checkbox"/>  Infusion Rate 0.2 – 0.4 mls/kg/hour :  Infusion Rate Range not to exceed 10 mls/hr:  .....to.....mls/hour</p> <p><b>Protocol H Rescue Protocol</b> <input type="checkbox"/>  Infusion Rate maximum 15 mls/hour  Infusion Rate Range:  .....to.....mls/hour</p> <p>Air sensitivity - on</p>
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Pre-printed adhesive labels are also available to secure to the “as required side of the medication chart.

## PUS/Heulwen/PICU

Bupivacaine 0.1% (1mg/ml) with Fentanyl 2 micrograms/ml range 0.1 - 0.4 ml/kg/hr

Or

Bupivacaine 1mg/ml range 0.1 - 0.4 ml/kg/hr

If the child is receiving local anaesthetic with opioid epidural analgesia no other systemic opioids should be prescribed .

Naloxone and ondansetron should be prescribed to combat the potential side effects associated with the use of opioid drugs.

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## **Neonatal Unit**

Bupivacaine 0.1% (1mg/ml) range 0.1 - 0.25 ml/kg/hr

The infusion should be prescribed at a rate of 0.1 - 0.25ml/kg/hr with instructions to contact the Acute Pain Service (Bleep 5414) during a weekday or the prescribing Consultant Paediatric Anaesthetist at night if pain relief is still inadequate at the upper limit of the prescription.

## **Perioperative**

Levobupivacaine 2.5mg/ml:- 0.5 - 0.75 ml/kg

## **Postoperative Infusions**

Bupivacaine 0.1% with Fentanyl 2 micrograms/ml (available in pre-prepared 500 ml bags)

Or:

Bupivacaine 0.1% (available in pre-prepared 250ml bags)

## **Minimising the risk of wrong route error**

The bags of epidural solution should be clearly labelled, indicating that they are for epidural use only.

No bags of epidural analgesia solution should be stored in the operating theatres or anaesthetic rooms.

Bags of epidural solution containing fentanyl should be stored in the recovery room only (i.e bupivacaine 0.1% with fentanyl 2 micrograms/ml) in a dedicated locked controlled drug cupboard. If an additional bag of this solution is required in the ward area this must be ordered from pharmacy on a named patient basis in a controlled drug book and utilised immediately on delivery to the ward.

Bags of local anaesthetic only (i.e. 0.1% bupivacaine) epidural solution should not be stored anywhere other than the recovery room – If an additional bag of this solution is required this can be obtained from the recovery room via the acute pain service / on-call obstetrics anaesthetist and utilised immediately on delivery to the ward.

## **Equipment**

The Mckinley Epidural Infusion Device and dedicated giving set must be used. A bacterial filter must always be used.

A patent intravenous cannula must be in situ whilst the child is receiving epidural analgesia.

When the McKinley infusion device is no longer required, ward staff should contact the Pump library for it to be collected. Here it will be checked and cleaned prior to return to the Recovery room.

## **Designated clinical areas & responsibilities**

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Children receiving epidural analgesia are currently able to return to PUS, , Neonatal Unit, Heulwen ward and PICU.

### **Initiating treatment & monitoring of patients receiving epidural analgesia**

Epidural catheters are inserted in the anaesthetic room prior to surgery. If in the immediate postoperative period the child has a pain score of 2 or more using the FLACC, Wong Baker FACES or PAIN THERMOMETER scales, nursing staff in the recovery room should contact the prescribing anaesthetist as a bolus of more concentrated local anaesthetic may be necessary to settle the child.

On return to the ward area, observations of pulse, blood pressure and respiratory rate effort should be initiated at 1/2 hourly intervals for 2 hours and then 1 hourly (except blood pressure) until the epidural is removed. In children <8years blood pressure should be recorded every 4 hours. In children >8 years blood pressure should be recorded every 2 hours. Following an epidural 'top-up' blood pressure should be recorded every 5 minutes for 30 minutes.

Pain at rest and on movement and sedation levels should be assessed and recorded on the postoperative observation chart using the pain assessment tools available in the ward areas.

The epidural catheter insertion site should be inspected regularly for inflammation, swelling, tenderness and leakage. The site should be covered with a transparent occlusive semi-permeable dressing (IV3000) to allow for inspection of the site. The temperature of the child should also be recorded every 4 hours to highlight any signs of infection.

An epidural care plan is attached to the epidural prescription chart. This gives clear concise instruction in the overall management of the epidural.

The amount of drug infused should be recorded hourly on the dedicated epidural infusion chart, in accordance with the Cardiff and Vale Trust Infusion Device Policy, September 2006

### **Management of complications / potential problems or side effects in ward area.**

<b>Problem</b>	<b>Action</b>
Inadequate analgesia	<p>Check pump, catheter site and connections for leakage. Check level of sensory block using ice / ethyl chloride. Increase infusion rate within prescribed limits.</p> <p>Seek advice if pain persists despite epidural analgesia infusing at maximum prescribed rate.</p> <p>An anaesthetist or member of the pain team may, If appropriate, top-up with 0.5 ml/kg of levobupivacaine 1.25mg/ml up to a maximum of 10ml</p>

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Pooling of fluid at epidural insertion site	This could be either oedema or local anaesthetic infusion. If analgesia adequate change dressing & reassure If inadequate treat as above
Motor loss	See care plan advice.
Respiratory rate below acceptable parameters for age of child or sedation score 2  Respiratory rate below acceptable parameters for age of child or sedation score 3.	May need to change to local anaesthetic only solution Give oxygen 4l/min, check oxygen saturation and monitor closely. Record respiratory rate and sedation score every 5 minutes until respiratory rate is within acceptable limits for age and sedation improves. <b>Contact Acute Pain Service/ on-call anaesthetist for advice.</b> Bleep 5414 or Bleep 5101 Switch off infusion, give 4 l/min oxygen, check oxygen saturation, and give IV naloxone until sedation score 0-1 and respiratory rate $\geq 12$ . Monitor continuously. <b>Contact Acute Pain Service /on-call anaesthetist for advice.</b> Bleep 5414 or Bleep 5101
Hypotension	Do not assume that epidural is causing hypotension. Inform surgical team Check for signs of hypovolaemia. Increase IV infusion rate if necessary and as prescribed. <b>Contact Acute Pain Service / on - call anaesthetist</b> Bleep 5414 or Bleep 5101
Nausea & Vomiting	Give anti-emetic as prescribed and reassess.
Itching	Give IV Naloxone 2micrograms/kg if epidural opioid is thought to be causal factor. This may need to be repeated p.r.n. <b>Contact Acute Pain Service/on-call anaesthetist if the problem persists.</b> Bleep 5414 or Bleep 5101
Urinary retention where patient has not routinely been catheterised	Insert urinary catheter.
Inflamed epidural insertion site / pus at epidural site / back pain.	<b>Stop infusion. Contact Acute Pain Service</b> Bleep 5414 / <b>Consultant Paediatric Anaesthetist</b> via switchboard and refer to epidural care plan. If it is necessary to remove the epidural catheter then remove according to section 11.9 Send catheter tip and wound swab from epidural site to microbiology for culture and sensitivity, ensure all clinical details are documented. Inform Consultant Paediatric Anaesthetist.

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Suspected epidural site infection.	<b>Contact Acute Pain Service / Consultant Paediatric Anaesthetist.</b> Bleep 5414 or Bleep 5101 The epidural catheter will need to be removed. Vancomycin or Teicoplanin should be started along with either a Cephalosporin or Ciprofloxacin and reviewed when C+S results are available. The patient will be reviewed regularly by the Acute Pain Service.
Confirmed epidural site infection	Treat with antibiotics as per microbiology advice in accordance with C+S results. The APS will review the patient regularly.
Epidural catheter disconnected from filter.	<b>Seek immediate advice from Acute Pain Service / On call anaesthetist.</b> Bleep 5414 or Bleep 5101  The epidural will need to be discontinued and removed and must not be reconnected. See epidural care plan.
Epidural dressing becomes removed/dislodged.	Refer to the epidural care plan. <b>Seek advice from the Acute Pain Service/On-call anaesthetist if necessary.</b> Bleep 5414 or Bleep 5101

The nursing care plan for epidural analgesia should be followed. Any problems should be discussed with the Consultant Anaesthetist responsible for the epidural. If this is not possible then contact the Consultant on call for Paediatric Anaesthesia via the switchboard

### Additional points when using epidural analgesia

- Balanced analgesia - Regular paracetamol and if appropriate an NSAID must also be prescribed
- Naloxone  
**Respiratory Depression:- Naloxone 4 micrograms/kg should always be prescribed intravenously on the “prn” side of the drug chart if respiratory rate falls below the figures indicated in the table below. Add instruction ‘Call Acute Pain Service (bleep 5414) or obstetric anaesthetist (bleep 5101).**

Age (Years)	Give Naloxone 4 micrograms/kg if respiratory rate falls less than
<1 year	20
1-5 years	15
5-12 years	10
>12 years	8



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(In children 50kg and over Naloxone should be prescribed as per adult regimen)

Itching:- Naloxone 2 micrograms/kg should be prescribed **intravenously** to counteract the effects of itching.

- The volume infused should be recorded on the infusion chart according to the Cardiff and Vale University Health Board Infusion policy. Epidural catheters for paediatric surgical procedures should only be inserted under the supervision of the Consultant Paediatric Anaesthetists.
- All children receiving local anaesthetic and an opioid via the epidural route should have a urinary catheter.
- Epidurals are routinely inserted following induction of anaesthesia, therefore the lumbar route is preferred. The catheter is then advanced so that the tip lies at the appropriate sensory level for the surgical procedure.
- Thoracic epidurals can be used for children > 10 years old. If patient is younger than 10 years this is at the discretion of the Consultant Paediatric Anaesthetist.
- The Acute Pain Service will review all children receiving epidural analgesia at UHW.

### **Discontinuing Epidural Analgesia**

Epidural catheters should be removed after a maximum of 48 hours in neonates because of the risk of bupivacaine accumulation. In older babies and children epidural catheters should be removed within 5 days because of the risk of infection. It is the decision of the Acute Pain Service or Consultant Paediatric Anaesthetist who inserted the epidural in conjunction with the ward nurses to discontinue epidural analgesia. Before removing the epidural catheter, the following points should be considered.

- Level of pain & infusion rate
- Ability to tolerate free fluids and absorb alternative analgesia. If the patient has a coagulopathy or is receiving an IV Heparin infusion, seek advice from the APS.
- The epidural catheter should not be removed if the platelet count is less than 100. However, if there is a high risk of epidural related infection, specific advice should be sought from the Consultant Paediatric Anaesthetist.
- Prior to removal of the epidural catheter the epidural infusion should be

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stopped for approximately 4 hours, alternative analgesia should be prescribed and administered and its efficacy assessed. If the patient is comfortable, the epidural catheter may then be removed. The site should be sprayed with iodine spray (**except in neonates**) and covered with an occlusive transparent dressing. The site should be observed for 7 days following its removal for any signs of infection.

- Consideration may be given to the removal of the patient's urinary catheter once the epidural catheter has been removed

## **Management of severe local anaesthetic toxicity**

### **Signs of severe toxicity:**

- Sudden loss of consciousness, with or without tonic-clonic convulsions
- Cardiovascular collapse: sinus bradycardia, conduction blocks, asystole and ventricular tachyarrhythmias may all occur
- Local anaesthetic (LA) toxicity may occur some time after the initial injection

### **Immediate management:**

- Stop injecting the LA
- Call for help
- Maintain the airway and, if necessary, secure it with a tracheal tube
- Give 100% oxygen and ensure adequate lung ventilation (hyperventilation may help by increasing pH in the presence of metabolic acidosis)
- Confirm or establish intravenous access
- Control seizures: give a benzodiazepine, thiopental or propofol in small incremental doses
- Assess cardiovascular status throughout

### **Management of cardiac arrest associated with LA injection:**

- Start cardiopulmonary resuscitation (CPR) using standard protocols
- Manage arrhythmias using the same protocols, recognising that they may be very refractory to treatment
- Consider treatment with lipid emulsion. **Intralipid 20% is available in the following clinical areas at the University Hospital of Wales:**

### **MAIN THEATRE RECOVERY AND SHORT STAY SURGICAL UNIT RECOVERY**

- Prolonged resuscitation may be necessary; it may be appropriate to consider other options:
- Consider the use of cardiopulmonary bypass if available

### **Treatment of cardiac arrest with lipid emulsion:**

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- Give an intravenous bolus injection of Intralipid® 20% 1.5ml.kg<sup>-1</sup> over 1min
- Continue CPR
- Start intravenous infusion of Intralipid® 20% at 0.25ml.kg<sup>-1</sup>.min<sup>-1</sup>
- Repeat the bolus injection twice at 5 min intervals if an adequate circulation has not been restored
- After another 5 min, increase the rate to 0.5 ml.kg<sup>-1</sup> if an adequate circulation has not been restored
- Continue infusion until a stable and adequate circulation has been restored

### **Remember:**

- Continue CPR throughout treatment with lipid emulsion
- Recovery from LA-induced cardiac arrest may take >1h
- Propofol is not a suitable substitute for Intralipid®
- Replace your supply of Intralipid® 20% after use

### **Follow-up action:**

- Report cases to the National Patient Safety Agency (via [www.npsa.nhs.uk](http://www.npsa.nhs.uk)).
- If possible, take blood samples into a plain tube and a heparinised tube before and after lipid emulsion administration and at 1 h intervals afterwards. Ask your laboratory to measure LA and triglyceride levels (these have not yet been reported in a human case of LA intoxication treated with lipid).
- Please read the following notes

### **Notes**

- Intralipid® 20% has been shown to reverse LA-induced cardiac arrest in animal models and in human case reports and its use has been reported in the treatment of life-threatening toxicity without cardiac arrest. Its therapeutic potential has been highlighted by National Patient Safety Agency.
- Intralipid® 20% 1000ml should be immediately available in all areas where potentially cardiotoxic doses of local anaesthetics are given, along with guidelines for its use.
- The use of Intralipid® in this way is relatively novel. Therefore, future laboratory and clinical experiences are likely to dictate further refinement of the method.
- The guideline document will be reviewed regularly and updated when necessary. Updated versions will be available on <http://www.aagbi.org> and <http://lipidrescue.org>.
- Further educational matter is available at <http://www.lipidrescue.org>.

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## ENTONOX

### Definition

Mixture of 50% oxygen: 50% nitrous oxide.

Entonox is a powerful pain relieving gas that can be self-administered by the child through a special demand apparatus. With a rapid onset of action and short duration, entonox is an extremely safe method of pain relief with minimal side effects.

### Indications

Short painful procedures e.g.

- Removal of surgical drain
- Removal or insertion of wound packs
- Physiotherapy.
- Painful examinations or treatments.

### Contraindications

- High and low pressure atmospheres (e.g. diving chambers and aircraft);
- Impaired consciousness/head injury/unconsciousness;
- Decompression sickness or recent dive;
- Recent air instillation or insufflation into body cavities as in encephalography;
- Severe bullous emphysema;
- Chronic lung disease;
- Traumatic or spontaneous pneumothorax;
- Bowel obstruction;
- Maxillo facial injuries;
- Sedated patients
- Multiple Trauma

It may be difficult for Entonox to be used by the very young due to mask fitting and administration difficulties. Different “flavoured” coloured childrens masks are available e.g. strawberry or bubble gum.

### Prescription

It is not necessary for Entonox to be prescribed. However, **only** a qualified nurse who has received training and is competent in its administration may supervise a child in its use.

### Equipment

Entonox demand apparatus is available on PUS and Heulwen ward. The mouthpiece is usually preferred to the facemask and is available from C.S.S.D. The equipment will be regularly serviced and maintained by the Regional Anaesthetic Support Services unit who should be contacted if any problems are encountered with the equipment.

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### **Cleaning the equipment**

**A disposable, single use bacterial filter should be used to prevent cross infection. Facemasks should be washed in warm soapy water after use, the mouthpieces are disposable**

### **Designated clinical areas & responsibilities**

Entonox may be used anywhere within the hospital if there are suitably trained qualified nurses to supervise its administration. As Entonox is a form of patient-controlled analgesia, it is the responsibility of the nurses to instruct the child in its use.

### **Initiating treatment & monitoring of patients**

A qualified nurse may initiate treatment, if Entonox is thought to be of benefit, particularly in those situations indicated above. No specific observations should be made, as side effects are minimal. However, it is extremely important that the child, rather than the nurse, hold the facemask or mouthpiece during administration of the gas. If excessive sedation does occur, the child will drop the mask or mouthpiece and immediately breathe room air.

(As a safety precaution, it is recommended that driving or the use of machinery should not be undertaken until 12 hours have elapsed after Entonox administration).

**Should Entonox be required for any situation other than those indicated seek advice from the Acute Pain Service.**

**Please refer to the Entonox data sheet for more information.**

## **RESOURCES**

- Administrative time
- Infusion devices – pump library, maintenance, upgrading and consumables
- Time allocated for teaching

## **TRAINING**

It is a mandatory requirement within Cardiff and Vale University Health Board that any personnel using infusion devices, including intravenous PCA and Epidural undergo training and competency assessment (please refer to the Policy for the use of Parenteral Infusion Devices). Training is available through clinical engineering.

Pain Management Study days are provided by the Acute Pain Team every two months primarily for Registered Nurses although other members of the multidisciplinary team are welcome to attend.

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## **IMPLEMENTATION**

These guidelines are an update to previous guidelines. Throughout the formal pain management study days and informally in day to day clinical practice reference is made to the document. These guidelines are written for the multidisciplinary team.

## **EQUALITY IMPACT AND ASSESSMENT**

An equality impact assessment has been undertaken to assess the relevance of these guidelines to equality and potential impact on different groups, specifically in relation to the General Duty of the Race Relations (Amendment) Act 2000 and the Disability Discrimination Act 2005 and including other equality legislation. The assessment identified that the guidelines presented no risk to the Health Board.

## **FURTHER INFORMATION**

For any further information or clarification in relation to paediatric peri-operative pain management practices please contact the Clinical Lead for Paediatric Anaesthesia via the Department of Anaesthetics or the Acute Pain Team on Bleep 5414.

## **AUDIT**

Compliance with these guidelines will be audited continuously by the Acute Pain Service via the Acute Pain Service Clinical Workstation Database. Audit results will be discussed and distributed to each relevant clinical area.

## **DISTRIBUTION**

These guidelines will be throughout the Health Board via the Clinical Portal Intranet system.

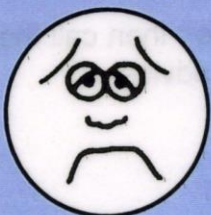


University Hospital of Wales  
Department of Child Health  
**Pain Assessment Scales**



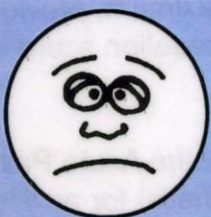
**Hurts as much as  
you can imagine**

(Score as 10)



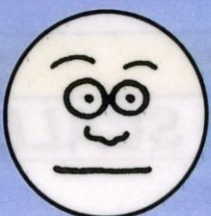
**Hurts a lot**

(Score as 8)



**Hurts even more**

(Score as 6)



**Hurts a little more**

(Score as 4)



**Hurts just a little bit**

(Score as 2)



**Does not hurt**

(Score as 0)

**WONG & BAKER  
FACES SCALE**

Having explained to the  
child what each face  
means, ask child to choose  
the face which expresses  
their pain / hurt.

**10**

**8**

**6**

**4**

**2**

**0**

**PAIN  
THERMOMETER**



# **FLACC PAIN ASSESSMENT SCALE**

**(Face, Legs, Activity, Cry, Consolability)**

- Behavioural scale - can be used in children up to 7 years.
- Can also be used in children with cognitive impairment.
- Each of the 5 categories (**F**aces, **L**egs, **A**ctivity, **C**ry, **C**onsolability) is scored 0-2, and the scores added to get a total from 0-10.
- Behavioural scores need to be considered within the context of the child's psychological status, anxiety and other environmental factors.

<b>Face</b>	<b>0</b> No particular expression or smile	<b>1</b> Occasional grimace or frown, withdrawn, disinterested	<b>2</b> Frequent to constant frown, clenched jaw, quivering chin
<b>Legs</b>	<b>0</b> Normal position or relaxed	<b>1</b> Uneasy, restless, tense	<b>2</b> Kicking or legs drawn up
<b>Activity</b>	<b>0</b> Lying quietly, normal position, moves easily	<b>1</b> Squirming, shifting back and forth, tense	<b>2</b> Arched, rigid or jerking
<b>Cry</b>	<b>0</b> No cry (awake or asleep)	<b>1</b> Moans or whimpers	<b>2</b> Crying steadily, screams or sobs, frequent complaints
<b>Consolability</b>	<b>0</b> Content, relaxed	<b>1</b> Reassured by touch	<b>2</b> Difficult to console or comfort

**CAREFULLY SCORE EACH SECTION ABOVE AND TOTAL.**

**See reverse of observation chart regarding nursing interventions when scores have been totalled.**



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## **Children and Women's Health Clinical Board**

### **Guidance for use of Codeine** **For Children and Breastfeeding Mothers**

#### **Appendix 2-**

<p><b>S</b></p> <p><b>Situation</b></p>	<p>The Pharmacovigilance Risk Assessment Committee (PRAC) of the European Medicines Agency (EMA) and the US regulator (FDA) has recommended restrictions on the use of codeine. They include:-</p> <ul style="list-style-type: none"> <li>• Restricting use of codeine to children over 12 years of age</li> <li>• Avoiding the use of codeine in all children (under 18) who undergo tonsillectomy or adenoidectomy (or both) for obstructive sleep apnoea.</li> </ul>
<p><b>B</b></p> <p><b>Background</b></p>	<p>A European review of the safety of codeine-containing medicines licensed for pain relief in children (age 0-18 years) began in October 2012. This review was triggered by concerns of an increased risk of morphine toxicity when susceptible children receive codeine for pain after surgery. These concerns follow the reporting of three fatalities and one life-threatening case of respiratory depression in children given codeine after tonsillectomy or adenoidectomy in the treatment of obstructive sleep apnoea.</p> <p>Codeine is converted to morphine in the liver by CYP2D6 enzyme. There are many genetic variations of CYP2D6, which affect the extent of this conversion in individuals. Different plasma morphine concentrations in patients' blood leads not only to different levels of pain relief, but also to a variable and unpredictable risk of side effects due to morphine's action on the brain and respiratory centre.</p>
<p><b>A</b></p> <p><b>Assessment</b></p>	<p>Given the widespread use of codeine in paediatric practice including postoperative analgesia, particularly after day stay surgery, this has caused considerable concern. The current advice falls short of contraindicating the use of codeine in all children but has left clinicians with a dilemma to either continue to use the drug with increased caution, (in the knowledge of the MHRA communication) or to change practice to one of a number of alternatives such as oral morphine, tramadol, oxycodone or dihydrocodeine. These products may not be available in the same range of formulations; may contain unsuitable excipients; may have similar adverse effect profile and/or may not be suitable for use on discharge from hospital.</p>

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# R

## Recommendation

The following recommendations have been made following discussions at the Child Health Directorate Safe Medication Practice Group and agreement at the Quality and Safety and Patient Experience Group.

1. Codeine should not be used in any children (under 18 years of age) who undergo removal of tonsils or adenoids due to sleep apnoea
2. Codeine should only be used in children over 12 years of age.

Change to the prescribing of low dose morphine for breakthrough pain at home. Some teams are uncomfortable with providing morphine outside the hospital setting albeit at a low dose, even though it is not a controlled substance in this dilute formulation. However, as a precaution, we are able to provide the appropriate amount of morphine as a limited number of individualised doses, with access to advice should pain continue.

As with codeine, patients who have undergone removal of adenoids or tonsils with a history of obstructive sleep apnoea are a special case. Again, these patients need in-hospital evaluation of opioid sensitivity. Decisions need to be made whether to keep these children in the hospital until no longer requiring opioids or to send them home with an appropriately considered dose of opioid for breakthrough pain.

All patients should be closely monitored, healthcare professionals should be alert to the symptoms of toxicity including reduced levels of consciousness, somnolence, respiratory depression. If any of these symptoms develop the patient should be reviewed **immediately** by a doctor. No further doses should be given. Naloxone may be indicated. Pin-point pupils, lack of appetite, constipation or nausea and vomiting are also signs of toxicity.

### Breastfeeding

- Codeine **MUST NOT** be used in breastfeeding mothers

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## Appendix 3

### Cardiff and Vale University Health Board

#### **Paediatric PCA – for children over 50kg**

### Patient Details

Surname	Weight
First Name	Ward
Date of Birth	Unit No.

Drug	Morphine
Mass of drug	50 mg
Diluent	0.9% Sodium Chloride /5% dextrose <b>(Total volume 50ml)</b>
Final concentration	1 mg/ml
Bolus dose	1 mg
Lockout	5 minutes
Background infusion rate	ZERO
4 hour limit	50 mg

If respiratory rate < ..... (see overleaf for appropriate rate). Stop PCA, call acute pain service BLEEP 5414/obstetric anaesthetist BLEEP 5101. Consider giving Naloxone

Prescribers name and signature. .....

Date.....

Recovery room nursing staff, pump settings to be checked against prescription chart before return to ward. Signature 1. .... 2.

.....

#### **GUIDELINES FOR PCA PRESCRIPTION**

- The Alaris P5000 infusion device should be used,
- The paediatric protocol should be selected and the default setting amended and programmed as per prescription
- Children should initially receive analgesia in theatre +/- recovery by IV bolus.
- Please also complete pre-printed PCA label for “AS REQUIRED” side of drug chart
- **Please prescribe naloxone as per adult regimen; i.e. 200 micrograms but usually administered in 50 microgram increments if respiratory rate falls below rate indicated above. Add instruction ‘Call Acute Pain Service (bleep 5414) or obstetric anaesthetist (Bleep 5101).**
- **Please prescribe an anti-emetic: ondansetron IV 100 micrograms/kg 8 hourly if regularly or 150 microgram/kg IV as a single dose.**

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- Balanced analgesia - Regular paracetamol and an NSAID (unless contra-indicated) should also be prescribed (see Paediatric Acute Pain Service Guidelines for Postoperative Analgesia for specific guidance).

### Guidelines for the administration of naloxone in children

Age (years)	Give naloxone 4mcg/kg if respiratory rate falls:
< 1 year	< 20
1- 5 years	< 15
5-12 years	< 10
>- 12 years	< 8

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## Appendix 4

### Cardiff and Vale University Health Board

#### Paediatric PCA – for children up to 50kg

#### Patient Details

Surname	Weight
First Name	Ward
Date of Birth	Unit No.

Drug	Morphine
Mass of drug (Total volume 50ml)	.....mg (1mg per kg)
Diluent	0.9% Sodium Chloride /5% dextrose
Final concentration	.....micrograms/ml (20micrograms/kg/ml)
Bolus dose	.....micrograms (20micrograms/kg)
Lockout	.....minutes
Background infusion rate	.....micrograms/hr (4micrograms/kg/hr)
4 hour limit	..... (400micrograms/kg)

If respiratory rate < ..... (see overleaf for appropriate rate). Stop PCA, call acute pain service BLEEP 5414/obstetric anaesthetist BLEEP 5101. Consider giving Naloxone

Prescribers name and signature. ..... Date......

Recovery room nursing staff, pump settings to be checked against prescription chart before return to ward.

Signature 1. .... 2. ....

#### ***GUIDELINES FOR PCA PRESCRIPTION***

- The Alaris P5000 infusion device should be used,
- The paediatric protocol should be selected and the default setting amended and programmed as per prescription
- For children over 5 years of age.
- Children should initially receive analgesia in theatre +/- recovery by IV bolus.
- For children up to 50kg, draw up 1mg/kg of morphine and dilute to 50mls. Each 1.0ml contains 20mcg/kg. Program pump in micrograms. Children 50kg and over see separate prescription
- Please also complete pre-printed PCA label for 'AS REQUIRED' side of drug chart
- Please prescribe naloxone 4 micrograms/kg

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- Balanced analgesia - Regular paracetamol and an NSAID (unless contra-indicated) should also be prescribed (see Paediatric Acute Pain Service Guidelines for Postoperative Analgesia for specific guidance).
- **Please prescribe an anti-emetic: ondansetron IV 100 micrograms/kg 8 hourly if regularly or 150 microgram/kg IV as a single dose.**

### **Guidelines for the administration of naloxone in children**

<b>Age (years)</b>	<b>Give naloxone 4mcg/kg if respiratory rate falls:</b>
<b>&lt; 1 year</b>	<b>&lt; 20</b>
<b>1- 5 years</b>	<b>&lt; 15</b>
<b>5-12 years</b>	<b>&lt; 10</b>
<b>&gt;- 12 years</b>	<b>&lt; 8</b>

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## Appendix 5

### Cardiff and Vale University Health Board Acute Pain Service Paediatric NCA Prescription Chart (Children 6 months and over)

Please attach this chart to the ward prescription chart

#### Patient Details

Surname	Weight
First Name	Ward
Date of Birth	Unit No.

#### SEE GUIDELINES FOR NCA PRESCRIPTION AT BASE OF THIS PAGE

Drug	Morphine
Mass of drug	..... mgs ( <b>1mg/kg</b> )
Diluent	0.9% sodium chloride/5% glucose
<b>(Total volume of 50ml)</b>	
Final concentration	..... micrograms/ml ( <b>20micrograms/kg/ml</b> )
Bolus dose	..... micrograms ( <b>20micrograms/kg</b> )
Lockout	..... minutes
Background infusion rate	... micrograms/hr ( <b>10micrograms/kg/hr</b> )
4 hour limit	..... ( <b>400micrograms/kg</b> )

If respiratory rate < ..... (See overleaf for appropriate rate). Stop NCA  
Consider giving Naloxone, call acute pain service BLEEP 5414/obstetric  
anaesthetist BLEEP 5101

Prescribers name and signature. ....  
Date.....

Recovery room nursing staff - pump settings to be checked against  
prescription chart before

return to ward. Signature 1).....2) .....

#### GUIDELINES FOR NCA PRESCRIPTION

- The Alaris P5000 infusion device should be used,
- The paediatric protocol "B" should be selected and the default setting amended and programmed as per paediatric guidelines (see below).

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- Use for children between 6 months and 5 years of age. (N.B. Separate guidelines exist for children less than six months old.)
- Children should initially receive analgesia in theatres +/- recovery by IV bolus.
- Draw up 1mg/kg of morphine and dilute to 50mls. Each 1.0ml contains 20micrograms/kg. Program pump in micrograms.
- Example of suitable initial settings:

Morphine

Bolus dose 20micrograms/kg      Lockout 15 minutes

Background Infusion      10micrograms/kg/hr

Please also complete 'PRN' side of drug chart e.g. 'Morphine IV as per NCA chart'.

- **Balanced analgesia** - Regular paracetamol and an NSAID (if not contraindicated) should also be prescribed. (see paediatric Acute Pain Service guidelines for postoperative analgesia for specific guidance).
- Please also prescribe naloxone 4 micrograms/kg, if respiratory rate falls below rate indicated above and add instruction 'Call Acute Pain Service (bleep 5414) or obstetric anaesthetist (Bleep 5101)'.
- **Please prescribe an anti-emetic: ondansetron IV 100 micrograms/kg 8 hourly if regularly OR 150 micrograms/kg IV as a single dose**



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## Appendix 6

### Cardiff and Vale University Health Board Acute Pain Service Paediatric NCA Prescription Chart (Children under 6 months)

Please attach this chart to the ward prescription chart

#### Patient Details

Surname	Weight
First Name	Ward
Date of Birth	Unit No.

SEE GUIDELINES FOR NCA PRESCRIPTION AT BASE OF THIS PAGE

**Drug** **Morphine**  
Mass of drug ..... mgs **(1mg/kg)**  
Diluent 0.9% sodium chloride/5% glucose **(Total volume of 50ml)**  
Final concentration ..... micrograms/ml **(20 micrograms/kg/ml)**  
Bolus dose ..... micrograms **(10 micrograms/kg = 0.5ml)**  
Lockout ..... minutes  
Background infusion rate ..... micrograms/hr **(10 micrograms/kg/hr = 0.5ml/hr)**  
4 hour limit ..... **(400 micrograms/kg)**

If respiratory rate < ..... (see overleaf for appropriate rate). Stop NCA.  
Consider giving Naloxone, call acute pain service BLEEP 5414/obstetric anaesthetist BLEEP 5101

Prescribers name and signature ..... Date.....

Recovery room nursing staff - pump settings to be checked against prescription chart before

return to ward. Signature 1).....2) .....

#### GUIDELINES FOR NCA PRESCRIPTION

- The Alaris P5000 infusion device should be used.
- The paediatric protocol should be selected and the default setting amended and programmed as per paediatric guidelines (see below).
- Use for children under 6 months, Strong opioids should only be used in this age group **after seeking advice from a Consultant Paediatric**

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### **Anaesthetist.**

- Children should initially receive analgesia in theatres +/- recovery by IV bolus.
- Draw up 1mg/kg of morphine and dilute to 50mls with N Saline.  
**Each 1.0ml = 20 micrograms/kg.**  
**0.5ml = 10 micrograms/kg, 0.5ml/hr = 10 micrograms/kg/hr**  
Program pump in micrograms.
- Example of suitable initial settings:

<b>Age</b>	<b>Bolus</b>	<b>Lockout</b>	<b>Infusion</b>
< 6months	10 micrograms/kg	15-20 min	10
	micrograms/kg/hr		

Please also complete 'PRN' side of drug chart e.g. 'Morphine IV as per NCA chart'.

- **Balanced analgesia - Regular paracetamol should also be prescribed (for specific guidance see Paediatric Acute Pain Service Guidelines for postoperative analgesia).**
- **Please also prescribe naloxone 4micrograms/kg, if respiratory rate falls below rate indicated above and add instruction 'Call Acute Pain Service (bleep 5414) or obstetric anaesthetist (Bleep 5101)'.**
- **Please prescribe an anti-emetic: ondansetron IV 100 micrograms/kg 8 hourly if regularly or 150 micrograms/kg iv as a single dose.**

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## Appendix 7

Cardiff and Vale University Health Board

### Paediatric PCA Prescription Chart – FENTANYL – up to 50 kg

Please attach this chart to the ward prescription chart

#### Patient Details

Surname	Weight
First Name	Ward
Date of Birth	Unit No.

**SEE GUIDELINES FOR PCA PRESCRIPTION OVER 50 kg AT BASE OF THIS PAGE**

#### Drug Fentanyl

Mass of drug ..... mcg **(50micrograms per kg)**  
Diluent ..... 0.9% Sodium Chloride **(Total volume 50ml)**  
Final concentration ..... micrograms/ml **(1 microgram/kg/ml)**  
Bolus dose ..... micrograms **(0.5 micrograms/kg)**  
Lockout ..... minutes **(5 minutes)**  
Background infusion rate ..... micrograms/hr **(0.5 micrograms/kg/hr) (for children up to 50kg only)**  
4 hour limit ..... **(10micrograms/kg up to 50 kg, see below for >50kg).**

If respiratory rate < ..... (see overleaf for appropriate rate). Stop PCA, call acute pain service BLEEP 5414/obstetric anaesthetist BLEEP 5101. Consider giving Naloxone.

Prescribers name and signature. .... Date.....

Recovery room nursing staff, pump settings to be checked against prescription chart before

return to ward. Signature 1. .... 2. ....

#### **GUIDELINES FOR PCA PRESCRIPTION**

- The Alaris P5000 infusion device should be used,
- The paediatric protocol should be selected and the default setting amended and programmed as per paediatric guidelines (see below).
- Use for children over 5 years of age.
- Children should initially receive analgesia in theatre +/- recovery by IV

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bolus.

- For children up to 50kg, draw up 50 microgramsg/kg of fentanyl and dilute to 50mls. Each 1.0ml contains 1 mcg/kg. Program pump in micrograms.
- For children 50kg and over, make up a syringe with a concentration of 25 mcgs/ml. Draw up 20 ml of fentanyl 50 micrograms/ml and dilute with 20 ml of 0.9% sodium chloride
- Example of suitable initial settings:

**Children up to 50kg: -**

Fentanyl                      Bolus dose 0.5 micrograms/kg Lockout 5 minutes  
    Background infusion – 0.5 micrograms/kg/hr

**Children 50kg and over: -**

Fentanyl                      Bolus dose 10 micrograms Lockout 5 minutes  
    Background Infusion – Nil. 4 hour limit – 480 micrograms

- Please also complete 'PRN' side of drug chart e.g. 'fentanyl IV as per PCA chart'.

**For children up to 50 kg please prescribe naloxone 4 micrograms/kg,**

**For children 50kg and over naloxone should be prescribed as per adult regimen; that is, prescribed as 200 micrograms but usually administered in 50 microgram increments if respiratory rate falls below rate indicated above. Add instruction 'Call Acute Pain Service (bleep 5414) or obstetric anaesthetist (Bleep 5101).**

- Balanced analgesia - Regular paracetamol and an NSAID (unless contra-indicated) should also be prescribed (see Paediatric Acute Pain Service Guidelines for Postoperative Analgesia for specific guidance).
- **Please prescribe an anti-emetic: ondansetron IV 100 micrograms/kg 8 hourly if regularly or 150 microgram/kg IV as a single dose.**

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**Appendix 8**                      Cardiff and Vale University Health Board  
**Acute Pain Service**  
**Paediatric NCA Prescription Chart - FENTANYL**  
**(Children 6 months and over)**

**Please attach this chart to the ward prescription chart**

**Patient Details**

Surname	Weight
First Name	Ward
Date of Birth	Unit No.

**SEE GUIDELINES FOR NCA PRESCRIPTION AT BASE OF THIS PAGE**

<b>Drug</b>	<b>Fentanyl</b>
Mass of drug	..... micrograms <b>(50 micrograms/kg)</b>
Diluent	0.9% sodium chloride <b>(Total volume of 50ml)</b>
Final concentration	..... micrograms/ml <b>(1microgram/kg/ml)</b>
Bolus dose	..... micrograms <b>(1 microgram/kg)</b>
Lockout	30 minutes
Background infusion rate	... micrograms/hr <b>(1 microgram/kg/hr)</b>
4 hour limit	..... <b>(10micrograms/kg)</b>

If respiratory rate < ..... (See overleaf for appropriate rate). Stop NCA  
Consider giving Naloxone, call acute pain service BLEEP 5414/obstetric  
anaesthetist BLEEP 5101

Prescribers name and signature. .... Date.....

Recovery room nursing staff - pump settings to be checked against  
prescription chart before return to ward. Signature 1).....  
2) .....

***GUIDELINES FOR NCA PRESCRIPTION***

- The Alaris P5000 infusion device should be used,
- The paediatric protocol "B" should be selected and the default setting amended and programmed as per paediatric guidelines (see below).
- Use for children between 6 months and 5 years of age or those older who require NCA. (N.B. Separate guidelines exist for children less than six months old.)
- Children should initially receive analgesia in theatres +/- recovery by IV bolus.

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- Draw up 50 micrograms/kg of fentanyl and dilute to 50mls. Each 1.0ml contains 1 microgram/kg. Program pump in micrograms.
- Example of suitable initial settings:

## Fentanyl

Bolus dose 1microgram/kg Lockout 30 minutes

Background Infusion 1 microgram/kg/hr

Please also complete 'PRN' side of drug chart e.g. 'Fentanyl IV as per NCA chart'.

- **Balanced analgesia** - Regular paracetamol and an NSAID (if not contraindicated) should also be prescribed. (see paediatric Acute Pain Service guidelines for postoperative analgesia for specific guidance).
- Please also prescribe naloxone 4 micrograms/kg, if respiratory rate falls below rate indicated above and add instruction 'Call Acute Pain Service (bleep 5414) or obstetric anaesthetist (Bleep 5101)'.
- **Please prescribe an anti-emetic: ondansetron IV 100 micrograms/kg 8 hourly if regularly OR 150 micrograms/kg IV as a single dose**

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## Appendix 9

### CARDIFF AND VALE UNIVERSITY HEALTH BOARD ESKETAMINE INFUSION PRESCRIPTION CHART

**Children up to 50 kg**

(Please attach to the patient's ward prescription chart)

**Addressograph**

**Consultant  
Ward**

**Children up to 50kg**

**Weight =      kg**

Into a 50 ml BD Plastipak luer lock syringe draw up 1mg/kg of esketamine and dilute to 50ml with either Sodium Chloride 0.9% for injection or Glucose 5%

Each 1ml of solution will contain 20microgram/kg/ml

Esketamine is available in 5mg/ml 5 ml ampoules

The Alaris P5000 PCA infusion device must be used.

Set up using the "paediatric Esketamine". Under 50kg cannot be used on the ketamine protocol because the default settings will not allow this. These devices are stored in the recovery room.

A dedicated giving set incorporating an anti- reflux and anti-syphon valve must always be used with these infusion devices.

Mass of drug ..... mg (1mg per kg)

Diluent ..... 0.9% Sodium Chloride /5% glucose (Total volume 50ml)

Final concentration ..... micrograms/ml (20micrograms/kg/ml)

Continuous infusion rate ..... micrograms/hr (0-20micrograms/kg/hr)

(see below for continuous infusion rate for scoliosis surgery)

4 hour limit ..... ( 500 micrograms/kg)

set by..... checked by.....date/time.....

#### Regimen for infusion rate post scoliosis surgery

Day of surgery.....mg/hr(1.5 micrograms/kg/minute) =      ml/hr

set by..... checked by.....date/time.....

Day 1 10:00am.....mg/hr(1 micrograms/kg/minute) =      ml/hr

set by..... checked by.....date/time.....

Day 2 10:00am.....mg/hr(0.5micrograms/kg/minute) =      ml/hr

set by..... checked by.....date/time.....

**Day 3 STOP**

set by..... checked by.....date/time.....

Only the Anaesthetist or pain team will adjust the infusion rate daily within the range specified above

**Balanced analgesia:**

Balanced analgesia must be considered for all patients. Paracetamol and Diclofenac (if not contraindicated) should be prescribed as a **regular** prescription.

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For further information relating to Esketamine please see section 9 of the Paediatric Perioperative Pain Management Guidelines.

**Prescribers Name:**

**Date**

**Set up by:**

**Signature**

**Checked by:**



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## Appendix 10

### CARDIFF AND VALE UNIVERSITY HEALTH BOARD ESKETAMINE INFUSION PRESCRIPTION CHART

**Children 50 kg and over**

(Please attach to the patient's ward prescription chart)

Addressograph

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## Consultant

## Ward

### Children 50kg and over

**Weight =      kg**

**Into a 50 ml BD Plastipak luer lock syringe draw up 100mg of Esketamine and dilute to 50ml with either Sodium Chloride 0.9% for injection or Glucose 5%**

**Each 1ml of solution will contain 2mg/ml**

**Esketamine is available in 5mg/ml 5 ml ampoules**

The Alaris P5000 PCA infusion device must be used minus the handset.

Set up using the "Esketamine protocol". These devices are stored in the recovery room.

A dedicated giving set incorporating an anti-reflux and anti-syphon valve must always be used with these infusion devices.

Mass of drug	<b>100mg</b>
Diluent	0.9% Sodium Chloride /5% glucose <b>(Total volume 50ml)</b>
Final concentration	<b>2mg/ml</b>
Bolus dose	<b>NONE</b>
Lockout	<b>180 minutes (Default setting)</b>
Continuous infusion rate	..... mg/hr( <b>1-4mg/hr [0.5-3ml/hr]</b> )
<b>(see below for continuous infusion for scoliosis surgery)</b>	
4 hour limit	<b>25mg</b>

### Regimen for infusion rates post scoliosis surgery:

**Day of surgery.....mg/hr(1.5micrograms/kg/minute)      ml/hr**  
**set by..... checked by.....date/time.....**

**Day 1 10:00am.....mg/hr(1micrograms/kg/minute)      ml/hr**  
**set by..... checked by.....date/time.....**

**Day 2 10:00am.....mg/hr(0.5 micrograms/kg/minute)      ml/hr**  
**set by..... checked by.....date/time.....**

**Day 3 10:00 STOP**  
**set by..... checked by.....date/time.....**

**Only the Anaesthetist or pain team will adjust the infusion rate daily within the range specified above**

### **Balanced analgesia:**

Balanced analgesia must be considered for all patients. Paracetamol and Diclofenac (if not contraindicated) should be prescribed as a **regular** prescription.

For further information relating to esketamine please see section 10 of the Paediatric Perioperative Pain Management Guidelines.

**Prescribers Name:**

**Date:**

**Set up by:**

**Signature:**

**Checked by:**

**Date:**

**Checked by**

**Set up by:**

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## Appendix 11

### CARDIFF AND VALE UNIVERSITY HEALTH BOARD PAEDIATRIC EPIDURAL ANALGESIA PRESCRIPTION CHART – McKinley Infusion Device

(Please attach to the patient's ward prescription chart)

<b>Patient name:-</b> _____	<b>Consultant:-</b> _____
	<b>Ward:-</b> _____
	<b>Date:-</b> _____
<b>Unit number:-</b> _____	<b>Weight:-</b> _____

### PAEDIATRIC EPIDURAL ANALGESIA

<b>Protocols - Indicate by circling the appropriate solution below. Please note the container size when programming the pump.</b>	
<b>Epidural Infusion (Continuous infusion only)</b> <b>Bupivacaine 0.1%/ml/Fentanyl 2 mcg/ml</b> <b>(500ml container)</b> <b>Please tick appropriate protocol box:</b>  <del> <b>Protocol A neonate up to 4 kgs-</b>            Infusion Rate 0.1 - 0.25 mls/kg/hour: <input type="checkbox"/>            Infusion Rate Range:            .....to..... mls/hour         </del>  <b>Protocol B &gt; 4-10 kgs</b> <input type="checkbox"/> Infusion Rate 0.2 - 0.4 mls/kg/hour: Infusion Rate Range: .....to.....mls/hour  <b>Protocol C &gt; 10 kgs</b> <input type="checkbox"/> Infusion Rate 0.2 – 0.4 mls/kg/hour : Infusion Rate Range(not to exceed 10 mls/hr): .....to.....mls/hour  <b>Protocol D Rescue Protocol</b> <input type="checkbox"/> Infusion Rate maximum 15 mls/hour Infusion Rate Range: .....to.....mls/hour  Air sensitivity - on	<b>Epidural Infusion (Continuous infusion only)</b> <b>Bupivacaine 0.1%</b> <b>(250ml container)</b> <b>Please tick appropriate protocol box:</b>  <b>Protocol E neonate up to 4 kgs-</b> Infusion Rate 0.1 - 0.25 mls/kg/hour: <input type="checkbox"/> Infusion Rate Range: .....to..... mls/hour  <b>Protocol F &gt; 4-10 kgs</b> <input type="checkbox"/> Infusion Rate 0.2 - 0.4 mls/kg/hour: Infusion Rate Range: .....to.....mls/hour  <b>Protocol G &gt; 10 kgs</b> <input type="checkbox"/> Infusion Rate 0.2 – 0.4 mls/kg/hour : Infusion Rate Range (not to exceed 10 mls/hr): .....to.....mls/hour  <b>Protocol H Rescue Protocol</b> <input type="checkbox"/> Infusion Rate maximum 15 mls/hour Infusion Rate Range: .....to.....mls/hour  Air sensitivity - on

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Prescriber's name  
and signature: \_\_\_\_\_

Date: \_\_\_\_\_

Set by: \_\_\_\_\_

Checked and  
connected by: \_\_\_\_\_

### Acute Pain Service Administering Epidural Bolus ('Top-up') Guidelines for Acute Pain Nurses

- Assess pain, level of block (with ice), sedation and respiratory rate.
- If pain score 2 or over and observations within normal limits then consider epidural 'top-up'.
- Contact Consultant Paediatric Anaesthetist on-call to prescribe 'top-up'.
- Draw up 0.5ml/kg\* of Levobupivacaine 1.25mg/ml\*\*
- Check and record blood pressure prior to 'top-up'. (Children <8 tend not to get sympathetic response from local anaesthetic but check blood pressure anyway).
- Give 'top-up' – for volumes over 5mls give in three divided doses (approx).
- Check blood pressure every 5 minutes for 30 minutes following 'top-up'.
- Check level of block (with ice) following 'top-up'.
- Assess pain, sedation and respiratory rate following 'top-up'.
- Seek advice from on call Consultant Paediatric Anaesthetist if pain score not reduced to 0 or 1 following 'top-up'.

Note:

- Position patient with 'bad' side down for unilateral block prior to 'top-up' particularly if child has been lying on 'good' side up for a prolonged period.
- Consideration should be given to withdrawing catheter by 1cm if unilateral block persists and 'top-up' fails. Discuss with Consultant Paediatric Anaesthetist on call.

\*Maximum volume 10ml

\*\*To prepare a solution of Levobupivacaine 1.25mg/ml (0.125%), draw up 12.5mgs of Levobupivacaine 5mg/ml (2.5mls) and add 7.5ml of Sodium Chloride 0.9% making total volume of 10mls.

(The pre-filled bag containing 0.1% Bupivacaine with Fentanyl 2mcg/ml is **not** used for the top-up this is in order that the administration of additional Fentanyl is avoided).

### VITAL SIGNS – PARAMETERS FOR DIFFERENT AGE GROUPS

Age (years)	Respiratory rate (per minute)	Heart rate (per minute)	BP (mmHg)
<1	30-40	110-160	70-90
1-2	25-35	100-150	80-95
2-5	25-30	95-140	80-100
5-12	20-25	80-120	90-110
>12	15-20	60-100	100-120

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(SOURCE – APLS –RECOGNITION OF THE SERIOUSLY ILL CHILD)

## Appendix 12

### **Prescribing discharge analgesia for children undergoing adenotonsillectomy, tonsillectomy and adenoidectomy**

This guidance refers to all children undergoing tonsillectomy, adenotonsillectomy and adenoidectomy (see exclusions below).

The ENT doctor should prescribe the following discharge analgesia:

#### **Tonsillectomy / Adenotonsillectomy**

<b><u>Drug</u></b>	<b><u>Dose</u></b>	<b><u>Dose interval</u></b>	<b><u>Duration</u></b>
<b><u>Paracetamol</u></b>	<b><u>15 mg/kg</u></b>	<b><u>6 hourly regularly</u></b>	<b><u>7 days</u></b>
<b><u>Ibuprofen</u></b>	<b><u>10 mg/kg</u></b>	<b><u>8 hourly regularly</u></b>	<b><u>7 days</u></b>
<b><u>Morphine (orally)*</u></b>	<b><u>100 microgram/kg</u></b>	<b><u>4 hourly PRN</u></b>	<b><u>5 doses</u></b>

#### **Adenoidectomy**

<b><u>Drug</u></b>	<b><u>Dose</u></b>	<b><u>Dose interval</u></b>	<b><u>Duration</u></b>
<b><u>Paracetamol</u></b>	<b><u>15 mg/kg</u></b>	<b><u>6 hourly regularly</u></b>	<b><u>7 days</u></b>
<b><u>Ibuprofen</u></b>	<b><u>10 mg/kg</u></b>	<b><u>8 hourly regularly</u></b>	<b><u>7 days</u></b>

\* Morphine sulphate will be supplied as oral solution (2 mg/mL or 100 micrograms/mL (unlicensed)). The pharmacist will supply the most appropriate concentration depending on the dose prescribed.

At these concentrations oral morphine is not a controlled drug and should be prescribed as any other drug.

### **Exclusions**



- **Moderate or severe OSA**
- **Severe respiratory / cardiac conditions**
- **Children under 1 year of age**

### **Caution**



- **Children with a high BMI (see below)**
- **Avoid NSAIDS in severe asthma or previous sensitivity**

### **Children with a high BMI**

Children with a high BMI may need the dose of the above drugs adjusted. If you suspect a child has a high BMI:

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- Calculate the child's ideal body weight using the formulae below (adapted from the APLS guidelines):<sup>1</sup>

**1 – 5 years:    Weight (kg) = (2 x age) + 8**

**6 – 16 years:    Weight (kg) = (3 x age) + 7**

- If the child's actual body weight is more than 50% above their calculated ideal body weight, please liaise with the anaesthetist before prescribing.

## **Background**

- Codeine is not for use in children under 12 years old and in under 18 years old with Obstructive Sleep Apnoea (OSA).<sup>2</sup>
- A recent quality improvement project at Cardiff and Vale UHB demonstrated that 59% of parents felt paracetamol and ibuprofen alone was insufficient analgesia in the first week after their child's adenotonsillectomy.
- Oral morphine will be used instead of codeine for inpatient and take home analgesia.

These guidelines were produced by:

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Revision date: March 2018

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## **Appendix 13**

### **Abbreviations**

**APS Acute Pain Service**

**FLACC (pain assessment tool)  
Consolability**

**Face, Leg, Activity, Crying,**

**g**

**gram**

**IV**

**Intravenous**

**kg**

**kilogram**

**L.A.**

**local anaesthetic**

**mg**

**milligram**

**ml**

**millilitre**

**NCA**

**Nurse Controlled Analgesia**

**NSAID  
Drug**

**Non Steroidal Anti Inflammatory**

**PCA**

**Patient Controlled Analgesia**

**po**

**per oral**

**pr**

**per rectum**

**prn**

**as required**