Bristol Royal Hospital For Children

Bristol Royal Hospital for Children + Above & Beyond

NHS University Hospitals Bristol and Weston NHS Foundation Trust

Clinical Guidelines

Paediatric Pain Service
Acute Pain Management

Document Detail	
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	Date Consulted
Dr Gail Lawes Paediatric Consultant Anaesthetist	28/01/2023
Dr Caroline Wilson Paediatric Consultant Anaesthetist	21/01/2023
Dr Annabel Pearson Paediatric Consultant Anaesthetist	21/01/2023
Dr Valerie Rogers Paediatric Consultant in Rheumatology and Chronic Pain	21/01/2023

Document Dissemination			
To be disseminated to:	**How will it be disseminated?**	**Who**	**When**
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Philosophy of Paediatric Pain Management

Children should have access to the safest, most effective pain relief possible during all phases of their illness or injury. At Bristol Royal Hospital for Children assessing and relieving pain is the responsibility of all healthcare professionals caring for the children and should include personal, cultural, spiritual and/or ethnic beliefs in relation to pain management.

Effective pain management involves the collaboration of the child, the family and members of the health care team, based on clinically approved guidelines. Our paediatric pain service provides staff education and pain management resources to promote optimal pain management.

To ensure pain is managed effectively, formal means must be used to assess pain and gain patient and family feedback to determine the adequacy of its control. Pain management plans should be evaluated and revised until the pain is well controlled.

If pain is chronic, a rehabilitation approach should be offered using a biopsychosocial model.

[redacted] - Lead Nurse Paediatric Pain Management
[redacted] - Paediatric Consultant Anaesthetist
[redacted] - Paediatric Consultant Anaesthetist
[redacted] - Consultant in Rheumatology and Chronic Pain

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Abbreviations

ANTT	Aseptic-non-touch-technique
APTT	Activated partial thromboplastin time
BD	Bis die (twice daily)
BRHC	Bristol Royal Hospital for Children
BMT	Bone Marrow Transplant
BNFC	British National Formulary for Children
COX2	Cyclooxygenase
CSF	Cerebrospinal fluid
CVVH	Continuous veno-venous hemofiltration
ED	Emergency Department
EMG	Electromyography
ERP	Enhanced Recovery Pathway
CNS	Clinical Nurse Specialist
GFR	Glomerular filtration rate
GP	General Practitioner
HDU	High Dependency Unit
IN	Intranasal
INR	International normalised ratio
IV	Intravenous
Kg	Kilogram
LA	Local anaesthetic
LMWH	Low molecular weight heparin
mg	Milligram
min	Minute
mL	Millilitre
MRI	Magnetic resonance imaging
NCA	Nurse-Controlled Analgesia
NCT	Nerve conduction test
NSAID	Non-Steroidal Anti-Inflammatory Drug
OD	Omni die (once a day)
PAPS	Paediatric Acute Pain Service
PCA	Patient-Controlled Analgesia
PGD	Patient Group Directive
PICU	Paediatric Intensive Care Unit
PO	Per oral
PONV	Postoperative nausea and vomiting
PR	Per rectum
PRN	Pro Re Nata (as needed)
PSARP	Posterior sagittal anorectoplasty
QDS	Quarter die sumendum (four times daily)
TDS	Ter die sumendum (3 times daily)
TTA	To take away
BPM	Breaths per minute
MDT	Multi-Disciplinary Team
NPSA	National Patient Safety Agency
PHDU	Paediatric High Dependency Unit
SJS	Stevens-Johnson Syndrome
SSSS	Staphylococcal Scalded Skin Syndrome
TEN	Toxic Epidermal Necrolysis

Introduction

The relief of pain is a fundamental objective in the National Health Service (NHS). All patients have the right to expect the highest possible standards of care in their treatment and management of pain. Effective and efficient pain management requires a multidisciplinary approach by all services in the provision of an individualised pain management plan for each patient. These guidelines, developed by the Paediatric Pain Management Team, are to be used in conjunction with the Pain Assessment and Management Policy of the Trust to provide optimal pain relief.

Purpose

University Hospitals Bristol & Weston NHS Foundation Trust is a major teaching and training hospital. The purpose of these guidelines is to act as a resource for all clinical staff and provide conformity of standards across the Trust for acute pain management in children and adolescents. As a consequence the Trust should be able to provide assurance that the requirements and recommendations from the Department of Health (Essence of Care October 2010), the Royal College of Anaesthetists and the Association of Anaesthetists of Great Britain and Ireland, Association of Paediatric Anaesthetists and the Royal College of Nursing are being addressed.

Definitions

Pain: An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage *(International Association of the Study of Pain 1994)*. Pain is a complex and personal phenomenon that requires multidisciplinary collaboration and patient involvement in assessment, implementation of a treatment plan of care, intervention and regular review.

Analgesia: Absence of pain in response to stimulation which would normally be painful. This may include medication, interventional techniques (such as epidural infusion, Patient Controlled Analgesia (PCA) or non-pharmacological techniques such as positioning, distraction, supporting the limb and mobilising)

Assessment: All patients have the right to assessment of pain and appropriate intervention *(Pain Assessment and Management Policy,* United Hospitals Bristol & Weston NHS Foundation Trust 2022). Pain assessment is fundamental to the establishment of an individualised and safe pain management plan of care. All staff caring for inpatients are required to record and document pain assessment on the appropriate care plan and take responsibility to implement active treatment if needed.

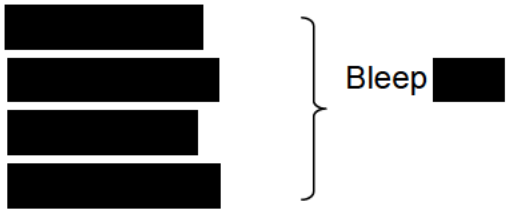
Duties (Roles and Responsibilities)

Pain management is everyone's responsibility. The clinician, the registered nurse, and all other healthcare providers have a responsibility to work collaboratively in assessing each individual patient's needs in order to establish and implement a safe and appropriate pain management plan to provide optimum pain relief.

Paediatric Acute Pain Management Service
Personnel and Ward Round Responsibility

This service is provided under the direction of the paediatric anaesthetic department based at the Bristol Royal Hospital for Children.

- Lead Nurse Paediatric Pain - [redacted], Bleep [redacted]
- Clinical Nurse Specialists Paediatric Pain:



- Out of hours - Anaesthetic Registrar on call Bleep [redacted]
- Consultant Lead Paediatric Pain Service - [redacted]
- Consultant Lead Paediatric Pain Service – [redacted]

The Paediatric Acute Pain Management daily ward round will be undertaken by a member of the pain team seven days a week and by the Anaesthetic Registrar on call out of hours and bank holidays.

The Acute Pain Round is responsible for:

- Following up the referred patients on PCA/NCA and local anaesthetic infusion.
- Assessing and implementing a pain management plan.
- Reviewing pain assessment, sedation level, adjuvant analgesics prescribed and administered, side effects of infusions, technical faults with catheters/lines and the insertion site of epidural, wound, nerve and paravertebral catheter: look for – leak, erythema, tenderness and swelling.
- Discussing and informing the patient, parents, and nursing staff of the pain management plan.
- Completing the electronic patient record in CareFlow EPR on assessment and clinical follow-up requirements for each patient.
- Management of IV opioid weaning and support early discharge from PICU.
- Handing over any ongoing patient related pain issues to the anaesthetic Registrar on call for out of hours management.

Section 1
Pain Assessment, Analgesic Ladder, Referral to the Pain Service and Non-pharmacological pain management.

Pain Assessment:

Recognition and alleviation of pain should be a priority when treating pain in children. This process should start at the time of admission, be monitored during their stay and finish with ensuring adequate analgesia at and beyond discharge.

There are three pain assessment tools available at every bed space to suit all age groups (see below). The tool to be used should be discussed with the child/parent and documented on the additional observation chart alongside the E-vitals observations for every inpatient. E-Vitals does not cover full paediatric pain assessment and opioid side effects. There is a plan to develop a software add-on to accommodate this assessment within E-vitals but it may take a few years.

FLACC Pain Score (Non-verbal or Sedated infant / child):

Bristol Royal Hospital for Children

The FLACC Behavioural Pain Assessment Scale

Categories	Scoring		
	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
Activity	Lying quietly, normal position moves easily	Squirming, shifting back and forth, tense	Arched, rigid or jerking
Cry	No cry, (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching hugging or being talked to, distractible	Difficulty to console or comfort

© Merkel, S

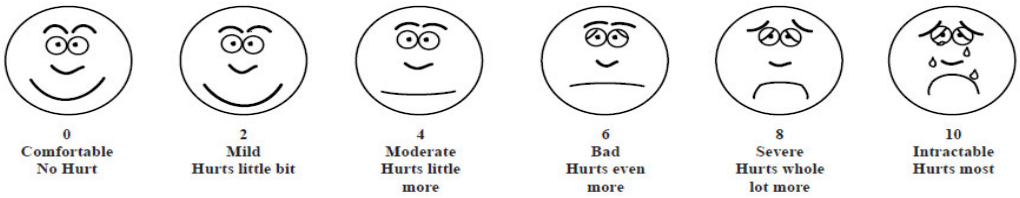
Each of the five categories is scored from 0-2, resulting in a total score between 0 and 10.

To be used for any child who is unable to report their level of pain. Please score out of ten.

FACES Pain Assessment Tool (3 years old and above)

University Hospitals Bristol NHS
NHS Foundation Trust

Bristol Royal Hospital for Children

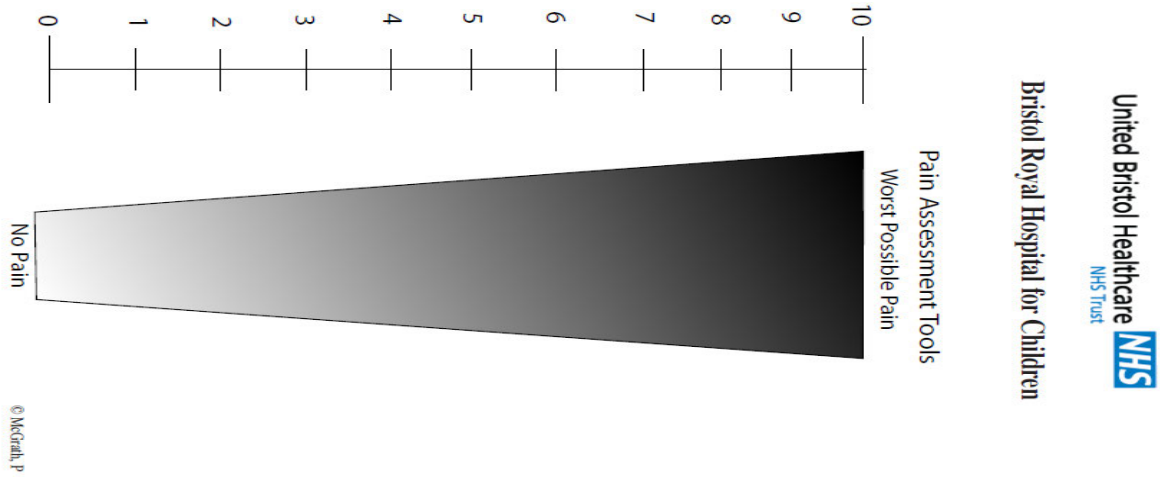


Faces Pain Assessment Tool

To be used for any child who can self-report their level of pain

Wong & Baker 1991

Visual Analogue Pain Score (Older Children 7-16yrs):

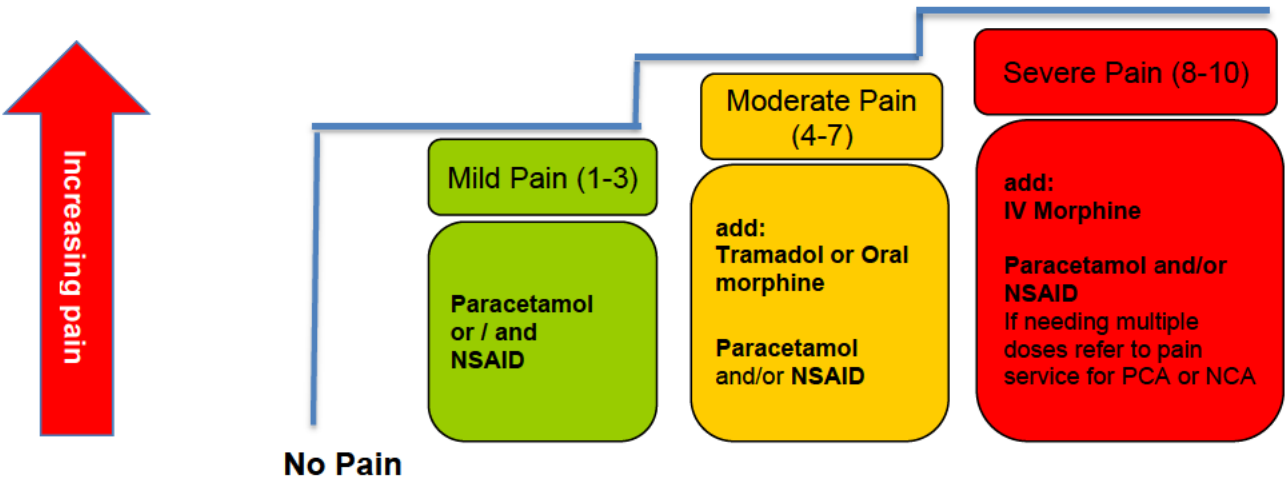


Children with severe physical and learning impairment can have many potential sources of pain, including neuropathic pain, Musculo-skeletal pain or incidental pain such as tooth ache. Additionally they may have difficulty in communicating the pain they are experiencing making it difficult for health professionals to adequately assess pain. The Paediatric Pain Profile tool can be completed by families to use alongside their hospital passport to help health professionals assess and manage the child's pain. https://ppprofile.org.uk/

Pain Management: Acute and Procedural

Pharmacological agents

Pain Scoring using appropriate tool



Referral Criteria

Acute

Paediatric Acute Pain Team:

Follow the adapted WHO analgesic ladder as shown above.

- Failure to manage sudden onset or increasing pain using the analgesic ladder.
- Uncontrolled postoperative pain
- Chronic pain patients admitted with an uncontrolled exacerbation of a new acute pain
- PICU patient requiring IV opioid weaning to support discharge.

Monday - Friday 9am – 6pm (excluding Bank Holidays):

Bleep [redacted] or via Careflow BRHC Acute Pain.

Saturday - Sunday 9am – 5pm:

Bleep [redacted]

Out of hours (Urgent referrals only):

Anaesthetic Registrar on call Bleep [redacted]

Chronic

Paediatric Chronic Pain clinic:

- There are no chronic pain beds and there is no service available to assess or provide rehabilitation for inpatients.
- Patients under the care of a BCH consultant may be referred for an interdisciplinary out-patient assessment.

We are unable to accept referrals for patients who:

- Are due to have further medical investigations or medical/surgical treatment.
- Have acute mental health problems requiring current treatment (e.g. active psychosis, active suicidal intent, significant eating disorder). We can treat people who have a stable mental health condition and/or have suicidal ideation but low intent.

Referral must be by a specialist consultant within BRHC. See: section 13 'Chronic Pain Management' for more details

Paediatric Out-patient Chronic Pain Clinic:

[redacted]
Chronic Pain Team
Bernard Ireland House
Building E2
Royal United Hospital
Bath
BA1 3NG

Non-Pharmacological Pain Management

As part of a multimodal approach non-pharmacological pain management techniques should be used. Consider the following Simple steps to help alleviate anxiety and stress:

1. Always ask, "Is this procedure necessary?"
2. Facilitate a calm environment, where possible carry out procedures away from the bedside. Consider the lighting and noise.
3. Think about the number of people necessary for the procedure.
4. Prepare the family and child with plenty of time before the procedure.

<u>Neonates:</u> Also see Neonatal Development Guideline for Supportive Measures to Minimise Pain and Stress.	• **Non-nutritive sucking:** This is when babies suck without receiving any nutrition for example on a dummy or empty breast. • **Skin to skin / Kangaroo care**: See Neonatal Development Guideline For Skin To Skin on NICU: The baby is held upright and facing the care givers bare chest, the baby should be wearing only a nappy. • **Swaddling:** All four limbs closely wrapped close to the body with a blanket or similar • **Facilitated Tucking:** Can be used during invasive procedures to reduce distress. To carry this out the care giver or health care professional holds the babies arms and legs flexed and close to the trunk of the babies body. • **Sucrose:** See sucrose guidance on DMS • **Massage:** Suggested to provided tactile and kinesthetics stimuli and Modulates behaviour to pain response. • **Auditory:** white noise, heartbeat etc • **Environment:** Lighting, clustering procedures and day / night cycles
<u>Infants to adolescents</u> Also consider	• **Play specialist input:** this is particularly useful for preparation of a procedure or for anxious children and their families. Referral to the play team can be carried out via Careflow EPR • **Distraction:** Can be carried out by any member of the multi-disciplinary team or the child's family. Examples of distraction techniques are storytelling, games/ videos on a tablet or simple techniques such as bubbles. • **Guided imagery:** Often the play team use this form of distraction for long procedures such as burns dressings. • **Massage:** Suggested to provided tactile and kinesthetic stimuli and Modulates behaviour to pain response. • **Auditory:** music, audiobooks or noise cancelling headphones • **Environment:** Lighting, clustering procedures and day / night cycles

Psychological support: There is psychology support available within the children's hospital for certain specialities, ask your patient's team if this is available. If not available under the patients speciality consider the LIASE service.

Section 2

Acute Pain Management Formulary

Recommended commonly prescribed analgesic regimens and adjuvant drugs for Paediatric Patients

*(Please refer to **BNFC** for further information)*

Dosing considerations for Obesity: A child ≥ the 91st weight centile is classified as overweight and if their weight is ≥98th centile they are classified as obese. There continues to be a lack of available data for how and when to adjust doses for obese children. There are recommended adjustments provided below for the relevant medications.

Weight (kg)	**Calculation**
Total Body Weight (TBW)	Actual body weight
Body Mass Index (BMI)	TBW (KG) / (height in m)^2
Ideal Body Weight (IBW)	Using UK WHO growth charts cross reference height centile to weight for that centile
Adjusted Body Weight (AdjBW)	IBW + Adjustment factor (0.35) x (TBW-IBW)

Simple Analgesics **Paracetamol** *These are maximum doses.* **For obese children use adjusted body weight (AdjBW)**			
Syrup: 120 mg/5mL and 250 mg/5mL Tablets: 500mg Suppositories: 60, 120, 250 and 500 mg	**Babies** > 32/40 weeks to 3 months	PO/PR	Oral 15 mg/kg 6hrly Rectal 20 mg/kg 8hrly Maximum recommended dose 60 mg/kg/day.
	Infants / Children > 3 months	PO/PR	Oral 15 mg/kg 4 - 6 hourly Rectal 15 – 20 mg/kg 6 hourly Maximum recommended dose 75 mg/kg/day. Review at 72 hours.
	For children > 12 years and over 50kg	PO/PR	1 Gram 4-6hourly Max 4 gram / 24 hours. Review at 72 hours.

IV Solution One 100 mL vial contains 1000 mg = 10mg/mL One 50 mL vial contains 500mg = 10 mg/mL	Term neonate	IV	10 mg/kg 4-6 hourly Max dose 40mg/kg/24 hours Review at 72 hours Doses are different to BNFC, reference - *Intravenous paracetamol dosage in the neonate and small infant, British Journal of Anaesthesia 112 (2): 380–94 (2014)*
	> 1 month Infant or child up 50 kg	IV	15mg/kg 4- 6hourly Max dose 60 mg/kg/24 hours Review at 72 hours
	In children > 12 years and over 50kg	IV	1 Gram 4-6hourly Max dose 4g/day. Review at 72 hours

NSAIDs (Non-Steroidal Anti-inflammatory drugs)

NOT applicable for Neonates
Caution with asthma, renal impairment, and low platelet count
No rectal medication should be prescribed for - Neutropenic patients (oncology / BMT) or following a rectal anastomosis (e.g. Duhamel / Soave /PSARP)

Ibuprofen
For obese children use adjusted body weight (AdjBW)

Tablets 200 mg Elixir 100 mg / 5mL	> 1 -3 month >3 months	PO	5mg/kg 6 hourly Maximum 20mg/kg/day 5 - 7.5mg/ kg 6 hourly **or** 10 mg/kg 8 hourly Maximum recommended dose: 30 mg/kg/day not exceeding 2400 mg /day. Review at 72 hours

Diclofenac Sodium			
Suppositories: 12.5mg, 25mg, 50mg and 100mg	Over 1 year old Infants (under 1 year old) - rectal dose to be discussed with the Pain Team	PR	1 mg/kg Give TDS 6-8 hourly. Maximum recommended dose: 3 mg/kg/day up to 150 mg/day PR.
IV 25mg /mL (3mL ampoule) (NEEDS to be buffered) Theatres use only .	Not recommended in patients under 6 months old	IV	0.3 -1 mg/kg BD Maximum recommended dose: up to 150 mg/day for two days.

Oral Opioids
Note: Codeine – Codeine is not included in this formulary as we do not advocate its use for paediatric pain management within UHBW.
For patients whose pain may not be fully controlled on one form of oral opiate, they may benefit from one regular opiate to manage 'background' pain and another PRN for breakthrough pain / procedural pain. Immediate release oral morphine and tramadol oral/IV can both be prescribed for patients over one year of age. However, they should have a minimum time of 90 minutes separating the doses. For example, a patient of 30kg may be prescribed regular 30mg Tramadol QDS and PRN 3mg Oramorph QDS *90 minutes post tramadol administration*

Oral Morphine **2nd line in children > 1year** **IBW – Titrate to effect**			
Immediate release formulations Oramorph: 10 mg/5mL Sevredol tablets: 10mg, 20mg, 50mg	Neonate	PO	<u>Moderate – severe pain:</u> 50 micrograms / kg 8 hourly - PRN
	1 - 12 months	PO	<u>Moderate – severe pain:</u> 80-100 micrograms/ kg 4 hourly
	Over 1 year old	PO	<u>Moderate pain:</u> 100-200 micrograms/kg 4h <u>Moderate – severe pain:</u> 200-400 micrograms/kg 4h
Immediate release formulations Oramorph 20mg/mL concentrated oral solution	Over 1 year old	Buccal	<u>Moderate pain:</u> 100-200 micrograms/kg 4h <u>Moderate – severe pain:</u> 200-400 micrograms/kg 4h
Immediate release formulations Actomorph Tablets – 1mg, 2.5mg,.5mg,10mg, 20mg	Over 1 year old	Orodispersible	<u>Moderate pain:</u> 100-200 micrograms/kg 4h <u>Moderate – severe pain:</u> 200-400 micrograms/kg 4h

Morphine sulphate (Modified release)

Modified release morphine maybe required for patients whose pain is expected to last an extended period; for example tumour related pain.

Modified-release formulations MST Continus tablets: 5mg, 10mg, 15mg, 30mg, 60mg Zomorph capsules: 10mg, 30mg, 60mg	Consult pain service for dosing advice	PO	Dosing is based on the patients' current opiate requirements, effectiveness of pain management, age and weight. Please ensure that both modified-release morphine (for background pain) and immediate-release morphine for breakthrough pain. Please consult with the pain service for guidance on commencement and escalation.

Tramadol- 1st line > 1 year

We have extensive experience with Tramadol over the past 15 years. However, Tramadol is metabolised by the same CYP2D6 enzyme as codeine. It therefore, has the theoretical potential to undergo extensive metabolism to more potent opioid metabolite. Therefore, it should be used with caution in ultra-metabolisers from Sudan/Ethiopia and Spain

IV 50mg/mL (2mL ampoule) 50mg capsules Tablet soluble: 50 mg	>1 year	IV/PO	1 – 1.5 mg / kg 4-6 hourly. For tonsillectomy max 1mg/kg rounded to the nearest 5mg Max 100 mg / dose and 400 mg / day

Oxycodone (not applicable for neonates or infants <3months) – 3rd line

Only for infants or children with significant side effect profile from morphine or tramadol.

Please discuss with CNS pain management or paediatric consultant anaesthetist before use.

Contraindicated in severe renal impairment and moderate to severe hepatic impairment.

Immediate release formulations (OxyNorm Liquid) Oral solution: 5mg / 5ml (OxyNorm) Capsules: 5mg, 10mg, 20mg	3-6 months	PO	50 micrograms/kg 4hrly PRN
	6-12 months	PO	50-100 micrograms/kg 4hrly PRN
	> 1 year of age	PO	100-200 micrograms/kg 4hrly PRN

Adjuvant drugs (In described situation)

Clonidine

For complex pain patients the addition of oral clonidine can be effective as an opiate sparing adjuvant. Only to be prescribed after consultation between Acute Pain Service and the Speciality Team.

Oral solution 50microgram/5mL	All ages	PO	0.5-1microgram /kg 4-6 hourly Ensure blood pressure maintained within normal limits.

Anti-emetics

Ondansetron (1st line)

2mg/mL IV solution (2mL ampoule) Tablets: 4mg Oral solution: 4mg/5Ml	> 1 Year	IV/PO	0.1- 0.15mg/kg Maximum 4mg 8 hourly.

Dexamethasone (2nd line)			
Ampoules 3.3 mg / mL *NB: Use with considerable caution in oncology/haematology patients; in particular newly diagnosed patients and those at risk of acute tumour lysis syndrome.*	All ages	IV	0.1-0.15 mg/ kg Max of 4mg (as a single dose and review) *Doses are expressed as Dexamethasone base.*
Droperidol (3rd line)			
2.5mg /mL Ampoules *NB: avoid in patients at risk of prolonged QT syndrome and with other drug products known to prolong QT interval.*	> 1 Year	IV	20 micrograms /kg to Max 1.25 mg per dose 6 hourly
Cyclizine (4th Line) To be use if Droperidol is contraindicated or unavailable.			
IV solution 50mg/1mL	>1 year	IV	0.5 - 1 mg /Kg to Max 50 mg 8 hourly

Acute Dystonic Reactions			
Procyclidine hydrochloride For treatment of acute dystonic reaction and/or oculogyric crises which is a rare side-effect of medications such as metoclopramide and droperidol.			
IV ampule: 10mg/2mL	>1 year	IV	IV 50-100 micrograms/kg Maximum 10 mg Dose may be repeated after 20 minutes
Naloxone Required for **all** patients receiving intravenous or neuraxial opioids.			
400 micrograms/mL ampoules *NB: For respiratory depression doses can be administered via the intramuscular route if the intravenous route is not feasible. However, onset of action is slower and the half-life increased.*	All ages	IV	**Respiratory depression** See table below for respiratory ranges **IV bolus:** 10 micrograms/kg (max 400 micrograms) repeated as necessary **IV infusion:** 100 micrograms added to 500ml IV maintenance fluid. Initial rate 60% of the initial bolus dose per hour. Adjust rate according to response **Pruritus / urinary retention** IV 0.5 micrograms/kg (x 4 doses 5 minutes apart)

*Guidance for Paediatric Respiratory Rates		
Age	**Normal rates**	**Low rate for Naloxone**
Birth – 6 months	30 – 50	22
6 – 12 months	24 – 40	20
1 – 3 years	24 – 30	16
3 – 6 years	22 – 30	14
6 – 12 years	18 – 30	10
> 12 years	12 – 20	8

Chlorphenamine (oral)			
Syrup: 2 mg /5mL Tablets: 4 mg	1 month - 2 years 2 – 5 years 6-11 years 12-17years	PO	1 mg BD 1 mg every 4-6 hours Max 6 mg in 24 hours 2 mg every 4-6 hours Max 12 mg in 24 hours 4 mg every 4-6 hours Max 24 mg in 24 hours

Chlorphenamine (IV)			
IV:10mg/mL ampoules	1 - 5 months 6 months - 5 years 6 -11 years 12 -17 years	IV	250micrograms /kg (max dose 2.5mg) QDS 2.5mg QDS 5mg QDS 10 mg QDS

Diazepam Routinely prescribed for children with cerebral palsy and/or undergoing orthopaedic multilevel correction, scoliosis surgery, muscle spasm and external fixators.			
IV Injection:10mg / 2mL Syrup: 2mg / 5mL Tablets: 2mg, 5mg *NB: IV Diazepam can be administered if agreed with Consultant Anaesthetist or Pain Service.*	>1 month	PO	0.1 mg/kg to a max of 5mg 6 hourly. Review at 72 hours and gradually wean over 10-12 days by decreasing the frequency to 8 hourly, then 12 hourly.

Management of neuropathic pain			
The International Association for the Study of Pain (IASP) define neuropathic pain as 'Pain arising as a direct consequence of a lesion or disease affecting the somatosensory system. It develops because of damage to, or dysfunction of, the nervous system. The pain may be constant or intermittent, and it is typically described as shooting, stabbing, burning, tingling, numb, prickling, or itching'.			
Gabapentin			
Capsule: 100mg, 300mg Oral solution: 50mg/mL *NB: See: https://www.medicinesforchildren.org.uk/medicines/gabapentin-for-neuropathic-pain/ for patient information.* *Do not suddenly stop Gabapentin. This medication needs to be weaned*	> 6 years	PO	Day 1: 10mg/kg OD Day 2: 10mg/kg BD Day 3+: 10mg/kg TDS Max 300mg / dose Some children may not tolerate daily increments; therefore this may need to be adjusted to tolerance.
Amitriptyline hydrochloride			
Tablets: 10mg Oral solution: 10mg/5mL *NB: See https://www.medicinesforchildren.org.uk/medicines/amitriptyline-for-neuropathic-pain/ for patient information.*	2 – 11 years 12-17 years	PO	200 micrograms/kg OD (Max 10mg) 10mg OD Dose to be administered at night. Only to be prescribed in consultation with the Acute Pain Service.
VERSATIS® Lidocaine hydrochloride Localised neuropathic pain			
Medicated plasters: 700mg NB: Must be discussed with Acute Pain Service before being prescribed.		Topical	Max 1400mg (2 patches) OD Apply OD for up to 12 hours, followed by 12 hours plaster free period. If no response after 4 weeks to be discontinued. Plasters can be cut to better cover the affected area.

Procedural pain management			
LMX4 (1st line)			
5 gram tube *NB: Can be administered via Medicine Protocol (PM)*	1 month – 3 months 3 months – 1 year > 1 year	Topical	1 gram (Max application time 1 hour) 1 gram (Max application time is 4 hours) 5 gram (Max application time 5 hours)
Ametop (2nd line)			
1.5 gram tube *NB: Can be administered via Medicine Protocol* [redacted]	1 month – 4 years > 4 year	Topical	1.5 gram (Max 1 tube) 7.5 gram (max 5 tubes)
Entonox - This is a self-administration concentration.			
50% oxygen & 50% Nitrous oxide(mix) There is a 70/30 mix, which is used for sedation in the ED and can ONLY be administered by consultants in resus.	> 5 year	Inhale	Refer to appendix for Entonox guideline Can be administered via Patient Group Directive [redacted]
Sucrose 24% (see SOP in appendix)			
24% Sucrose / mL	Preterm to 3 months	PO	Refer to Oral Sucrose [redacted]

Opioids for procedural pain management			
Intravenous Morphine			
IV solution 50mg/50mL IV solution 10mg/1mL IV solution 30mg/1mL *NB: Naloxone must be prescribed additionally*	> 1 month	IV	Refer to appendix for intravenous morphine bolus [redacted] Only to be administered by medical staff or nursing staff who have been signed off as competent to do so.
Intranasal Fentanyl			
IV solution 50micrograms/1mL *NB: Naloxone must be prescribed additionally*	> 1 year and 10kg	IN	See appendix for IN fentanyl [redacted] Only to be administered by medical staff or nursing staff who have been signed off as competent to do so. Only to be used in ED, Daisy, Dolphin and burns outpatients.
NB: Previously intranasal diamorphine had been the opioid of choice at BRHC for this indication. There is a supply problem with both the intranasal diamorphine (Ayendi) licensed product and diamorphine injection (which we had used intranasally prior to Ayendi becoming available). The supply problem is ongoing (as of November 2020) with no date of resupply therefore we are using IN fentanyl as an alternative for patients with acute pain.			

All postoperative patients prior to discharge from recovery should have prescribed:

- An appropriate analgesic regime
- Naloxone if patient has PCA/NCA or epidural opioids
- Anti-emetic if patient > 1 years old

Anaesthetists:

Please use the pain service drug chart and prescription labels available in theatre.

Section 3
Opioid delivered via infusion and PCA / NCA

All patients having on Opioid infusion or PCA/NCA must have the following documents and drugs in place or prescribed.

- Pain drug chart insert (except BMT patients)
- Registered on pain service database
- Additional hard copy Observation chart (Vital does not cover pain assessment or pain management observations)
- Fluid chart

Drugs

- Opioid prescription
- Antagonist - Naloxone
- > 1 year ensure Anti-emetic prescribed
- Paracetamol (unless contraindicated)
- NSAID (unless contraindicated)
- Diazepam (anti spasm dose in orthopaedic and scoliosis patients)
- Patient information leaflet.

Ward /Clinical area

- Pain assessment tool
- Pain care plan
- Clinical guideline for Opioid Infusion.

Monitoring	
All children with morphine infusions, NCAs and PCAs require routine monitoring as described below: **All infants** (under 1 year old), require respiratory monitoring via ECG (with alarms set at appropriate levels).	
Frequency of observations: ➢ Every 15 minutes for first hour ➢ Every 30 minutes for the second hour ➢ Hourly for 24 hours ➢ > 24 hours 2 hourly ➢ > 4 days can have observations carried out 2 to 4 hourly depending upon their clinical condition. ➢ **When there is an increase in the infusion rate or there are concerns, observations should revert to hourly**	
Pain assessment	Score and record on additional observation chart 0 - 10 on rest and movement
Pulse, respiratory rate and blood pressure	Score and record on E-Vitals

Sedation level	Score and record on additional observation chart: 0 = Wide awake 1 = Drowsy 2 = Asleep but easy to arouse 3 = Somnolent and difficult to arouse S = Normal sleep
Nausea	Score and record on additional observation chart: 0 = None 1 = Nausea 2 = Vomiting 3 = Severe nausea or vomiting
Pruritus	Score and record on additional observation chart: 0 = None 1 = Mild 2 = Moderate 3 = Severe

Intravenous Morphine, Fentanyl and Oxycodone Delivered via a NCA / PCA

Purpose

- To provide effective and immediate pain relief for patients in continuous severe pain
- Provide a relatively steady level of analgesia.
- The infusion rate can be adjusted with reference to the patient's pain score and level of sedation

Indications of use:

- Consistent pain score > 7, post-surgery, pain due to medical condition or as a symptom of medical treatment.

To make the infusion:

- Dose 1 mg/kg morphine made up to 50 mL with 0.9% sodium chloride **(max 50 mg in 50 mL)**
- 1 ml/hour = 20 micrograms/kg/hour
- Example: - 15kg child, use 15mg of morphine and dilute with 0.9% sodium chloride to 50ml. Each mL will contain 300 micrograms of morphine.
- For children over 50kg use 50mg morphine in 50mLs = 1mg/mL

What is Patient Controlled Analgesia (PCA)

The PCA pump is the self-administration of opioid analgesia via a dedicated intravenous giving set, of a predetermined dose of analgesia with an interval lockout time.

The PCA pump will give: –

- A pre-set amount of analgesic (the bolus dose)
- At a pre-set interval (the lockout time)
- Has a 4-hour opioid delivery limit
- In response to a trigger initiated by the patient

There is also the optional facility for a background infusion which is common in paediatric post-operative pain management or pain due to disease and treatments such as mucositis.

The patient:

- Must understand the concept and be physically able to use a PCA
- May require a loading dose of IV Morphine prior to starting the PCA

PCA pump and disposables required:

- BD BodyGuard 575 stored, checked in Recovery and Theatres level 4 BRHC.
- BD 50mL syringe with a Luer lock connector dedicated PCA admin set

Programming of the PCA

- Trained and experienced Anaesthetists
- CNS Paediatric Pain Management Team

PCA Monitoring and documentation

In Recovery:

- Prescription Check
- Program check against prescription and patient on entering and leaving Recovery
- Pain assessment every 15 minutes

The Ward:

- Prescription Check
- Program check against prescription and patient on retrieving patient from Recovery and at change of shifts and syringe.
- Patient monitoring as with morphine infusions above.

CME Bodyguard 575 PCA/NCA Pump Protocols

- NCA – Term -1 month
- NCA – Infant 1- 3 months
- NCA >3 month
- PCA
- Fentanyl NCA/PCA
- Complex NCA / PCA

Nurse-Controlled Analgesia (NCA) Morphine or Oxycodone

Oxycodone only to be used in > 3 months of age.

- Similar to PCA but used in small babies and older children who are unable to use PCA
- Provides a constant background infusion and allows the nurse looking after the patient to give a bolus dose for breakthrough pain or for minor procedures.
- Avoids the delay associated with increasing background infusion rate alone.
- Parents of oncology/heamatology and sickle cell patients may be taught to use the button under guidance from the Acute Pain Service.

Morphine or Oxycodone = 1 mg / kg made up to 50 mL with 0.9% sodium chloride gives a concentration of 20 micrograms / kg / mL

Patients 50kg and over have standard concentration of 50mg/50mL = 1mg/1mL

Dose and Program guide			
	Term – 1 month (neonate)	**1 – 3 months**	**>3 months**
Bolus	0.25mL	0.5mL	1mL
Lockout	20 minutes	20 minutes	20 minutes
4 hour limit	6mL	12mL	20mL
Background	0.25mL	0.5mL	1mL

Patient-Controlled Analgesia (PCA) Morphine or Oxycodone dose and program guide.

If the pump program is not within the guidelines please ensure that the reason is documented in the Careflow EPR clinical note.

Morphine 1 mg / kg made up to 50 mL with 0.9% sodium chloride gives a concentration of 20 micrograms / kg / mL

Children 50kg and over have a standard concentration of 50mg/50mL = 1mg/1mL

Bolus	1 mL
Lockout	5 minutes
4 hour limit	20 mL
Rate	0 - 0.3mL

(Background)	

NCA / PCA Fentanyl Dose and program guide <u>only to be used in > 3 months of age</u>. *2nd line opiate or 1st line for specific patients eg renal impairment or significant side effects with Morphine*).

If the pump program is not within the guidelines please ensure that the reason is documented in the Careflow EPR clinical note.

Dose 50 micrograms/kg fentanyl made up to 50 mL with 0.9% sodium chloride gives a concentration of 1microgram/kg/mL (Children over 50 kg use undiluted fentanyl)

	NCA	**PCA**
Bolus	0.5mL	0.5 mL
Lockout	20 minutes	10 minutes
4 hour limit	12mL	12mL
Rate (Background)	0 - 0.5 mL	0 - 0.5 mL

Specialist Pain Service Complex PCA / NCA

These maybe be KETAMINE added to MORPHINE or FENTANYL, double strength opioid or larger dosing regimes

NOTE - Mainly used in complex patients who are not responding to morphine alone, only to be commence following discussion with the pain service.

- Used for complex pain when opioid requirement escalates and resistance. Must be managed by the pain service.
- Discuss with CNS pain or paediatric consultant anaesthetist pain before commencing.

Dose and program suggestions

Ketamine 1mg / kg combined with Morphine 1 mg / kg made up to 50 mL with 0.9% sodium chloride (maximum 50 mg in 50 mL) or Fentanyl 50 micrograms/kg (max 50 micrograms per mL). Program pump to the morphine or fentanyl complex protocols.

Example dosing

1. **Morphine + Ketamine** Child's weight is 20kg-

   20mg Morphine + 20mg ketamine made up to 50mL with 0.9% sodium choride. The pump would be programmed by the Morphine concentration, if already at a background and bolus of 2 - 2.5mL reduce the background infusion by 50% once Ketamine added.

2. **Fentanyl + Ketamine** Child's weight is 20kg –

   1000 micrograms of Fentanyl + 20mg of Ketamine made up to 50mL with 0.9% sodium chloride. The pump is programmed on the Fentanyl concentration and if already running at 1 – 1.5 mL background and bolus when the Ketamine is added reduce the background by 50%.

Please use one of the below stickers

PCA/NCA COMPLEX Weight kg
50microg/kg Fentanyl made up to 50mL Saline 0.9% (Max.conc. 50microgram/mL)

Fentanyl	**micrograms**
	mg
Rate (background infusion)	**mL/h**
Bolus	**mL**
Lockout (min 10)	**min**
Four hour limit	**mL**

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NCA/PCA complex Weight kg
Infusion made up to 50mL 0.9%Saline

Morphine	**mg**
	mg
Rate(background infusion)	**mL/h**
Bolus	**mL**
Lockout	**min**
Four hour limit	**mL**

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Section 4

Local anaesthetic infusions

Wound and rectus sheath catheter infusions, peripheral nerve infusions, epidural and paravertebral infusions

Local Anaesthetic Infusions

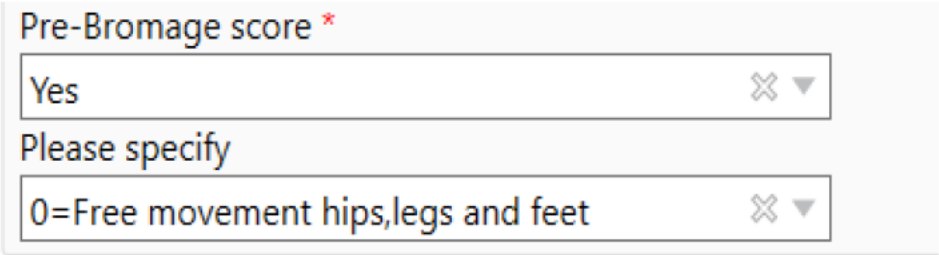
For safety and to meet national standards, patients with local anaesthetic infusions should be nursed in the below clinical areas where staff are trained and competent in the management of local anaesthetic infusions and related complications.

Areas where patients with local anaesthetic infusions can be nursed are **Penguin, Dolphin, Daisy, Apollo, Lighthouse and Seahorse.**

All patients should have:

- Pain Service drug chart insert
- Naloxone prescribed where epidural opiates are prescribed
- For epidurals and peripheral nerve infusions, record pre-operative Bromage assessment score in the CareFlow live clinical note (see below) for all children with altered movement in the lower limbs
- Local anaesthetic toxicity monitoring
- Additional observation chart

The epidural and peripheral nerve infusion Bromage score will be recorded in the drop-down section of the pain service initial set up clinical note as below -



Medication

- Local anaesthetic prescription – please ensure the correct sticker is used for the correct infusion type, age, and weight of patient.
- Naloxone if opiate included
- Anti-emetic, except < 1 year
- Paracetamol (unless contraindicated)
- NSAID (unless contraindicated)
- Diazepam (anti-spasm dose in orthopaedics and spinal patients)

- **In obese children (>98th centile for weight) consider using the patient's Ideal Body Weight (IBW).**

Ward / Clinical area

- Patient information leaflet – [redacted]
- Pain assessment tools
- Additional observation chart
- Clinical guideline for local anaesthetic infusion management.
- Fluid chart
- Algorithm for guidance on the management of suspected epidural haematoma / abscess.
- Algorithm for suspected nerve injury
- Algorithm for suspected Local Anaesthetic Toxicity

Local anaesthetic catheter insertion – peripheral nerve infusion catheter, paravertebral and epidural catheters

All local anaesthetic infusion catheters must be inserted using an aseptic technique. This includes the use of:

- Sterile drapes, gloves, cap, gown and facemask
- The skin cleaned with 2 % Chloraprep
- Sterile probe cover where ultrasound used
- The catheter fixed in place using a purpose-manufactured dressing

Urethral catheter

- All patients with **epidurals** over 1 year old should have a urethral catheter inserted
- This is not required as standard for all other local anaesthetic infusions.

Local anaesthetic
Wound and rectus sheath catheter infusions

Pump

McKinley Bodyguard 545 yellow fronted pump with designated yellow giving set and pre-set protocols.

Indications

- Wound catheter infusions can be used for postoperative analgesia in patients undergoing abdominal surgery. Catheters may be unilateral (single wound catheter) or bilateral (rectus sheath catheters) depending on the nature of the incision.
- Transverse incisions (e.g. rooftop / pfannenstiel incisions) require a single wound catheter to be inserted within the surgical incision.
- For longitudinal midline incisions rectus sheath catheters are inserted. This requires **two** equally sized wound infusion catheters to be placed on either side of the incision (within the rectus sheath muscle layer) and connected with a Y-connector, so that they can be infused via a single pump.
- Catheters are available with holes in the **first** 40mm, 75mm, 100mm, 150mm and 220mm. Match these lengths to the incision length as closely as possible, since the LA will infuse out of these holes.

Patient Selection

- Single wound catheters can be used in patients from 38 weeks post conceptual age. Different protocols are available for neonates (38 to 44 weeks post conceptual age) and should be used with caution due to the increased risk of local anaesthetic toxicity in this group. Rectus sheath catheters are not recommended in patients under 6 months of age due to dosing constraints.
- Use with caution in patients with hepatic impairment, renal impairment, or coagulopathy.

Initial bolus dose

- Once the catheter has been placed, a bolus of LA should be given prior to starting the infusion. For single catheters in children over 1 month of age the skin should also be infiltrated. **Please document the amount given on the anaesthetic chart.**
- Please prime filter +/- Y-connector with LA before connecting to the catheter/s.

For single wound infusion catheter (transverse incision, 1 catheter in the surgical incision):

Neonates:

- No skin infiltration
- 1mL/kg of **0.125%** Levobupivacaine as a bolus for wound catheter (0.5 mL/kg 0.25% Levobupivacaine diluted with 0.9 % sodium chloride to double the volume eg. for a 3 kg baby, 1.5 mL 0.25% Levobupivacaine diluted to 3 mL with 0.9% sodium chloride)

>1 month:

- 0.25mL/kg of 0.25% Levobupivacaine as skin infiltration.
- 0.25mL/kg of 0.25% Levobupivacaine as bolus dose for wound catheter.

For rectus sheath catheters (midline incision, 2 catheters either side of the incision, in the rectus sheath):

- 0.25mL/kg of 0.25% Levobupivacaine down each catheter (total 0.5mL/kg) before connecting Y-connector.
- No skin infiltration to maximise the volume given into the rectus sheath space.

Infusion dose

- Drug: Ropivacaine 0.2% 200mL bag. Use single wound infusion (neonate, 1-6 months or >6 months) or rectus sheath infusion (>6 months) drug sticker.
- **In obese children (>98th centile for weight) consider using the patient's Ideal Body Weight (IBW).**

PCA/NCA

- For single wound infusions and rectus sheath infusions please also set up either PCA/ NCA morphine with **NO** background infusion rate. Select dual intervention within the Intervention section on Careflow EPR.

Dose and Program guide for single wound infusion catheters

Only to be used in neonates >38 weeks post conceptual age and >2kg

Ropivacaine Hydrochloride (Naropin®) 2mg/ml (0.2%)

	Neonate	**1-6 months**	**>6 months**
Rate	0.1mL/kg/hr (max 0.5mL/hr)	0.1 mL/kg/hr (max 1mL/hr)	0.1 mL/kg/hr (max 7.5mL/hr)
Max duration of infusion	**48 hours**	**72 hours**	**72 hours**

Dose and Program guide for rectus sheath catheters **Only to be used in > 6months of age**			
Ropivacaine Hydrochloride (Naropin®) 2mg/ml (0.2%)			
	Neonate	**1-6 months**	**>6 months**
Rate	Not recommended	Not recommended	0.2mL/kg/hr (max 15mL/hr)
Max duration of infusion	Not recommended	Not recommended	**72 hours**

Trouble shooting

- The infusion rate should not be altered. If pain relief is ineffective, please consider adding or increasing the patient's NCA/PCA background and optimising alternative analgesia.
- The wound infusion may cause the abdominal wound to leak. This will require a surgical review to ensure wound integrity.
- The wound catheter site may leak. This is not a reason to stop the infusion. Get an Anaesthetist or the pain team to review the site. Increase site observation.
- If the pump alarms and it is suspected that the catheter has blocked, please turn off the infusion, this will require an anaesthetic or pain team review. If the blockage cannot be resolved the wound catheter will need to be removed and consideration of escalating of alternative analgesia such as increasing a PCA/NCA background may be required.

Local Anaesthetic - Peripheral Nerve Infusions

Pump –

- BD Bodyguard 545 yellow fronted pump with designated yellow giving set and pre-set protocols.

Indications –

- Peripheral nerve catheter infusions can be used for postoperative analgesia in patients undergoing upper or lower limb surgery.
- Catheters used are: Pajunk SonoLong NanoLine catheters available with 19G x 50mm & 19G x 100mm facet tip needles.

Patient selection –

- Peripheral nerve catheters can be used in patients from 6 months of age. Use with caution in patients with hepatic impairment, renal impairment or coagulopathy.
- For patients at risk of compartment syndrome, consider single shot blocks or consider using the low dose peripheral nerve infusion protocol for continuous post-operative analgesia. Ensure teams are aware of the potential risk, instigate appropriate post-operative monitoring and escalate concerns early.
- Areas where patients with peripheral nerve catheters can be nursed are **Penguin, Daisy, Apollo, Lighthouse, Dolphin and Seahorse.**

Common placement sites of nerve catheters

- Femoral
- Popliteal-Sciatic
- Fascia Iliaca
- Supraclavicular
- Quadratus lumborum

Initial bolus dose –

- This can be given using the insertion needle prior to placing the catheter or once the catheter has been placed. **Please document the amount given on the anaesthetic chart.**
- If immediately starting the infusion eg if placed at the end of surgery then please do not exceed a bolus of 0.5ml/kg of 0.25% Levobupivacaine or 0.25ml/kg of 0.5% Levobupivacaine.

Infusion dose –

- **Standard dose infusion**: Ropivacaine 0.2% 200mL bag. Use nerve infusion drug sticker.
- **Low dose infusion**: Levobupivacaine 0.125% 200 mL bag. Use low dose nerve infusion sticker.
- **In obese children (>98th centile for weight) consider using the patient's Ideal Body Weight (IBW)**

PCA/NCA –

- If patient also requires a PCA/NCA please select dual intervention within the Intervention section on Medway.
- Oral breakthrough opiates such as Tramadol and/or Oramorph may be sufficient in place of PCA/NCA.

Dose and Program guide for peripheral nerve infusion catheters

Only to be used in > 6 months of age

Ropivacaine Hydrochloride (Naropin®) 2mg/ml (0.2%) standard dose or Levobupivacaine 1.25mg/ml (0.125%) low dose concentration

	<6 months	**>6 months**
Rate	Not recommended	**Standard dose** :0.1ml/kg/hour (max 7.5mL/hr) **Low dose**: 0.1ml/kg/hr (max 15ml/hr)
Max duration of infusion	Not recommended	72 hours

If running two peripheral nerve infusion catheters concurrently, use above dosing for each catheter and a drug sticker for each. Total rate not to exceed 0.4mg/kg/hour. Not to have bolus doses.

Trouble shooting

- The infusion rate should not be altered. Optimise alternative analgesia. If pain relief remains ineffective and the patient has a single nerve catheter, please consider giving a clinician's bolus via the pump (0.1ml/kg) (Only to be performed by Anaesthetist or Pain CNS)

- The nerve infusion may leak. This is not a reason to stop the infusion. Get an Anaesthetist or the pain team to review the site. Increase site observation.
- If the pump alarms and it is suspected that the catheter has blocked, please turn off the infusion, this will require an anaesthetic or pain team review. If the blockage cannot be resolved the nerve infusion catheter will need to be removed and consideration of escalating of alternative analgesia, such as increasing a PCA/NCA background, may be required.
- For patients at risk of compartment syndrome, early diagnosis is vital. Maintain a high index of clinical suspicion and escalate concerns early. A previously well working regional technique that now appears inadequate could indicate compartment syndrome, and therefore should be investigated rather than simply increasing analgesia. Pain remote to the site of surgery, paraesthesia not attributable to the regional technique, signs of reduced perfusion, local swelling or pain on passive movement should all warrant investigation. Please inform the pain team and orthopaedic team immediately if any concerns exist.

Paravertebral Infusion

Pump –

- BD Bodyguard 545 yellow fronted pump with designated yellow giving set and pre-set protocols.

Indications –

- Paravertebral infusions can be used for postoperative analgesia in patients undergoing thoracic surgery.
- Catheters used are: either epidural or nerve catheters.
- **Can be placed by an Anaesthetist or surgically placed.**

Patient selection –

- Paravertebral catheters can be placed in infants and children over 2kg.

Anatomy of the paravertebral space

- The paravertebral space is lateral to the epidural space where the somatic and sympathetic segmental nerves are still close together and contained by tissue layers that allow unilateral block with local anaesthetic solution.

Initial bolus dose

- The recommended dose is 0.5 mL/kg of 2.5mg/mL L-Bupivacaine.

Infusion dose – Please use the paravertebral infusion sticker.

- The paravertebral infusions are prescribed as a **set rate** (which can be altered by the pain service or an Anaesthetist to within the below ranges).
- 0.125% Levobupivacaine.

	< 6 months	> 6 months
Rate	0.1-0.2mL/kg/hr Start at 0.2mL/kg/hr Max 2mL/hr	0.1-0.4mL/kg/hr Start at 0.2mL/kg/hr Max 20mL
Max duration	72 hours	72 hours (Can be increased to 120 hours with extreme caution)

PCA/NCA –

- If patient also requires a PCA/NCA please select dual intervention within the Intervention section on Medway.
- Oral breakthrough opiates such as Tramadol and/or Oramorph may be sufficient in place of PCA/NCA.

Epidural Infusion

Pump –

- BD Bodyguard 545 yellow fronted pump with designated yellow giving set and pre-set protocols.

Indications –

- Epidural infusions can be used for postoperative analgesia in patients undergoing laparotomy, thoracic or lower limb surgery.
- Catheters used are: Epidural mini pack, 16g and 18g Tuohy needles

Please check if patient is on anti-coagulation pre insertion of epidural.

Patient selection –

- Epidural infusions can be used in patients weighing > 2kg.
- Use with caution in patients with hepatic impairment, renal impairment, or coagulopathy.

Epidural anatomy

- The epidural space is a potential space from the foramen magnum to the sacral hiatus. It surrounds the dura matter and is within the bones and ligaments of the vertebral column.
- Epidural analgesia is the administration of analgesic drugs into the epidural space via an epidural catheter to bath the spinal nerves in local anaesthetic resulting in segmental analgesia.

Epidural infusion concentration and container available

- 0.125% Levobupivacaine (200mL bag)
- 0.125% Levobupivacaine (200mL bag) + 300mcg Clonidine*
- 0.1 % Levobupivacaine with Fentanyl 2 micrograms / mL (250mL bag) [Protocol set to 190mL bag volume

*This will require the addition of Clonidine to the plain 0.125% Levobupivacaine bag. Clonidine comes in 150micrograns/mL ampules.

Local anaesthetic bags must be stored in either a controlled drug or high-risk drug cupboard

Low molecular weight heparin (Enoxaparin) anticoagulation

- Epidural insertion: Ensure 12 hours post last dose of Enoxaparin
- While the epidural catheter is in situ: First dose of Enoxaparin to be given 4 hours postoperatively.
- Prophylactic dosing – Refer to BRCH [redacted]

  Prophylactic enoxaparin dosing:

  <2 months: 1.5mg/kg OD SC.

>2 months: 1mg/kg OD SC (max 40mg OD)

- **Ensure prescribed and administered as an evening once daily dose.**

- Epidural catheter removal: The catheter can be removed 12 hours post dose of Enoxaparin. The next dose should not be administered for a further 4 hours after removal.

Infusion dose – Please use age/weight appropriate epidural prescription sticker

Neonatal protocol:

- 0.125% Levobupivacaine with **no additive**.
- **Infusion rate 0.1-0.2mL/kg/hour**
- No bolus facility

Infant / Child > 5kg

- **0.1 - 0.4 mL/kg/hour**
- Clinicians bolus facility to allow a 0.25mL/kg bolus

Protocol	**Max infusion rate**
Neonate 2-5kg	1mL/hour
Baby 5-7kg	3.5mL/hour
Infant 7-10kg	5mL/hour
Child 10-20kg	10mL/hour
Child >20kg	15mL/hr

PCA/NCA –

- No IV or enteral opiates to be administered if the patient has an epidural containing fentanyl.
- If patient also requires a PCA/NCA please select dual intervention within the Intervention section on Medway.
- Oral breakthrough opiates such as Tramadol and/or Oramorph may be sufficient in place of PCA/NCA.

Initial bolus dose –

- The recommended dose for a single shot lumbar epidural is 0.5 mL/kg of 2.5mg/mL L-Bupivacaine.

Bolus dose for failing epidurals *(Only to be administered by an anaesthetist or pain specialist)*
First Line • Via the epidural pumps bolus dose of between 0.1-0.2mL/kg. **maximum of 10mL of epidural mix.** **Second Line** • 0.1-0.2mL / kg of 0.25% Levobupivacaine **maximum 10mL** Access the line via the filter. Record on prescription chart and audit form.

Reasons why epidural may fail to provide pain relief	
Problem	Action
Occlusion - The catheter may: kink block leak	• If the child is pain free but the site is leaking, ensure the dressing is reinforced, you may need to increase the rate to compensate for the leak. • Check the catheter from patient to pump ensuring line is not tangled and no kinks noted
Increased pain - Infusion rate too low	• Increase infusion rate within the prescription after sensory check. • If pain persists, call the CNS pain or On-call anaesthetist to review and give a bolus of epidural mixture (see above).
Increased pain - Catheter not in epidural space	• Check catheter insertion site for leakage etc • Review length of catheter visible at skin to compare to documented length on anaesthetic chart • Continue to monitor for LA toxicity as risk of migration into vascular system • Consider alternative analgesia
Spasms - Some children (especially those with cerebral palsy) after orthopaedic procedures have muscle spasms.	• Consider regular oral Diazepam or Baclofen. • Adding Clonidine to the epidural infusion is an alternative ***(as per guidelines)***
SPICA may be too tight and there may be difficulty checking catheter	• A window must be cut into the cast so that the epidural site is easily seen and accessible for removal • Discuss further adjustment with the speciality team.
Child may be in urinary retention	• Check urethral catheter is draining, may require catheter to be flushed. • If no catheter, consider bladder catheterisation or if the patient is under 1 year of age consider manual palpation of bladder

Compartment syndrome – Painful condition that results when pressure within the muscle builds to dangerous levels. **Acute compartment syndrome** is a surgical emergency. Without treatment, it can lead to paralysis, loss of limb or death. **The classic sign** of acute compartment syndrome is pain, especially when the muscle is stretched. The pain intensity is out of proportion to the injury / surgery and may break through an epidural block. There may also be a tingling or burning sensation (paraesthesia) in the muscle. The muscle may feel tight or full. If the area becomes numb or paralysis sets in, cell death has begun and efforts to lower the pressure in the compartment may not be successful in restoring function.	**Treat promptly, this is an emergency** • Seek orthopaedic assessment. • Inform the pain team or duty consultant anaesthetist and the patient's speciality team. • Give rescue analgesia – either bolus epidural Levobupivacaine 2.5mg/mL or Intravenous morphine bolus. • Assesses pulses, may need doppler and pressure assessment (in children the pressure assessment is usually performed in theatres). • If surgery is required to relieve the pressure, the surgeon will make an incision and cut open the skin and fascia covering the affected compartment.
Motor block	• Check for signs of motor block: Assess using Modified Bromage Motor Score – see Paediatric Additional Observation Chart • If score 3 refer to the algorithm (see page 45) on Management of Suspected Epidural Haematoma / Abscess and Motor weakness in children on Epidural infusion All children are at risk of pressure or heat damage but this is more likely if there is significant motor block.
Epidural catheter site	Check for signs of infection – • Erythema • Tenderness • Swelling • Pyrexia
Suspected epidural infection	**Treat promptly, this is an emergency** • Remove epidural catheter, send tip for culture, swab site if pus present.

	• **Review motor block using modified Bromage Motor Score – see Front of UHBW Paediatric Additional Observation Chart** if score 3 refer to the algorithm and follow guidance • If pyrexial, take blood cultures • Start intravenous antibiotics including Flucloxacillin since Staph Aureus is the most likely organism • May need ultrasound scan or MRI to evaluate the depth of infection, especially if there is a suggestion of epidural abscess which may require incision and drainage ***(should be assessed by Consultant Anaesthetist)***
Neurological changes or persistent numbness.	• Inform the pain team or duty consultant anaesthetist and surgical / orthopaedic team. • May need ultrasound scan or MRI to evaluate the direct neural damage.
Witnessed catheter disconnection from filter.	The below procedures must be completed using a sterile technique; contact the pain service for support • If catheter disconnected from yellow clamp, clean the end of the catheter with 2% Chlorhexidine, allow to dry and holding the catheter with a sterile swab, cut the catheter with sterile scissors approximately 2 – 3cm and insert into the clamp. • If yellow clamp disconnects from filter, clean as above and reconnect.
Unwitnessed catheter disconnection from filter.	• Epidural will require removal. • Contact the Acute Pain Team or on call Anaesthetist for alternative analgesia
Local Anaesthetic Toxicity	**Treat promptly, this is an emergency. Please follow the algorithm** [See page 46 -47]

THE MANAGEMENT OF LEG WEAKNESS OR ONSET OF NEW BACK PAIN IN CHILDREN WITH EPIDURAL OR SPINAL INJECTION

Background: Epidural haematomas can occur at any time, and over half develop after removal of the epidural catheter. Epidural haematomas/abscesses can cause spinal cord or nerve compression. Regional anaesthesia can mask the signs. Incidence is low; NAP 3[1] states the risk of permanent neurological injury in children with continuous epidural infusion is 1:10,000.
Management: Definitive treatment is surgical decompression by neurosurgeons. Factors determining outcome are severity of neurological deficit at presentation and time from presentation to surgical intervention.

Motor Block Concerns
1. Increasing leg weakness with motor block / modified Bromage score 3. See front of UHBW Paediatric Additional Observation Chart
2. Sensory level increasing/new weakness

Onset New and unexpected Back Pain
1. Contact pain team (CNS and/or on-call anaesthetist) and follow algorithm.

If Motor Score 3
1. Switch Epidural Infusion Off
2. Monitor Motor & Sensory Block every 15-30 minutes
3. **Contact pain team (CNS bleep [redacted] and/or on-call anaesthetist bleep [redacted])**
4. Consider fasting for GA and checking clotting

Motor Score Improving?

Yes

NO! If no improvement by **4 hours** proceed to MRI as below.

Anaesthetic Consultant to discuss with Consultant Radiologist and Neurosurgeon
Call neurosurgical registrar early to highlight potential occurrence. **Surgical evacuation within 8 hours onset of symptoms for best chance of recovery.**

Yes

Patient comfortable?

No

Contact Pain Team to reassess the patient's analgesia

Yes

Recommence epidural infusion at a 30% reduction in rate and reassess as per UHBW Paediatric Epidural infusion guidelines.

Adapted from the Clinical Guideline 'The management of leg weakness or onset of new back pain in children with epidural or spinal injection'.

AAGBI Safety Guideline

Management of Severe Local Anaesthetic Toxicity

THE ASSOCIATION OF ANAESTHETISTS

1 Recognition

Signs of severe toxicity:

- Sudden alteration in mental status, severe agitation or 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 an initial injection

2 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 plasma 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
- Consider drawing blood for analysis, but do not delay definitive treatment to do this

3 Treatment

IN CIRCULATORY ARREST

- Start cardiopulmonary resuscitation (CPR) using standard protocols
- Manage arrhythmias using the same protocols, recognising that arrhythmias may be very refractory to treatment
- Consider the use of cardiopulmonary bypass if available

GIVE INTRAVENOUS LIPID EMULSION
(following the regimen overleaf)

- Continue CPR throughout treatment with lipid emulsion
- Recovery from LA-induced cardiac arrest may take >1 h
- Propofol is not a suitable substitute for lipid emulsion
- Lidocaine should not be used as an anti-arrhythmic therapy

WITHOUT CIRCULATORY ARREST

Use conventional therapies to treat:

- hypotension,
- bradycardia,
- tachyarrhythmia

CONSIDER INTRAVENOUS LIPID EMULSION
(following the regimen overleaf)

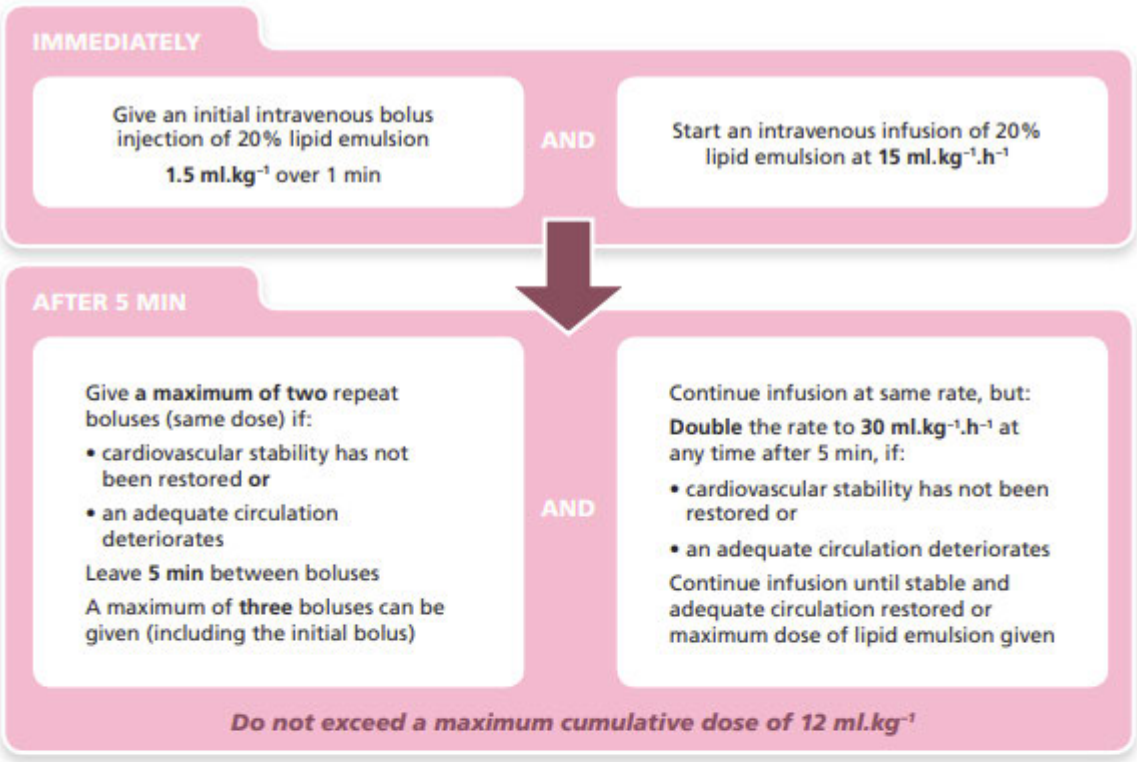
- Propofol is not a suitable substitute for lipid emulsion
- Lidocaine should not be used as an anti-arrhythmic therapy

4 Follow-up

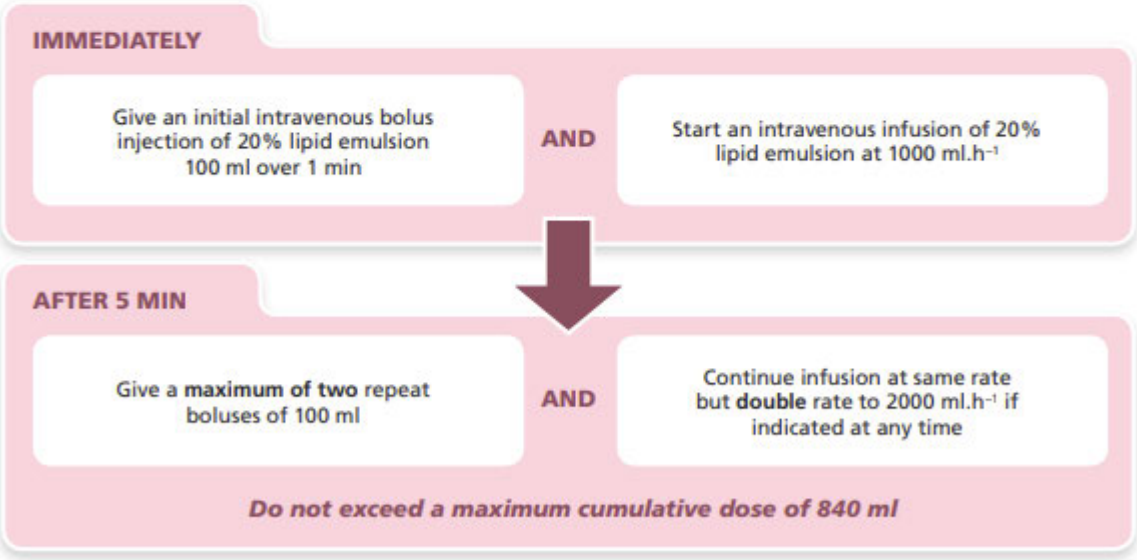
- Arrange safe transfer to a clinical area with appropriate equipment and suitable staff until sustained recovery is achieved
- Exclude pancreatitis by regular clinical review, including daily amylase or lipase assays for two days
- Report cases as follows:
  in the United Kingdom to the National Patient Safety Agency (via **www.npsa.nhs.uk**)
  in the Republic of Ireland to the Irish Medicines Board (via **www.imb.ie**)

If Lipid has been given, please also report its use to the international registry at **www.lipidregistry.org**. Details may also be posted at **www.lipidrescue.org**

Your nearest bag of Lipid Emulsion is kept.....



An approximate dose regimen for a 70-kg patient would be as follows:



This AAGBI Safety Guideline was produced by a Working Party that comprised:
Grant Cave, Will Harrop-Griffiths (Chair), Martyn Harvey, Tim Meek, John Picard, Tim Short and Guy Weinberg.

This Safety Guideline is endorsed by the Australian and New Zealand College of Anaesthetists (ANZCA).

Algorithm for management of nerve injury associated with peripheral nerve blocks (BRHC)

Suspected nerve injury defined as:
New onset of pain, weakness, numbness, paraesthesia or other abnormal sensation
Effects lasting beyond the usual duration of the specific block (e.g. if a single shot peripheral nerve block (PNB) lasts >48 hours)

Review relevant medical and surgical history
Review of operation and anaesthetic records, drug chart and observation chart
Clinical examination including neurological examination by the responsible surgical team

Mild or resolving symptoms

Reassure the patient and review in 4 weeks via telephone call

Persistent symptoms

No

No further follow up required

Yes

Neurological referral
Consider
-MRI and other imaging
-Nerve conduction tests (NCT)
-Electromyography (EMG)

Complete or progressive neurological deficit or presence of motor deficit

Inform the responsible surgical team and anaesthetic team immediately
Inform Acute Pain Service (Bleep [redacted]) or Anaesthetic SpR out of hours (Bleep [redacted])

Neurological referral
Consider surgical cause (e.g. haematoma, cut, stretch injury etc.) and appropriate intervention (decompression, reconstruction etc.)

Consider
-Further imaging (particularly if space occupying lesion is suspected and emergency decompression is needed)
-NCT, EMG

-Definitive diagnosis
-Conservative treatment (drugs, physiotherapy etc) or surgical intervention (as above)
-Keep the patient and responsible team informed
-Follow-up as appropriate

Adapted from RA-UK www.ra-uk.org August 2019

Section 5
Guidance on the Management of Appendectomy and Laparoscopic Pyeloplasty

Appendectomy - All Patients:

- Regular paracetamol
- Regular NSAID (unless contraindicated) + consider perioperative NSAID

Does the patient have EXCLUSION CRITERIA for Regular Tramadol?

- Open procedure
- Requirement for post- op antibiotics
- Age ≤ 6 *or* Behavioral / communication difficulties
- Late surgery (returning to ward after 10pm)?
- Normal appendix but other pathology identified

YES

PCA/NCA

- Dose as per acute pain formulary
- Decision regarding background infusion on case by case basis.

Prescription review after 24 hours

- Review amount of morphine required pain scores and mobilising.
- If background infusion, consider reduce by half or stop and continue to review.
- No background and comfortable consider Step-down to tramadol PRN when appropriate.

NO

No Device

- Regular tramadol 1mg/kg QDS IV/PO up to maximum of 400mg/day
- Prn oral morphine 0.1-0.2mg/kg max QDS (90 minutes after tramadol)
- Consider referral to pain service.

Pyeloplasty - All patients:

- Regular paracetamol
- Regular NSAID (unless contraindicated)

<1 year of age

First line -

- Regular oral morphine 80-100mcg/kg QDS

Second line -

- Consider bolus only NCA

>1 years old

First line -

- Regular tramadol 1mg/kg QDS IV/PO
- PRN oral morphine 100-200mcg/kg QDS
  Prescribe tramadol and oral morphine 90 minutes apart

Second line -

- Consider bolus only NCA / PCA

No device Review

Out of hours

- If pain not adequately managed ensure all simple analgesia administered regularly and optimal dosing prescribed, may require escalation to NCA/PCA in first 24 hours

PCA / NCA Review

First night out of hours -

- If pain not adequately managed ensure all simple analgesia administered regularly and optimal dosing prescribed, may require background on NCA/PCA
- If comfortable continue

Morning -

- If comfortable stop PCA / NCA and change to PRN tramadol or oral morphine
- If pain not adequately managed review PCA/NCA and simple analgesia use and re-assess within 6 hours. May require background adding or removing.

Once patient comfortable on oral analgesia discharge from pain service

Section 6
Analgesia for the Application of Frames and External Fixators

This surgery involves the insertion of fixator pins near major nerve trunks plus stretching of the nerves thereafter. Motor block should therefore be avoided to enable assessment of nerve function.

Therefore:

- Neuromuscular blockade should not be maintained intra-operatively
- Major nerve trunk blocks are contra-indicated
- High dose epidural infusions should be avoided

Epidural infusions can be used and are often indicated especially in complex foot reconstruction or where there have been significant painful episodes with previous frames. However, they should be avoided in surgery involving tibial reconstruction because of surgical concerns about the risk of a "missed" compartment syndrome. Consider the use of low dose nerve infusions after discussion with the pain and orthopaedic teams.

There is animal data suggesting that NSAIDs, including COX2 inhibitors, delay bone healing so these are best avoided in the acute phase. However, they may be required for intermittent analgesia to allow physiotherapy and mobilisation.

From surgery

- PCA (Morphine) + /- spinal (most common)

Or

- Epidural or low dose nerve infusion of Levobupivacaine **(Epidural off day 3)**. Only to be commenced after discussion with Acute Pain Team.

Regular Paracetamol 15mg / kg max dose 4 gram a day for 3 days then change to PRN 15mg /kg max 4 gram a day QDS orally 4-6 hourly. QDS Diazepam 0.1mg/kg to max 5mg (reducing dose gradually after 3 days)

Usual Sequence of pain management over 4 days

- Think about taking background out of Morphine PCA infusion on day 1 and discontinuing on day 2 – perhaps hang button up and allow use for physiotherapy if needed. Change to Tramadol (1mg/kg 4-6 hourly Max 100mg/dose and 400mg a day)
- As infusions stop switch to QDS Paracetamol and Tramadol (1mg/kg 4-6 hourly Max 100mg dose and 400mg a day.

- Weaning or PRN dose Diazepam
- If Pain an issue, consider adding Oral Morphine Sulphate at 100 - 400 micrograms /kg, max dose 20mg 4 hourly and refer to pain service for advice.

When acute perioperative analgesia has been discontinued and the pain team is no longer doing daily reviews, ongoing pain problems need to be discussed with the patients team prior to further involvement of the acute pain nurse or chronic pain team.

If patient struggling with adequate pain control need to check with Consultant if can have short course (i.e. 2-3 days of Non-Steroidal Anti Inflammatory NSAID) to help them over this issue.

TTA 's for discharge and home management

1. Paracetamol QDS 15mg/kg max dose 4 gram a day (PRN)
2. Tramadol 1mg /kg QDS (max 400mg in 24 hours) (PRN) should be reviewed weekly by CNS for Frames or GP
3. Diazepam 0.1mg/kg QDS (20mg in 24 hours) (PRN). Diazepam should be reviewed weekly by CNS for Frames or GP

Sleeping problems –

Melatonin 3 mg nocte – an hour before bedtime. Increase to 6 mg if needed.

Important. Need to consider laxatives at early stage if on regular opioid.

Advise: as patients get more comfortable to start reducing doses of Tramadol e.g. miss out lunchtime dose first keeping bedtime and morning doses

Advise: there may be times when pain relief requirements may vary during the time course of the frame e.g. may go up during adjustment phase and with pin site infection but go down during consolidation phase.

NSAIDs are only to be used after consultation with the pain and surgical teams

Section 7
Pain Management of Patients with Renal Failure

Renal Patients – Please avoid NSAID

Consider the below GFR guidance when prescribing for this group of patients

- Haemodialysis: dialysed out, consider giving after. Dose as in GFR<10mL/min.
- Peritoneal dialysis: Not dialysed out. Dose as in GFR<10mL/min.
- Continuous veno-venous hemofiltration (CVVH): Unknown dialysis. Dose as in normal renal function

Simple analgesia for mild to moderate pain

Paracetamol

- Normal dose as above unless renal function = GFR < (10mL/min) then **IV** paracetamol should have an interval dose of 6- 8 hourly at normal dose.

Tramadol

- Normal dose as above unless renal function = GFR < (20-50mlL/min) normal dose at extended intervals TDS or if GFR < (10mL/min) use 50% of normal dose at extended intervals.

Oral Morphine Sulphate

- Normal dose as above unless renal function = GFR < (10-20mL/min) then use 75% of normal dose. Or if GFR < (10mL/min) use 50% of normal dose at extended intervals and titrate to comfort.

Oxycodone

- Normal dose as above unless renal function = GFR < (10mL 50mL/min) start with 75% of normal dose and titrate to comfort.

Moderate – Severe pain

Please use a multi- modal approach by including regular paracetamol, anti-emetics. When IV opioids are prescribed ensure Naloxone is prescribed.

IV Morphine Bolus - Give normal dose 100 – 200 micrograms /kg (see IV morphine bolus) unless GFR <50 (see below for dosing).

NCA/PCA If pain persists or the patient is post-surgery consider PCA without background or NCA with small background (refer to pain service and guidance on management, prescribing / management of PCA within these guidelines).

If Renal function :

- GFR < (20-50mL/min) use 75% of normal morphine dose.
- GFR < (10mL/min) use 50% of normal morphine dose and titrate to comfort consider Fentanyl at 50% of normal dose if GFR < (10mL/min).

GFR between 10 -20mL/min use 50% of morphine. If GFR <10mL/min use 25% of normal morphine dose and titrate to comfort.

Analgesia for Renal Transplantation

- Wound catheter – Single wound catheter at 0.1ml/kg/hr 0.2% Ropivacaine (max 7.5ml/hr) Please refer the local anaesthetic wound infusions guideline for bolus dosing and further information)
- Alongside a Fentanyl NCA/PCA (please see NCA /PCA Fentanyl dose and program guide within Section 3 of this guideline).
- Please place both a Fentanyl and single wound catheter sticker within the renal transplant drug chart.

Section 8

Guideline For Standard Analgesia for Post Cardiac Surgery Patients (Including ERP pathway) On Discharge from PICU and Management on Wards

All children (except those under 3 months), on transfer from PICU should have the following prescribed, by the PIC Fellow:

- **Paracetamol** weight appropriate dose (to be reviewed after 48 hours) REGULARLY
- **Ibuprofen** 5mg/kg 4 – 6 hourly REGULARLY (maximum 30mg/kg/24H) EXCEPT CHILDREN INTENDING TO BE WARFARINISED (or on a Heparin infusion) to be reviewed after 48 hours.
- **Tramadol** (>1 year of age) IV / PO 1 mg/kg QDS 4-6hourly (maximum 400mg /24hr) PRN
- **Oral Morphine Sulphate** see page 16 for age specific dosing.

If Pain Uncontrolled Consider the following:

Please use a multi- modal approach by including regular paracetamol, anti emetics and when IV opioids are prescribed ensure Naloxone is prescribed.

- **IV Morphine Bolus -** Give normal dose (see IV morphine bolus guideline (appendix 1). If pain persists or the patient is post-surgery, consider PCA without background or NCA with small background. Refer to pain service for guidance on management.

If Pain management is required following discharge consider the following TTA's

- Paracetamol QDS 15mg/kg max dose 4 gram a day
- Ibuprofen 5mg / kg QDS max dose 30mg /kg EXCEPT CHILDREN INTENDING TO BE WARFARINISED
- Tramadol 1mg /kg QDS (max 400mg in 24 hours)
- Oral morphine Sulphate see page 16 for age specific dosing.
- Sleeping problems – Melatonin 3mg nocte – an hour before bedtime Increase to 6 mg if needed.

Important: Need to consider laxatives at early stage if on regular opioid.

Advice for parents/carers: as patients get more comfortable start reducing doses of Tramadol e.g. miss out lunchtime dose first keeping bedtime and morning doses. See patient information leaflet: [redacted]

NSAIDs are only to be used after consultation with the Cardiologist, Surgical team or Pain service.

Section 9
Acute pain management in special circumstances

Complex Cerebral Palsy Children Following Surgery

Cerebral palsy is a disorder of movement and posture.

It is associated with cognitive and neurosensory disabilities including seizure disorders and visual and hearing defects.

It is not unusual for these children to be on the following medication routinely to manage their symptoms.

- **Antispastic drugs** such as Diazepam and Baclofen (sometimes baclofen is administered intrathecally via a pump)
- **Anti-convulsant**
- **Treatment for oesophageal reflux or related symptoms.**

Method of PAIN CONTROL

1. Epidural +/- Fentanyl or Clonidine (Clonidine is currently used more if orthopaedic surgery is undertaken)
2. Nerve / wound Infusion + NCA/PCA without background.
3. NCA Morphine if an epidural is contraindicated
4. Regular Paracetamol
5. Regular NSAID (not in fundoplication or in patient with known gastric symptoms)
6. PRN Diazepam, although patients maybe on an anti-spasm medication regularly it is not unusual for them following surgery to need additional doses (Muscle spasms are a natural response of changing the length of a hypertonic muscle)

   Common problems in the first few days following surgery can be sudden exacerbation of seizures and hypertonia. Suggest medication review as regular oral medication for convulsion and hypertonia may of been omitted if the patient is nil by mouth and no alternative via a different route established to cover this period, discuss with specialist team responsible for the patient.

Step down analgesia following discontinuation of the epidural or NCA/PCA –

- Tramadol as per pain guideline for 3-5 days (discontinuing of this medication will be under the control of the patient's specialist team)
- Oral morphine as with Tramadol.
- Any additional diazepam for breakthrough spasm may be required for a further 2-3 days but should be discontinued prior to discharge.

Any further problem related to acute pain following surgery that has not been resolved by the above please discuss with the CNS for pain or anaesthetist registrar on-call.

Sickle Crisis

There are no specific or curative treatments. Management is supportive, with the aim of breaking the vicious cycle of sickle formation.

Pain Relief

Pain in during a sickle is due to vaso-occlusion and may be severe. Most patients attend ED after trying unsuccessfully to relieve their pain at home using simple analgesics and sometimes mild opioids.

Medical and nursing staff often under-estimate the severity of pain and deal with it inadequately. Severity may be difficult to assess but if in doubt it is better to over-estimate the intensity and reduce analgesia afterwards. Inadequate analgesia will precipitate a vicious cycle, resulting in increased fear, anxiety and more pain.

Aim to control pain FULLY as soon as possible after the child has been assessed.

- Triage category 2. Inform Paediatric Haematology SpR and CNS as soon as possible.
- Assess the site, severity, and duration of pain. Use analgesic ladder and flow chart to guide analgesia and a pain score tool to monitor effectiveness of pain relief. ALL children admitted must have analgesia prescribed at regular intervals: a prn basis is not recommended.

Method of PAIN CONTROL

- Determine opioid history, e.g. may have had regular paracetamol and mild opioid or IN Fentanyl prior to referral to the pain service. Therefore, these patients require IV opioid once referred to the pain service.
    - If necessary, consider loading dose IV morphine 100 microgram/kg bolus.
    - Maintenance analgesia via morphine Nurse controlled analgesia (NCA) or Patient controlled analgesia (PCA) with a background infusion starting at 0.5mL/ hour.
    - The duration of the symptoms varies from 1 -7 days. Titration of analgesia to meet pain requirement is important. Both background and bolus doses frequently need increasing and the time between dose delivery of the NCA may need to be reduced.
    - If pain is still uncontrolled when infusion and bolus dose exceeds 2 mL consider adding Ketamine. Please discuss with CNS pain or the consultant anaesthetist on call.

Parents of these patients are taught how to use the button and strictly forbidden to press the button whilst the child is asleep.

Mucositis

Mucositis is painful ulceration of the mucous membranes of the digestive tract and commonly occurs following the use of Chemotherapy and Radiotherapy (including conditioning therapy for Bone Marrow Transplant) (BMT). Mucositis may involve mucous membranes of entire gastrointestinal tract and give rise to oral mucositis, oesophagitis, gastritis, and ulceration involving bowel and perineal region.

'High risk' patients:

- Conditioning for BMT procedures
- High dose chemotherapy including agents such as melphalan, high dose methotrexate and regimens including doxorubicin and etoposide, especially in combination
- Abdominal radiotherapy

Mucositis leads to pain that requires the use of Opioid analgesia. There should be early involvement of the pain team to initiate intravenous analgesia as soon as this becomes necessary.

Method of PAIN CONTROL

- Determine opioid history, e.g., may have had regular paracetamol and mild opioid prior to referral to the pain service. Therefore, these patients require IV opioid once referred to the pain service.
    - If necessary, consider loading dose IV morphine 100 microgram/kg bolus.
    - Maintenance analgesia via morphine Nurse controlled analgesia (NCA) or Patient controlled analgesia (PCA) with a background infusion starting at 0.5mL/ hour.
    - The duration of the symptoms of mucositis does vary but on average it can last from 1 - 4 weeks.
    - Titration of analgesia to meet pain is important. Both background and bolus doses frequently need increasing and the time between dose delivery of the NCA may need to be reduced.
    - If pain is still uncontrolled when infusion and bolus dose exceeds 2mls consider adding Ketamine either maintaining the current infusion program i.e., if background infusion prior to the addition of Ketamine is 2mL keep it the same or if patient seems tired and exhausted reduce program parameters by 0.5ml aliquots. Please discuss with CNS pain or the consultant anaesthetist on call.

Parents of these patients are taught how to use the button and strictly forbidden to press the button whilst their child is asleep.

Haemorrhagic cystitis

Haemorrhagic cystitis is a painful inflammatory condition effecting the urinary bladder resulting in bleeding from the bladder mucosa. It is often as a result of either chemotherapy / anti-cancer treatment or in immunosuppressed patients as a result of certain infections such as BK virus. Patients with haemorrhagic cystitis may have pain from bladder spasms or severe pain when urinating especially when passing clots.

Haemorrhagic cystitis leads to pain that requires the use of Opioid analgesia. There should be early involvement of the pain team to initiate intravenous analgesia as soon as this becomes necessary.

Method of pain control:

- Due to the 'procedural' element of the pain (pain only with urination) Fentanyl is the first line opiate for NCA/PCA set up.
- When commencing an NCA/PCA use standard fentanyl programme / prescription titration of analgesia to meet pain is important. Both background and bolus doses frequently need increasing.
- For NCA patients the lockout period may need to be decreased depending on frequency of demand. These patient would need to be on Starlight, Apollo or HDU.
- If pain is still not controlled with 1mL bolus and 1mL/hr background of fentanyl consider addition of ketamine to the PCA/NCA syringe. Please discuss with pain team or the consultant anaesthetist on call.
- These patients often require a 'complex pain' set up on the PCA/NCA device.

Parents of these patients are taught how to use the button and strictly forbidden to press the button whilst their child is asleep.

The patients managing team will ensure the patient is hyper hydrated. Where possible urinary catheters will be inserted, however these may be contra-indicated due to the patient's clinical condition. If large clots are being passed urinary catheters can commonly become blocked, often they require frequent flushing and sometimes irrigation directly into the bladder.

Bladder spasm is managed by the patients leading team and with advice from Urology. Common medications used include (please refer to BNF for dosing unless specified otherwise):

- Oxybutynin
- Hyoscine Butylbromide [Buscopan]
- Solifenacin [Vesicare]
- Diazepam (Recommended starting dose of PO 0.1mg/kg Max 5mg QDS)

See 'Treating BK-Induced haemorrhagic cystitis in paediatric stem cell transplantation' SOP for further support. [redacted]

Amputation

Post-operative pain: stump pain, phantom limb sensations and phantom limb pain are causes of major morbidity. Developing and delivering effective analgesia is essential prior to surgery in order to enable swift recovery and rehabilitation. Good pain control in the pre-operative stage and peri-operative period reduces the incidence of chronic stump / phantom limb pain.

Method of PAIN CONTROL

Pre-surgery 1-2 weeks prior to surgery

1. If possible, commence Gabapentin at a TDS dosing regimen (see BNFC for dosing).
2. Amitriptyline 200 microgram/kg (max dose 10mg) nocte.

Perioperative

1. Regional block or local anaesthetic infusion (nerve infusion or epidural +/- fentanyl/clonidine).
2. Consider bolus only PCA/NCA if running alongside local anaesthetic infusion (if no opioid in the epidural) or with a background if local anaesthetic infusion is not possible.
3. If patients are experiencing significant pain *pre*-operatively, they are likely to experience significant chronic pain. These patients will benefit from a local anaesthetic technique. Also consider adjuncts:
    i. Ketamine bolus as part of the anaesthetic technique
    ii. Or add Ketamine to a morphine PCA/NCA
    iii. Clonidine
4. Ensure both Paracetamol and a NSAID (if not contra-indicated) are prescribed regularly.
5. Diazepam - see Paediatric acute pain guideline for doses PRN.

Step down analgesia-

1. Continue with the Paracetamol, NSAID and mild opioid and wean according to the patient's progress over a week.
2. Local anaesthetic infusion or epidural to run as per protocol
3. Keep Diazepam PRN for up to one week.
4. Continue with both Gabapentin and Amitriptyline for 1 – 3 months post-surgery. If no signs of phantom limb pain this should be weaned by either specialty team or GP over one month.

If pain is poorly controlled following discharge from the pain service, please refer back.

Scoliosis Repair

Children undergoing surgery for correction of scoliosis may have an anterior approach (thoracotomy), a posterior approach or both. Many of these children have complex conditions including cerebral palsy, congenital neuromuscular syndromes such as Nemaline myopathy. Some, however, will be 'normal' adolescents with an isolated scoliosis deformity (Adolescent Idiopathic Scoliosis, AIS). The analgesic regime for these patients is as follows -

Planned analgesia for scoliosis

1. Pre-op loading with Gabapentin on day of surgery
2. 1st line is Fentanyl PCA / NCA usually for 2 - 3 days
3. Alternatively, if an epidural is indicated due patient complexity and being unable to have IV opioid infusions, this will run for 48 hours.
4. These regimes are supplemented with regular Paracetamol, Ibuprofen and regular Diazepam 0.1mg/kg to max 5 mg QDS for spasm.
5. Step down from PCA/NCA to regular Tramadol and /or Oral morphine sulphate to enable mobilisation over the weekend.

Priority considerations

1. **Motor and sensory assessment** - Never assume that paralysis is due to the epidural. Ensure patient can wiggle toes and feel touch, if not stop epidural and follow leg weakness and onset of new pain algorithm.
2. Blood pressure – Maintenance of BP in some patients may require metaraminol. This is not a reason to stop the epidural, but it does require close observation as well as orthopaedic and pain team review.
3. Ketamine maybe added to PCA / NCA by the pain team if other regimes are inadequate.

Step down / discharge.

Tramadol or Oral morphine sulphate PRN should be available when infusion-based analgesia is stopped for at least a week. Gabapentin is continued for either 5 days or until discharge (whichever occurs first).

Section 10

Clinical Guideline

RECOMMENDED DOSES / FREQUENCY OF SIMPLE ANALGESIA AND MILD OPIOID TTA'S FOR PAEDIATRIC PAIN MANAGEMENT ON DISCHARGE.

(NOT INCLUDING Cardiac, Frames and External Fixators or Renal patients)

Analgesic medications prescribed for children on discharge from the hospital are the responsibility of the specialty team the child is under. The following is guidance on medications and doses considered suitable for children on discharge. It should also be noted that if an opioid is being dispensed the following is put in place as stated in the trust pain management policy.

> *"A post-discharge pain management plan of care should be in place for a patient taking opioids or antineuropathic medications home. The discharge information should include good communication to the patients and GP, with clear guidance and clarity over who is responsible for management of de-escalation or escalation of these medications."*

TTA's suggestion is as follows –

Paracetamol		
Babies <3 months old	PO	• Oral 15 mg/kg 4-6 hourly (max 60mg/day)
Infants / Children > 3 months	PO	• Oral 15mg/kg 4 - 6 hourly Maximum recommended dose 75 mg /kg/day, not exceeding 4g/ day.
Ibuprofen		
> 1 months old	PO	5mg/kg 6 hourly Maximum recommended dose: 30 mg/kg/day not exceeding 2400mg
IF Mild Opioid Tramadol = Suggest prescribing in aliquots of 5mg (e.g. 20 mg for an 18kg child) to make dose administration by parents easier i.e. they will have to draw up doses in either a mL or 0.5 mL increments. This is a controlled drug.		
> 1 year	PO	• 1 mg/kg 6 hourly max 400mg in 24 hours. • For tonsillectomy max 1mg/kg rounded to the nearest 5mg Beware risk of toxicity in ultra-metabolisers

Section 11

Clinical Guideline

Paediatric Burn Pain Management

Background Management for All Patients

Refer to section 1 of acute pain guidelines for dosing

Paracetamol

- Normal dose as above unless:
  Renal function = GFR < (30mL/min) then **IV** paracetamol should have an interval dose of 6- 8 hourly at normal dose.

Use in all patients. Suspend only if major LFT derangement. May need dosing frequency adjustment if mild / moderate LFT derangement.

NSAIDS

- Use Ibuprofen unless alternatives are recommended by Acute Pain Consultant.
- **Do not use** – within 48 hours of a burn >10% (>5% if child under 6 months)
- **Do not use** – within 1 week of a burn >20%
- **Do not use/stop** – if renal function is abnormal; if sepsis develops or if feed is not absorbed.

Mild Opioid see chapter 1 for dosing

Tramadol

- Normal dose as per pain guidelines unless -:
  Renal function = GFR < (20-50mlL/min) normal dose at extended intervals TDS or if GFR < (10mL/min) use 50% of normal dose at extended intervals.

Oral Morphine Sulphate

- Normal dose as per pain guidelines unless:
  Renal function = GFR < (20-50mL/min) then use 75% of normal dose. Or if GFR < (10mL/min) use 50% of normal dose at extended intervals and titrate to comfort.

Oxycodone

- Normal dose as per pain guidelines unless -:
  Renal function = GFR < (10mL/min) start with 50% of normal dose and titrate to comfort

Clonidine

Clonidine is in a group of medicines called alpha-agonists. By regulating brain activity, it has a calming effect in children and can also be used for other conditions, such as pain sleep. Side effects include drowsiness, headache, dry mouth, nausea, and vomiting

Dose - Initially 0.5–1 microgram/kg QDS, then increased if necessary up to 25 micrograms/kg daily in divided doses, increase dose gradually: maximum 1.2 mg per day

Diazepam

- Used for Muscle spasm in cerebral spasticity and postoperative skeletal muscle spasm.
- Benzodiazepines and benzodiazepine-like drugs co-prescribed with opioids can produce additive CNS depressant effects, thereby increasing the risk of sedation, respiratory depression.

Dosing: 0.1mg/kg to Max of 5 mg QDS (6 hourly)

IV Opioid - *Please use a multi- modal approach by including regular paracetamol, anti-emetics and when IV opioids are prescribed ensure Naloxone is prescribed.*

- **IV Morphine Bolus -** Give normal dose 100 – 200 micrograms /kg (see IV morphine bolus), see appendix 1
- **NCA/PCA** If pain persists or the patient is post debridement, graft or dressing changes consider PCA without background if age appropriate or NCA with small background (refer to pain service and guidance on management, prescribing / management of PCA / NCA within these guidelines).
    - **First line** morphine
    - **Second line** Fentanyl (1ST line if burn >20%)
    - **Third line Oxycodone -** This is not compatible with TPN so ensure there is suitable IV access to accommodate it.
- If Renal function = GFR < (20-50mL/min) use 75% of normal morphine dose.
- If GFR < (10mL/min) use 50% of normal morphine dose and titrate to comfort, consider Fentanyl at 50% of normal dose if GFR < (10mL/min).
- **Ketamine -** This can be a useful additional analgesia in patients where IV opioid infusion are not adequate, or the patient is experiencing significant side effects. This is added to the NCA/ PCA of opioid and on commencement the background infusion is reduce. Please see PCA guidelines section 3

Gabapentin – Added and managed by burn consultants.

Use in all burns >20%, and all patients who are itchy, Loading,

Day 1…once daily PO/NG/NJ at 5mg/kg

Day 2…12 hourly at 5mg/kg

Day 3+…8 hourly at 5mg/kg (May be further increased to 10mg/kg 8 hourly then 15mg/kg 8 hourly)

Increases should be accompanied by the addition of antihistamines (Cetirizine, then Chlorphenamine) as per BNFC guidance. End point is itch control. See full Burns Clinical Guidelines on the DMS.

Procedural Pain Management:

IN fentanyl - fentanyl 50micrograms/ml injection via the intranasal route for acute severe nociceptive pain in children and adolescents who are at least 1 year old* and weigh 10kg or more* within the Children's Emergency Department, Daisy and Dolphin wards. See appendix 2 for dosing

Entonox – for children - appr >6 years and able to self-administer**.** Entonox is a combination of 50% nitrous oxide and 50% oxygen. It is the nitrous oxide which provides the analgesic effect, the oxygen ensures the child does not become hypoxic during the procedure. It is fast acting, is taken up and eliminated very rapidly by the lungs. The elimination process occurs when the child stops using the Entonox. The gas is eliminated in an unchanged state. It has an analgesic affect after 30 seconds with a maximum effect after 2 minutes of inhalation. It is effective in treating procedural pain as there are few contraindications and it has a rapid onset with quick recovery. It can be used for any painful procedure either with or without supplementary analgesia:

Entonox should not be used more **than twice a week,** preferably with three days between doses. However, there may be rare occasions when this is exceeded – at medical discretion – within one week. See appendix 3 for prescribing and dosing

Oral opiates: - see chapter 1 for dosing

Oral morphine and/or tramadol maybe given to aid a procedure and for the pain persisting post a procedure.

IV sedation -

Procedural sedation must only take place in designated areas, with established monitoring, clinical backup and staff training. Please refer to the Clinical Guidelines: Sedation in Children and Young People. Their first non-theatre procedure should be supervised by a paediatric Consultant with advanced airway skills, to ensure adequate analgesia/ sedation. Please refer to the guidelines for further options.

[redacted]

SECTION 12

Acute Pain Management In The Children's Emergency Department And Assessing Safety Of Pre-Hospital Paracetamol Intake In Paediatrics

Guidance

(1) Pain Scoring:

Recognition and alleviation of pain should be a priority when treating ill and injured children. This process should start at the triage, be monitored during their time in the Emergency Department and finish with ensuring adequate analgesia at, and if appropriate, beyond discharge.

FLACC Pain Score (Non-verbal Child): first line used for triage

Bristol Royal Hospital for Children

The FLACC Behavioural Pain Assessment Scale

Categories	Scoring		
	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
Activity	Lying quietly, normal position moves easily	Squirming, shifting back and forth, tense	Arched, rigid or jerking
Cry	No cry, (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching hugging or being talked to, distractible	Difficulty to console or comfort

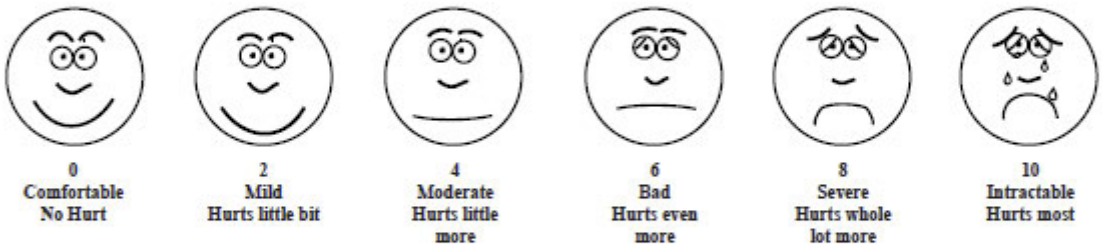
Each of the five categories is scored from 0-2, resulting in a total score between 0 and 10.

To be used for any child who is unable to report their level of pain. Please score out of ten.

Wong and Baker Faces tool (Children 4+yrs):

University Hospitals Bristol NHS
NHS Foundation Trust

Bristol Royal Hospital for Children



Faces Pain Assessment Tool

To be used for any child who can self-report their level of pain

Wong & Baker 1991

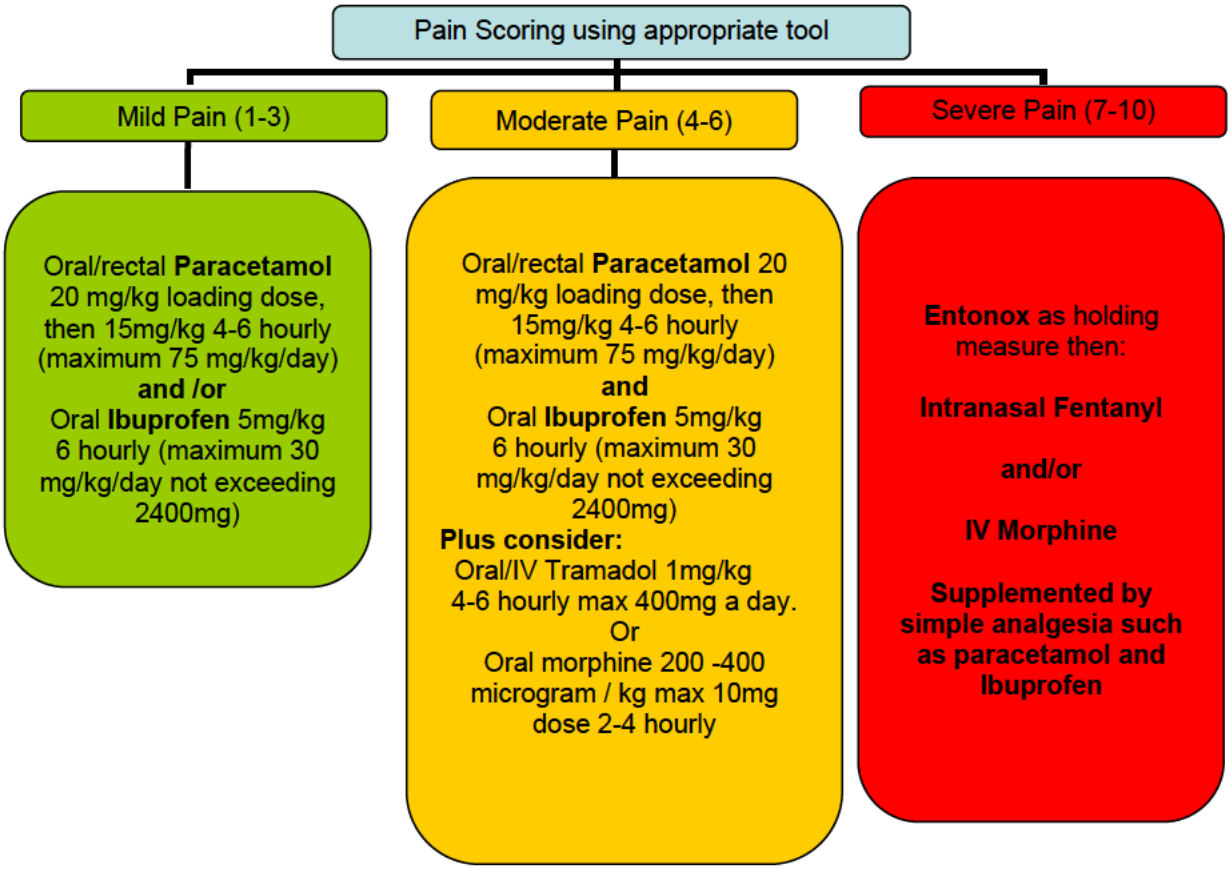
(2) Pain Management: Acute and Procedural

The use of non-pharmacological adjuncts

Psychological strategies: involving parents, cuddles, child-friendly environment, and explanation with reassurance all help build trust. Also, distraction with toys, blowing bubbles, reading, or story-telling using superhero or magical imagery to make the pain go away.

Physical strategies: such as limb immobilisation, dressings for burns.

Pharmacological agents:



Intranasal Fentanyl:

This guideline relates to the use of fentanyl 50micrograms/mL injection via the intranasal route for acute severe nociceptive pain in children and adolescents who are at least 1 year old* and weigh10kg or more* within the Children's Emergency Department, Daisy and Dolphin wards. Previously intranasal diamorphine had been the opioid of choice at BRHC for this indication. There is a supply problem with both the intranasal diamorphine (Ayendi) licensed product and diamorphine injection (which we had used intranasally prior to Ayendi becoming available). The supply problem is ongoing (as of November 2022) with no date of resupply therefore, we are using IN fentanyl.

Prescribing

For full detail of prescribing and administrations please see SOP in appendix 2

Prescribe according to weight (see table):

Weight (kg)	Dose of fentanyl (1.5 micrograms/kg)	Volume of 50 micrograms/ml fentanyl
10	15 micrograms	0.3 ml
12	17.5 micrograms	0.35 ml
14	20 micrograms	0.4 ml
16	25 micrograms	0.5 ml
18	27.5 micrograms	0.55 ml
20 - 24	30 micrograms	0.6 ml
25 - 29	37.5 micrograms	0.75 ml
30 - 34	45 micrograms	0.9 ml
35 - 39	50 micrograms	1 ml
40 - 44	60 micrograms	1.2 ml
45 - 49	70 micrograms	1.4 ml
≥ 50	75 micrograms	1.5 ml

Note – doses have been rounded to measurable volumes. Up to 0.75ml can be administered **into one nostril, over 0.75ml needs to be split between two nostrils**

When using Opiates (IV or Intranasal), observations (Heart Rate, Respiratory Rare, Saturations, Pain, Sedation scores) should be performed every 5 mins for 15 min and then every 15 mins for 1 hr. The dose should be prescribed in milligrams and the antagonist Naloxone should also be prescribed at 10 microgram/kg in case of respiratory depression and 0.5 microgram/kg in case of urinary retention/pruritis.

Links

Local anaesthetic cream:– can be prescribed under PGD

LMX4 (1st line) [redacted]

Ametop (2nd line) [redacted]

Simple analgesia:- can be prescribed under PGD

Paracetamol [redacted]

Ibuprofen [redacted]

Entonox: - can be administered under a PGD

(see SOP appendix 3 for more detail)

[redacted]

(3) Pain Reassessment:

The effectiveness of analgesia should be re-evaluated within 60 minutes of the first dose of analgesia and supplemental analgesia prescribed where there is on-going moderate or severe pain (CEM). **Reasons for analgesia refusals should be sought, reasons recorded and issues addressed at triage**

Clinical Guideline

PARACETAMOL - ASSESSING SAFETY OF PRE-HOSPITAL PARACETAMOL INTAKE IN PAEDIATRICS

SETTING	Bristol Royal Hospital for Children
FOR STAFF	Prescribers, nurses and pharmacists
PATIENTS	Paediatric patients who have been taking paracetamol pre admission (NB. **Excludes neonates** i.e. less than 45 weeks postmenstrual age)

GUIDANCE – see also "Useful Resources" at the end of this guideline

Patients presenting to hospital may have been either self-treating with paracetamol or been given it by their families prior to admission. This guideline is to aid staff in assessing the appropriateness of the pre-hospital paracetamol dosing and to help identify patients who have received a therapeutic excess.

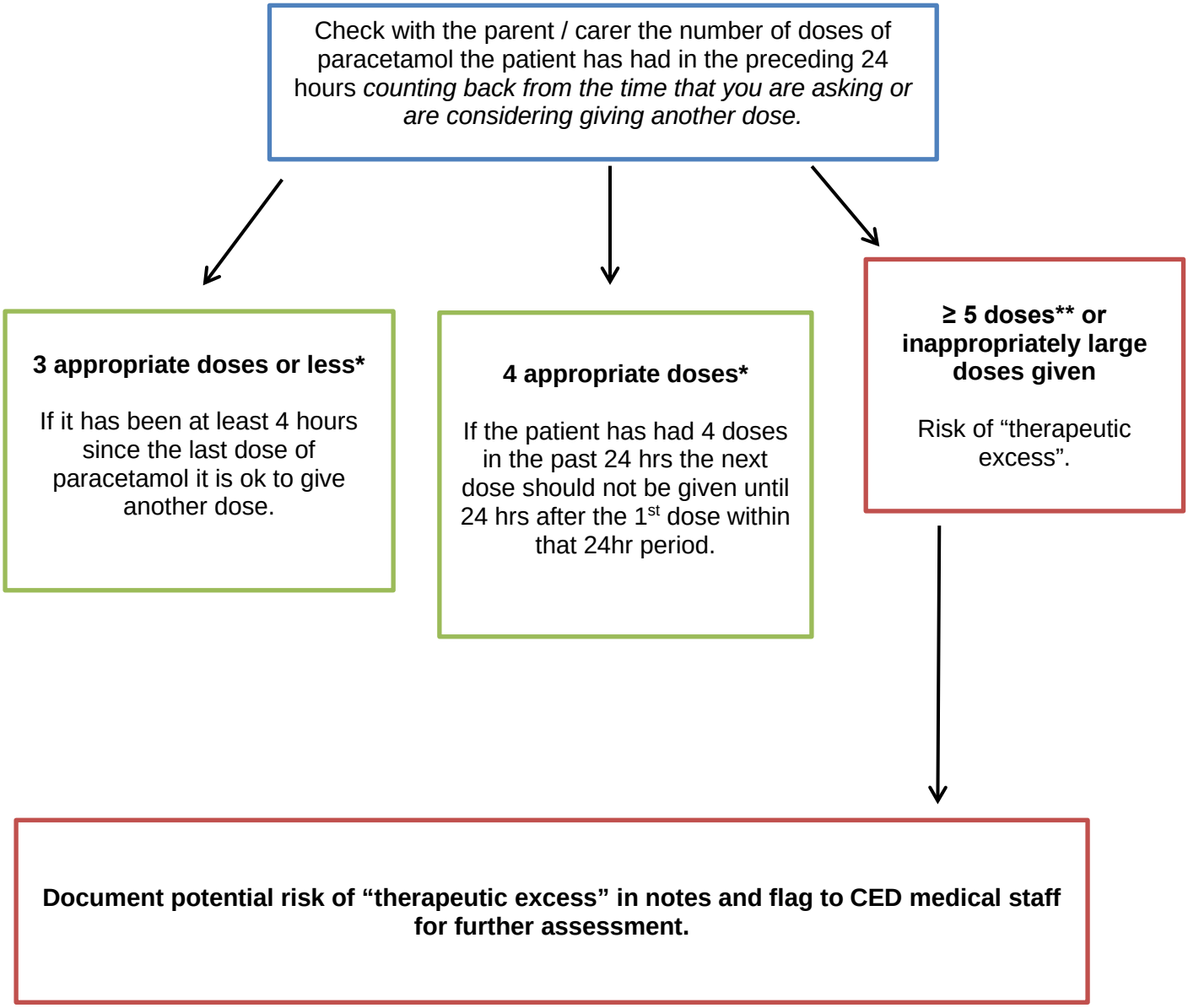
Therapeutic excess is defined as an excess of paracetamol with intent to treat pain or fever (N.B. without self-harm intent). The flowcharts within this guideline are based on the Toxbase paracetamol monograph for therapeutic excess and the paracetamol dosing within the [redacted].

Please note that the pain team may *occasionally* discharge patients >3months old home on doses of paracetamol up to 75mg/kg/day (not exceeding 4g/day) in 5 divided doses for up to 72 hours. **This pathway does not apply to this group of patients.**

At triage follow flowsheet 1. If a patient found to be at risk of therapeutic excess please flag this to a member of the medical team so that they can formally assess the patient using flowsheet 2.

If there is uncertainty about whether the presentation was due to therapeutic excess (e.g. the excessive dose ingested may have been deliberate, with an intention to harm), the patient should be managed as a **staggered paracetamol overdose** (non-therapeutic ingestions of excessive paracetamol over a period of more than one hour). See Toxbase - paracetamol staggered overdose.

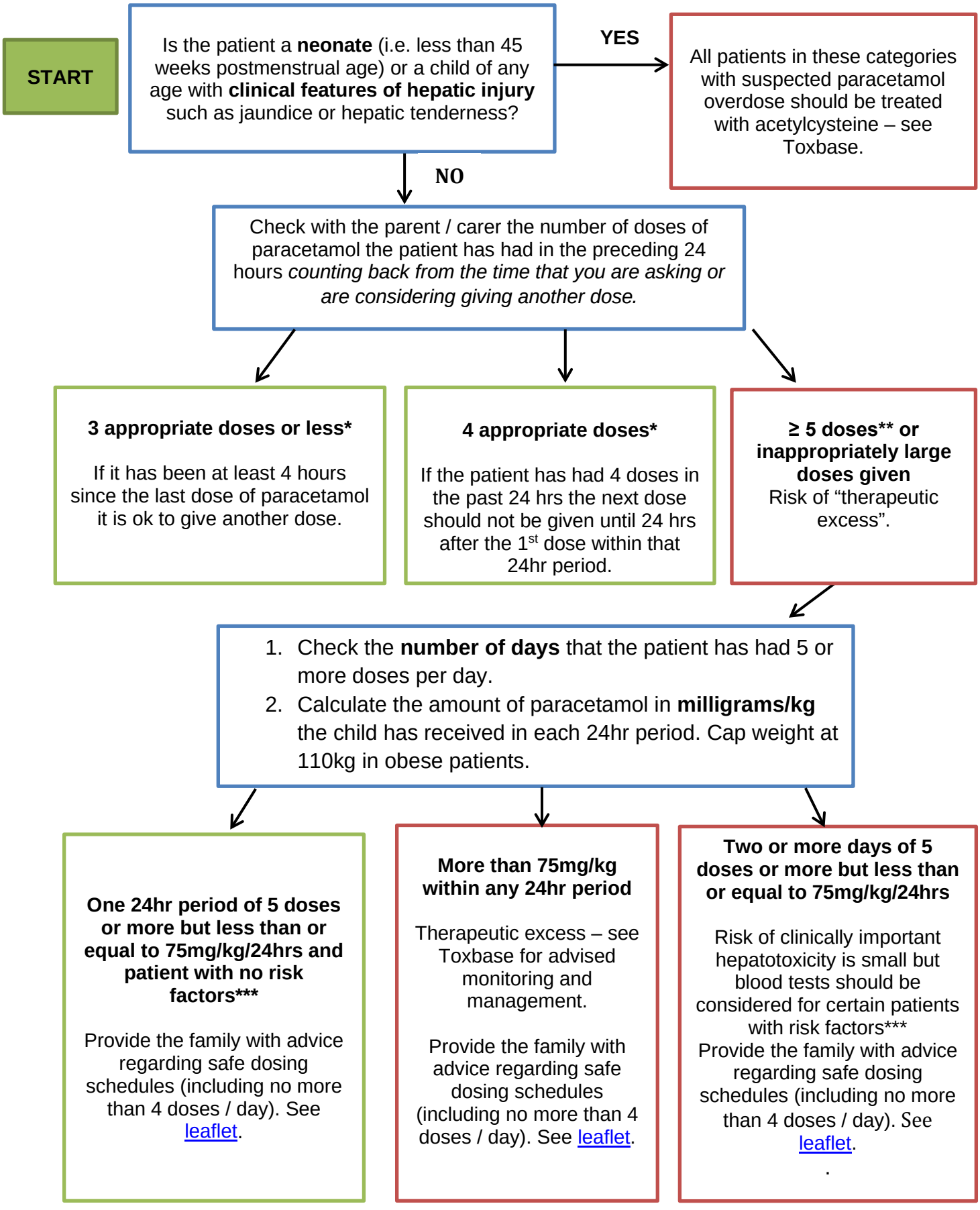
Flowsheet 1: assessment of pre-hospital therapeutic paracetamol ingestion at triage



***All actions above assume that a reliable history can be obtained from the parents – if not the assessor should use their own clinical judgement about the need for further assessment.

****The pain team may occasionally discharge patients > 3months old home on doses of paracetamol up to 75mg/kg/day (not exceeding 4g/day) in 5 divided doses for up to 72 hours. **This pathway does not apply to this group of patients.**

Flowsheet 2: assessment of pre-hospital therapeutic paracetamol ingestion by medical staff



*All actions above assume that a **reliable history** can be obtained from the patient or parents – if not the assessor/clinician should use their own clinical judgement about the need for further assessment.

The pain team may occasionally discharge patients > 3months old home on doses of paracetamol up to 75mg/kg/day (not exceeding 4g/day) in 5 divided doses for up to 72 hours. **This pathway does not apply to this group of patients.

***Patient groups with risk factors for hepatotoxicity**:

- Long term treatment with enzyme inducing drugs e.g. phenobarbital, phenytoin, rifampicin
- Regular consumption of alcohol
- Likely glutathione depletion e.g. eating disorders, CF, HIV, starvation, cachexia

Notes

- **Neonates** (i.e. less than 45 weeks postmenstrual age) may be more susceptible to paracetamol-induced liver toxicity therefore treatment with acetylcysteine is recommended in all paracetamol overdoses.
- All patients with **clinical features of hepatic injury** (e.g. jaundice, abnormal LFTs or hepatic tenderness) should be treated urgently with acetylcysteine.
- To avoid underestimating the potentially toxic paracetamol dose ingested by **obese children** who weigh more than 110 kg, use a body-weight of 110 kg (rather than their actual body-weight) when calculating the total dose of paracetamol ingested (in mg/kg).

Useful resources / contacts:

Paracetamol information leaflet for parents / carers

Toxbase

Toxbase paracetamol monograph

Toxbase paracetamol monograph - therapeutic excess

[redacted]

Royal College of Emergency Medicine Guidance - paracetamol overdose

Local Poisons Information Service (UK NPIS) - 0344 892 0111

References

Toxbase paracetamol monograph [Accessed Oct 2021]

Toxbase paracetamol monograph - therapeutic excess [Accessed Oct 2021]

[redacted] [UHB Version 13 Accessed Oct 2021]

RELATED DOCUMENTS [redacted]

AUTHORISING BODY Paediatric Emergency Department Governance Group

SAFETY QUERIES Contact: [redacted] (Paediatric Medicine Pharmacist) (updated by [redacted] Paed Pharmisit) Ext [redacted] / Careflow BRCH Paed Pharmacy Team Mon-Fri, 8.30-5pm or Oncall pharmacist (via switchboard) out of hours. Local Poisons Information Service (UK NPIS) [redacted] available 24hrs.

Section 13
Chronic Pain Management
[redacted]

Chronic pain

By definition chronic pain has been persisting for more than 3 months. This may include chronic widespread or localised musculoskeletal pain, congenital or acquired neuropathic pain, headaches, abdominal pain, back pain, Complex Regional Pain Syndrome (CRPS), persistent post-operative pain, chronic illness-related pain with poor response to treatment, and pelvic pain.

Children and Young Persons Chronic Pain Clinic

The Pain Clinic is provided by the Bath Centre for Pain Services. The National Centre for pain rehabilitation interventions for people of all ages, from children to older adults, with chronic pain.

Pain rehabilitation helps individuals to live well in the presence of ongoing pain. We do not aim to get rid of, or reduce pain. Children and young people of all ages with chronic pain can be referred to the national service at the Bath Centre for Pain Services. For children and young people under the care of a Bristol Children's Hospital consultant, they can also be referred to the Chronic Pain Clinic.

What does the Pain Clinic offer?

Patients will have an interdisciplinary assessment with a paediatrician with expertise in Chronic Pain, a specialist pain clinical psychologist and a specialist pain physiotherapist. The assessment includes a medical evaluation, a full family and psychosocial history and a medication review. The assessment clinic runs monthly, and sees six patients per month. One of those slots is kept for urgent appointments.

Treatment is provided by experienced clinicians from The Bath Centre for Pain Services. We use an acceptance and commitment therapy approach, the model of choice for pain, supporting patients to become fitter and more active in the presence of pain.

What interventions are offered?

There is no medical treatment to cure chronic pain. Medications will be discussed but usually are not particularly helpful in managing chronic pain. The aim of our clinic is to help children and young people live well even with chronic pain persisting. Research has shown that this is most effectively achieved by a biopsychosocial approach, combining physiotherapy, to help with overall body conditioning, with psychological support.

Outpatient appointments with the pain psychologist, or physiotherapist, or both may be offered for a fixed time period (maximum 6 appointments).

Who to refer?

We accept referrals for Children and young people with chronic pain regardless of cause. They must have completed all appropriate local treatment options. This may

include CAMHS (Child and Adolescent Mental Health Services) and physiotherapy. They must have completed all appropriate investigations and treatment options.

We are unable to see patients on the ward or provide chronic pain rehabilitation for inpatients. We can see such patients once discharged.

We cannot accept referrals for patients who are:

- Due to have further medical investigations or medical/surgical treatment.
- Suffering from mental health problems which require current treatment (e.g. active psychosis, suicidal intent). We can treat people who have a stable mental health condition and/or have suicidal ideation but low intent.

How do I refer?

The care pathway has been set up for patients under the care of a Bristol Children's Hospital Consultant. Referrals therefore should come from the responsible Consultant.

Please write a referral letter to [redacted] or [redacted] at the Bath Centre for Pain Services. If the referral is **urgent** please email:

[redacted] or [redacted]

Please note: in order to accept a referral for your patient, you will need to include:

- Copies of all clinical letters from all of the local services that have been involved in the patient's pain (such as Pain Consultants, Orthopaedic Surgeons, Rheumatologists, Adult/Adolescent Mental Health etc.) within the last year.
- Copies of all clinical discharge letters from any previous admissions that the patient may have had.
- A comprehensive recent summary and reason for referral to the pain clinic.

For more information on Bath Centre for Pain Services, please visit our website:

http://www.bathcentreforpainservices.nhs.uk/

Tel: 01225 821181

Section 14
Resources

Document	Date of Last Review	Review Due
An Epidural for Children (Patient Information Leaflet) (PIL)	Sept 2020	Sept 2023
Peripheral nerve block and infusion (PIL)	July 2020	July 2023
Caudal (PIL)	July 2022	July 2025
PCA and NCA for Children (PIL)	Oct 2020	Oct 2023
Caring for your child after tonsillectomy and/or adenoidectomy (PIL)	May 2021	May 2024
Coping with Children's pain following discharge from hospital (PIL)	April 2019	April 2022
Entonox (PIL)	Oct 2020	Oct 2023

Policy/Document	Date of Last Review	Review Due
Co-administration of opioids and blood transfusion/products via the same intravenous access (SOP) (V4.2)	Sept 2020	Sept 2025
Pain Assessment and Management Policy (V1.4)	Sept 2020	Sept 2023
Clinical Guidelines: Nursing management of Opioid Administration via PCA/NCA or continuous infusion (V2.2)	April 2022	April 2025

Clinical Guidelines: Sedation in Children and Young People (V2)	Oct 2020	0ct 2023
Clinical Guidelines: Nursing management of Local Anaesthetic infusion for infants and children (V2)	Oct 2020	Oct 2023
Clinical Guideline: Nursing management of opioid or Benzodiazepine withdrawal Syndrome – Prevention and Management of Weaning Following Discharge from PICU (v1)	August 2022	March 2025
Policy/Document	**Date of Last Review**	**Review Due**
Clinical Guidelines: Sedation in Children and Young People: Nursing Checklist	May 2022	May 2024
Oral Sucrose solution prior to minor painful procedures in babies under 3 months (V1.2)	August 2024	November 2024
Clinical Guideline: Y- Site Compatibility of Intravenous infusion (V3.1)	July 2020	July 2020
Standard Operating Procedure (SOP): Opiate or Benzodiazepine withdrawal Syndrome – Prevention and Management of Weaning Following Discharge from PICU	August 2022	May 2025

Document	Date of Last Review	Review Due
Competency IV Morphine Bolus (V3)	August 2021	August 2024
Competency Paediatric Pain Assessment (V4)	November 2020	November 2023
Paediatric Pain Assessment Criteria (V4)	August 2021	August 2024
PAEDIATRIC Bodyguard 575, McKinley PCA volumetric pump competency	January 2021	Jan 2023
PAEDIATRIC Bodyguard 575 PCA Assessment Criteria (V2.2)	April 2021	April 2024
Entonox Administration Training Pack(V5)	July 2020	July 2023
PAEDIATRIC Entonox Administration Competency (V2)	July 2021	July 2024
PAEDIATRIC Entonox Administration Assessment Criteria	July 2021	July 2024
Directed Study Pack for Registered Nurses Caring for Paediatric Patients Receiving - Epidural, Paravertebral and Wound Infusion and Nerve Infusion (V8)	April 2020	April 2023
Competency Paediatric Local anaesthetic infusion Clinical management	November 2020	November 2023
PAEDIATRIC Local anaesthetic Bodyguard 545 McKinley volumetric pump competency (V2)	May 2020	May 2023
Local anaesthetic Bodyguard 545, McKinley Assessment Criteria	April 2021	April 2023
Clinical Guideline: Pain Management for children receiving Palliative care	June 2020	June 2023

Additional resources -ON-LINE e-Learning		
On- line PCA/NCA pump Training	[redacted]	[redacted]
On-line LA infusion pump Training	[redacted]	

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Carbajal R, Chauvet X, Couderc S, Olivier-Martin M. Randomised trial of an anlgesic effects of sucrose, glucose, and pacifiers in term neonates. BMJ (1999); 319:1393-7.

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Guideline adapted from: College of Emergency Medicine - Guideline for the management of pain in children http://www.collemergencymed.ac.uk/ShopFloor/Clinical%20Guidelines/Clinical%20Guidelines.asp

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Appendix 1

Clinical Guideline

Single Dose Intravenous Morphine Bolus

[redacted]

Single Dose Intravenous Morphine Bolus	
Purpose	
To provide a guide to enable a bolus of intravenous morphine to be administered which will give timely and effective pain relief to children.	
Indications for use	
• Single dose IV morphine bolus is to be used for the management of severe pain, related to medical / surgical conditions or for the management of anticipated procedures (for example chest drain removal) • It is not to replace an opioid infusion or PCA / NCA. If the child is likely to have ongoing pain that requires IV morphine, an infusion or PCA / NCA should be established.	
Precautions	
• If the child is receiving other medication that may cause sedation (e.g. antihistamines, benzodiazepines or anticonvulsants) a smaller dose may be required. • This does not mean that analgesia should be omitted, however the staff administering the morphine bolus should be aware of the increased risk of sedation-induced respiratory depression. Other children at risk of sedation-induced respiratory depression are those with central neurological disease; sleep apnea, pre-existing respiratory failure, cardiac, hepatic or renal failure.	
Who can administer iv bolus morphine	
• Medical staff. • Nursing staff who are IV trained and have completed a clinical competency on the administration of IV bolus morphine.	
Prescription and Administration	
< 1 month	Only to be administered on NICU, PICU or the Emergency Department by medical staff and nurses who have completed the clinical competence (a member of the medical staff must be available in the clinical area whilst the bolus dose is given).
1 - 12 months	titrate up to a maximum of 100 micrograms/kg
> 12 months	titrate up to a maximum of 200 micrograms/kg

Dilute **to** 5 or 10ml in 0.9% sodium chloride and administer over five to ten minutes, titrate final dose to comfort.

- Check the patency of the cannula prior to drawing up the morphine.
- As per UHBW drug policy and using ANTT process, ensure that the syringe containing the morphine is clearly labelled.
- The doctor must assess the child prior to prescribing a morphine bolus.

The dose should be prescribed in milligrams and the antagonist Naloxone should also be prescribed at 4 – 10 micrograms / kg for respiratory depression and be available in the clinical area.

Monitoring morphine bolus

The following should be recorded in the general observation chart (which has all variables for scoring on the cover).

Prior to administration of the morphine bolus, a baseline set of observations should be recorded and the sedation level should be 1 or less.

Ensure the patient has pulse and saturation monitoring throughout the procedure.

<table>
<tr><td>< 1 month</td><td colspan="2">• Dose as identified above.
They have an increased risk of opioid induced respiratory depression. This patient group should have continuous respiratory monitoring after any bolus opioid administration for 6 hours</td></tr>
<tr><td rowspan="6">> 1 month</td><td colspan="2">During the bolus and every 5 minutes for the first fifteen minutes:</td></tr>
<tr><td>Heart Rate</td><td rowspan="5">Should be recorded.
Thereafter the observations should be at
• 15-minute intervals for 1 hour and then
hourly up to 4 hours following the last bolus dose</td></tr>
<tr><td>Respiration Rate</td></tr>
<tr><td>Oxygen saturation</td></tr>
<tr><td>Pain Score</td></tr>
<tr><td>Sedation level</td></tr>
</table>

Complications (With the exception of NICU which has a unit guideline for intubation following morphine administration)

If increased sedation level (3+) or respiratory depression is observed or suspected:

- STOP administering the morphine bolus.
- Attempt to rouse the patient.
- STOP any other infusion that could be contributing to the sedation.
- Administer 100% oxygen.
- Call for medical help or the arrest team via switchboard on [redacted] if appropriate.
- Check circulation. If pulseless start cardiopulmonary resuscitation.

- Prepare Naloxone and administer as prescribed and repeat at 2-minute intervals until rousable.
- **Inform the acute pain service of any complication in the administration and monitoring of patients receiving IV bolus morphine**

Reference

RELATED DOCUMENT Paediatric analgesia acute pain guidelines

SAFETY It is essential that children who have had opiate analgesia have regular observations, and also naloxone prescribed and available prior to administration

QUERIES Contact [redacted] CNS Paediatric pain management [redacted]

Version 3 From: July 2022 – To July 2024

Appendix 2

Clinical Standard Operating Procedure (SOP)

Intranasal Fentanyl

[redacted]

SETTING	Bristol Royal Hospital for Children – Emergency department, Daisy and Dolphin wards
FOR STAFF	Prescribers, nurses and pharmacy staff
PATIENTS	Use for acute severe nociceptive pain in children (≥1 year) and adolescents (who weigh 10kg or over)

Purpose of guideline

This guideline relates to the use of fentanyl 50micrograms/ml injection via the intranasal route for acute severe nociceptive pain in children and adolescents who are at least 1 year old* and weigh 10kg or more* within the Children's Emergency Department, Daisy and Dolphin wards.

Previously intranasal diamorphine had been the opioid of choice at BRHC for this indication. There is a supply problem with both the intranasal diamorphine (Ayendi) licensed product and diamorphine injection (which we had used intranasally prior to Ayendi becoming available). The supply problem is ongoing (as of November 2020) with no date of resupply therefore we are using alternative preparations for patients with acute pain.

Standard Operating Procedure

Prescribing

Contra-indications:

- Opiate allergy
- Recent significant head injury
- Altered GCS
- Epistaxis
- Airway / respiratory compromise
- Bilateral occluded nasal passage
- <1 year old*
- <10kg*

*There is no clinical experience of using intranasal fentanyl in under 1 year olds/ under 10kg therefore use alternative analgesia

Prescribe according to weight (see table):

WEIGHT (KG)	DOSE OF FENTANYL (1.5 MICROGRAMS/KG)	VOLUME OF 50 MICROGRAMS/ML FENTANYL
10	15 micrograms	0.3 ml
12	17.5 micrograms	0.35 ml
14	20 micrograms	0.4 ml
16	25 micrograms	0.5 ml
18	27.5 micrograms	0.55 ml
20 - 24	30 micrograms	0.6 ml
25 - 29	37.5 micrograms	0.75 ml
30 - 34	45 micrograms	0.9 ml
35 - 39	50 micrograms	1 ml
40 - 44	60 micrograms	1.2 ml
45 - 49	70 micrograms	1.4 ml
≥ 50	75 micrograms	1.5 ml

Note – doses have been rounded to measurable volumes. Up to 0.75ml can be administered into one nostril, over 0.75ml needs to be split between two nostrils.

Administration

- Ensure baseline observations have been taken (see below)
- Use fentanyl 100 micrograms/ 2 ml injection (=50 micrograms/ml concentration). No dilution is required.
- Withdraw the correct dose as per the table above AND an additional 0.1ml to allow for priming of the mucosal atomization device (MAD nasal) into a syringe
- Attach the MAD nasal to the syringe using a luer lock.
- Prime the MAD nasal into a tissue, discard the tissue into the clinical waste.
- Check the final volume on the syringe matches with the dosing table and the prescription.
- Up to 0.75ml can be given into one nostril, over 0.75 ml needs to be split between 2 nostrils.
- Position child at 45 degree angle
- Tilt child’s head back.
- Hold syringe in a horizontal position
- Expel syringe with firm application of pressure

- DO NOT ask patient to sniff contents

Monitoring

Observe all patients for at least 30 minutes following administration.

Take the following observations at baseline (before intranasal fentanyl administration) and at 10 mins and 30 mins after administration:

- Oxygen saturations
- Heart rate
- Respiratory rate
- APVU
- Pain score

Note - If IV opiates already given within 4 hours there could be higher chance of complications therefore closer observation and monitoring needed.

Side effects

Side effects are uncommon, but may include:

- Respiratory depression
- Hypotension
- Nausea and vomiting
- Pruritus
- Chest wall rigidity (only reported in large intravenous doses)

Treatment of overdose includes:

- Airway support and oxygen
- Assist ventilation
- Consider naloxone bolus 10 micrograms/kg IV (or IM if no access*), repeated at 1 minute intervals to maximum 2mg

* Naloxone can be given by IM injection; however the IV route is preferred. Given by IM injection, onset of action of naloxone is approximately 3-4 minutes and duration is 18 hours. The onset is approximately 2 minutes if given IV, but duration is only 3-4 hours.

Note - Naloxone dosing is as per the paediatric pain guideline (which differs from the BNFc)

Table A

REFERENCES	• UHW ED, 2019. Paediatric Intranasal Pathway (University Hospitals Wales) • UpToDate - Fentanyl paediatric drug information, Analgesia for minor procedures/sedation [Accessed December 2019] • UpToDate - Pharmacologic agents for pediatric procedural sedation outside of the operating room [Accessed December 2019] • APPM formulary 5th Edition 2020 Available at: www.appm.org.uk • Borland, M., et al., *A randomized controlled trial comparing intranasal fentanyl to intravenous morphine for managing acute pain in children in the emergency department.* Ann Emerg Med, 2007. **49**(3): p. 335-40

	• Borland, M.L., I. Jacobs, and G. Geelhoed, *Intranasal fentanyl reduces acute pain in children in the emergency department: a safety and efficacy study.* Emerg Med (Fremantle), 2002. **14**(3): p. 275-80. • Setlur, A. and H. Friedland, *Treatment of pain with intranasal fentanyl in pediatric patients in an acute care setting: a systematic review.* Pain Manag, 2018. **8**(5): p. 341-352. • Evelina paediatric formulary, Naloxone monograph, available at: http://cms.ubqo.com/public/d2595446-ce3c-47ff-9dcc-63167d9f4b80 [Accessed Dec 2019]
RELATED DOCUMENTS AND PAGES	• Paediatric acute pain guideline [redacted] • Medicines code chapter 5 - Controlled drugs SOP [redacted] • Medicines code chapter 5 - Controlled drugs policy [redacted]
AUTHORISING BODY	Children's Emergency Department Business meeting
SAFETY	Nurses must be trained and competent to administer. Follow controlled drug regulations with regards to storage, administration and documentation.
QUERIES AND CONTACT	Contact Children's Emergency Department on ext [redacted]. Paediatric Medicine Pharmacist bleep [redacted] / ext [redacted] or Paediatric Acute Pain Team bleep [redacted] / ext [redacted]

Appendix 3

Clinical Guideline

PAEDIATRIC ADMISTRATION OF ENTONOX

SETTING Bristol Royal Hospital for Children (BRHC)

FOR STAFF All registered practitioners

PATIENTS All child patients

Background

Entonox is a combination of 50% nitrous oxide and 50% oxygen. Entonox is an effective analgesic agent which has a rapid onset of action and is eliminated rapidly (unchanged) by the lungs. It is a predictable and reliable form of analgesia for painful procedures, which is patient controlled minimising the occurrence of side-effects.

The exact analgesic mechanism of Entonox is not fully understood. Nitrous oxide is thought to provide analgesia by stimulating the release of androgenous neurotransmitters with the central nervous system (CNS). There is also evidence that it activates opioid receptors within the periaqueductal grey matter (PAG) and activation of alpha-2 adrenoceptors within the Dorsal Horn modulating the descending pain pathways.

Who can administer Entonox?

It needs to be either prescribed by a registered medical practitioner or administered under a PGD. This is prescribed on the front of the drug chart under the 'once only' section.

It can be administered by a registered nurse or allied health professional who:

- Have been practicing for a minimum of 6 months.
- Have undergone Entonox training and supervised practice until they are deemed competent to safely administer / supervise a child using Entonox.
- Have undergone medical gasses online teaching.

Indications for use

Entonox is used when immediate and temporary analgesia is required for moderate to severe pain, without loss of consciousness. It can be used with or without supplementary analgesia such as Oramorph or Tramadol. See Table 1 below, containing suitable procedures where Entonox could be used (Not this is not an exhaustive list):

Suggested procedures for Entonox administration		
Dressing changes	Application of traction	Lumbar puncture
Drain removal	Removal of K-wires	Incision and drainage of collection

Application of POP	Physiotherapy	Cleaning of pin sites
Suturing / stitch removal	Removal of foreign body	Fracture manipulation

Contraindications

Entonox is not to be used if:

- The patient has a decreased level of consciousness (head injury, intoxication, etc.).
- Generalised severe infection.
- Carbon dioxide poisoning or decreased oxygen drive.
- Severe gastro-oesophageal reflux.
- If there is potential for trapped air within a patient's body cavity and expansion of that space may be dangerous (Nitrous oxide rapidly diffuses into the space increasing its size). Examples include:
  - Artificial, traumatic, or spontaneous pneumothorax
  - Gross abdominal distention
  - Air embolism
  - Following middle ear surgery or children with middle ear pain/complications

Cautions

Caution should be taken for the following patients and an assessment of the patients by a medical practitioner should be carried out prior to the administration of Entonox:

- Maxilla-facial injuries
- Abdominal pain
- Bone marrow abnormalities
- Chronic lung disease or cardiac failure
- Patients receiving medications which depress the central nervous system

Side effects and management

Most side-effects of Entonox are minimal and short term.

Side-effect	Management
Nausea and/or dizziness	Patient should be encouraged to breathe away from the Entonox until nausea subsides.
Euphoria and/or uncontrolled giggling	Cessation of Entonox administration will resolve effect.
Sedation	Patient should be encouraged to breathe away from the Entonox until sedation improves.
Tingling sensation in peripheries and/or lips	This is a sign of hyperventilating. Encourage the patient to take slow deep breaths.

Entonox should not be administered more frequently than twice a week (ideally with 4 days between doses or exceeding continuous administration time of 24 hours). Patients who have received Entonox or other nitrous oxide products regularly or for prolonged periods must have haematological monitoring. Regular / long-term use can result in:

- Inhibition of the enzyme methionine synthetase affecting vitamin B12 synthesis.
- Interference with folate metabolism and DNA synthesis which impairs bone marrow function. Evidence of megaloblastic changes of the red cells and hypersegmentation of neutrophils.
- Spinal cord atrophy.

Equipment and Storage

- Cylinder's can be found in the following clinical areas:
  - Apollo ward
  - Penguin ward
  - Puzzlewood
  - ED
  - Carousel outpatients
- Pipped Entonox is used in Daisy burns assessment room and Rainforest outpatients.
- The Entonox cylinder is identified by the blue and white striped collar and 'Entonox' written up main body of the cylinder. Entonox pin site is specific to the tubing used for the administration to reduce risk of wrong gas administration.
- The cylinder must be kept free from lubricants including oil or grease.
- It must be stored and used in a well ventilated area.
- When not in use, the cylinder should be stored in a secure area: either locked to a wall or in a locked room.
- The cylinder can be supplied by portering staff who are trained in the storage and transport of medical gases.
- Administration equipment includes:
  - tubing with handpiece
  - HME filter (1 per patient)
  - mouth piece or facemask (1 per patient)

Administration of Entonox

- Verbal consent should be obtained from the child and carers.
- The child and carers should be prepared for the procedure and administration of Entonox (Patient information leaflets are available).
- Ensure procedure being carried out in a well-ventilated area. Oxygen, suction, resuscitation facilities and monitoring should be available and easy to access.
- Ensure Entonox either prescribed or administered under a PGD.
- Consider the requirement of supplementary analgesia for during and/or post procedure.
- To be nil by mouth for 1 hour prior to the procedure (if it is a planned procedure).
- One nurse or allied health professional should be allocated to administer the Entonox and monitor the child during the procedure.

- The Entonox should be commenced at least 2 minutes prior to the commencement of the procedure.
- Maintain verbal contact with the child and allow self-administration.
- The child will be fully recovered within 10 minutes after stopping the administration of Entonox. If appropriate the child may be discharged home 15 minutes after the administration provided they are alert, orientated and able to communicate and mobilise as they would usually.
- The cylinder must be switch off and excess gas should be purged from the administration set. Ensure the cylinder is returned and secured.
- Document Entonox use with the medical notes.

REFERENCES	Boc Entonox Essential Guide
RELATED DOCUMENTS AND PAGES	[redacted]
AUTHORISING BODY	Clinical Effectiveness Group
QUERIES AND CONTACT	Paediatric Acute Pain Service [redacted]
AUDIT REQUIREMNTS	Included as part of teaching and pain study days.

Plan Elements	**Plan Details**
The Dissemination Lead is:	Sarah Parry
Is this document: A – replacing the same titled, expired	
This document is to be disseminated to:	BRCH all staff
Method of dissemination:	Email update
Is Training required:	As part of current training programme.

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