

Paediatric Acute Postoperative Pain and PCA Guidelines

Paediatric PCA: Patient Controlled Analgesia

These guidelines have been designed to provide evidence-based information on analgesia however, they are guidelines only and these recommendations may not be appropriate for use in all circumstances. If in doubt discuss with the acute pain service, anaesthetist or the responsible clinician.

Aim

To enable the child to safely operate and administer analgesia, e.g. morphine, via a Patient Controlled Analgesia Device (**Alaris IVAC PCAM syringe pump**) under the supervision of trained staff.

Patient criteria for using PCA: all 3 must be met

1. Age 5 years and over.
2. The child can physically operate the PCA device.
3. The child has a basic understanding of what happens when the PCA button is pressed.

Minimum Requirements for care of child on PCA

1. Staff appropriately trained in use of Alaris IVAC PCAM PCA device.
2. Hourly recordings carried out as per PCA prescription and observation chart.
3. Continuous pulse oximetry.
4. Daily visit by member of pain control team (*Pain Nurse or Anaesthetist*).
5. Use dedicated cannula or anti-reflux valve if on IV fluids.
6. Resuscitation equipment available.
7. Naloxone available on ward (*dose: see below and/or BNFC dosing for reversal of post operative respiratory depression*).

Prescription and preparation

IV Patient Controlled Analgesia with morphine (IVPCAM)

Use dedicated anti-syphon and anti-reflux extension set (*for example Alaris Extension Set [Ref 30852]*) Maintenance fluids can be run using the y connector on the PCA extension set via an infusion pump and with anti reflux valve on the line this will avoid reflux and unintended morphine bolus with intravenous fluids.

Only medical or nursing staff who have completed Alaris IVAC PCAM competency based training can programme the pump and/or change syringes in the Alaris PCAM Device. This requires 2 trained nurses who must both check prescription and preparation of drug syringe and device settings.

Only the acute pain nurse or an anaesthetist can program (*or reprogram*) and initiate a PCA on the paediatric ward, and they are required to check the prescription, syringe preparation and pump settings with a staff member who has received PCA training and is competent to facilitate this arrangement. In the setting of uncontrolled severe acute pain when neither of these individuals is available then it will be necessary, if simple analgesia is ineffective, to titrate a loading dose of intravenous morphine in 50microgram per Kg increments, 5 to 10 minutely to max 200micrograms/Kg with continuous monitoring.

Syringe Preparation

When commencing a Paediatric PCA - Theatre recovery staff may use 50mg in 50ml vials for preparation if child of weight above 50kgs. For changing syringe within Paediatric Ward the monograph (Appendix 1) will be used.

See Appendix 1: Morphine for Patient Controlled Analgesia in Paediatrics syringe preparation monograph. Our current stock leur lock syringe is BD Plastipak.

Settings for IVPCAM via the Alaris IVAC PCAM syringe driver

Bolus dose:	1 ml bolus, with above dilution, 20microgram/Kg bolus
Lockout interval:	5 minutes
Morphine Solution Concentration:	20microgram/Kg/ml
Loading dose:	Zero usually (<i>as should be loaded with intravenous titrated morphine already in theatre or if required for ward patient as PCA inevitably takes time to set up on ward suggest load separately with iv morphine prior to PCA as above</i>)
Background infusion:	Zero usually (<i>only consider a background of 4 micrograms/Kg/hr = 0.2ml per hour which can be useful in the first 24hours post op to improve sleep pattern</i>)

Always ensure you select correct make of 50ml leur lock syringe when programming pump.

Patient Controlled Analgesia Observations

From Theatre

When collecting a child from theatre, the ward nurse is responsible for checking the following details are complete:

Checklist

1. CHART: PCA prescription and observation chart:

- a. Patient details correct. Name, Chi Number, date of birth.
- b. Doctors prescription legible: Drug name, concentration, bolus dose, lockout and doctors signature.
- c. Form dated & timed.
- d. Drug Batch number and PCA device Serial Number recorded
- e. 2 loaders signatures
- f. First set of observations completed

2. DEVICE: PCA device.

Syringe clearly labelled with

- a. Patient name.
- b. CHI Number.
- c. Drug Name, Dose & Batch number.
- d. Date & Time prepared.
- e. Date & Time of expiry (*24 hours*).
- f. 2 loaders signatures.

Program, check device program matches PCA prescription and observation chart.

3. CARDEX: Check Prescription on cardex of:

- a. PCA.
- b. Co-analgesia. (*Paracetamol +/- NSAID*)
- c. Anti-emetic.

4. Once above details are correct, both ward and theatre nurse to sign anaesthetic form.

On return to Ward the following observations must be carried out hourly:

- a. Respiratory rate.
- b. Saturation rate (*continuous*).
- c. Temperature - can decrease to 4hrly prn.
- d. Pulse.
- e. Blood pressure can decrease to 4hrly prn.
- f. Pain score (*see pain assessment chart*).
- g. Sedation score.
- h. Nausea and vomiting score.
- i. Total dose infused and check intravenous cannulation site.
- j. Volume remaining in syringe.
- k. Signature.

6. Total dose Infused:

- ❖ Record hourly the total dose infused and volume remaining in the device.
- ❖ If a new syringe is required this may be prepared by the ward nurses and changed if they have passed the Alaris IVAC PCAM competency training otherwise contact acute pain team or if unavailable on call anaesthetist.
- ❖ PCA syringes should be changed every 24 hours if prescription to continue.
- ❖ PCA giving sets can be in situ for up to 72 hours and then require renewal if prescription to continue.

7. IV Site: Check site hourly for any problems.

On discontinuation of PCA

Two nurses verify and destroy as per medicine code of practice. Complete details on PCA form. File in patients casenotes.

Co-Analgesia for severe postoperative pain

Consider using Ideal Body Weight for Paracetamol and Ibuprofen dosing in Obese children

Paracetamol

AGE	ORAL		RECTAL		MAXIMUM DAILY DOSE ORAL OR RECTAL
	Loading Dose	Maintenance Dose	Loading Dose	Maintenance Dose	
>3 months to 18years	20 to 30mg/kg (max 1g)	15 - 20mg/kg up to 4-6hrly (to max 1g)	40mg/kg (max 1g)	20mg/kg up to 4-6hrly (max 1g)	75mg/kg/day (up to max 4g/day)

Table adapted from BNFC app 2021 doses for post operative pain.

Licensed use: not licensed for use in children under 2 months by mouth; doses for severe symptoms not licensed.

Cautions: Hepatic impairment, Renal impairment, Preterm & neonates less than 1 month - see BNFC for iv dosing see BNFC (*extract below*)

Paracetamol: by intravenous infusion over 15 minutes - only if oral route unavailable

Child body weight 10 - 50kg: 15mg/kg every 4-6 hours; max. 60mg/kg daily

Child body weight over 50kg: 1g every 4-6 hours; max. 4g daily

Consider using Ideal Body Weight for Paracetamol and Ibuprofen dosing in Obese children

Ibuprofen: age over 1. Oral 7.5mg/kg per dose up to 6 hourly with a max daily dose of 30mg/kg/day

Syrup 100mgs/5mls or Tablet 200mg or 400mg

Caution: if bleeding risk, asthma, renal dysfunction, GI ulceration/bleeding, on anticoagulants, age <1 year.

Diclofenac

Oral/Rectal 1mg/Kg 8 hourly. Maximum single oral dose 50mg. Maximum 50mg PR

If oral route unavailable (e.g. NBM, Ileus or Nausea/Vomiting) consider intravenous dosing. 0.3 to 1mg/Kg once or twice daily for maximum 48hours. For intravenous infusion see BNFC or Medusa via Firstport. Maximum daily dose by any route 150mg.

Tablet (*Enteric coated*) 25mg or 50mg, Tablet (*Soluble*) 50mg or Suppository 12.5mg, 25mg or 50mg

Caution: if bleeding risk, asthma, renal dysfunction, GI ulceration/bleeding, on anticoagulants, age <1 year.

Anti-Emetics

Ondansetron: 0.1mg/kg (*100micrograms/kg to maximum single dose 4mg*) up to 8hourly.
4mg in 2ml vial, Tablet 4mg

Dexamethasone: 0.1 to 0.15mg/Kg up to max. 8mg given intravenously slowly - a one off rescue dose, only if not already received in theatre. Beware insomnia if given in evening. Not for use in those at risk of tumour lysis syndrome.

Cyclizine: 1mg/kg 8-12hourly oral/iv, to maximum single dose 25mg under 12 years, over 12 years 50mg per dose.
50mg in 1ml vial, Tablet 50mg

Please note if one anti-emetic is ineffective consider using another anti-emetic.

REFERENCES

1. The Association of Paediatric Anaesthetists of Great Britain & (and) Ireland (2009). Guidelines on the Prevention of Post-operative Vomiting in Children.
2. Royal College of Paediatrics and Child Health (2010) The use of unlicensed medicines or licensed medicines for unlicensed applications in Paediatric Practice. Policy Statement produced by the joint RCPCH/NPPG Standing Committee on Medicines.

APPENDIX

1. Morphine for PCA in Paediatrics Syringe Preparation Monograph

Acute Pain Service

Nurse Specialist M. Herron (Dect 6224/Page 021), Dr C. Slorach (Page 133) : Monday - Friday 9am - 5pm

After hours or if unavailable, contact Duty Anaesthetist (Page 003)

Presentation^{1,2}: 10mg in 1ml Morphine sulphate ampoules

Dosage³: As per Acute Pain Service: Paediatric PCA guideline for Alaris IVAC PCAM pump
(available via Firstport)

Method of Administration³

Only the acute pain nurse or an anaesthetist can program and initiate a PCA on the Paediatric Wards.

1. Preparation The final concentration of morphine in the 50ml syringe for a paediatric PCA delivered via the Alaris IVAC PCAM pump is determined by the child's weight such that the final concentration is always 20micrograms/kg/ml, **except when weight over 50Kg.**

Dose (mg) morphine = patients weight (kg), if weight over 50Kg take maximum dose of 50mg

Volume (ml) of morphine 10mg/ml =mg divided by 10

Dilute calculated volume (ml) of morphine up to 50ml with sodium chloride 0.9% using a 50ml BD luer lock syringe.

Example:

A child weighing 23kg

Dose (mg) morphine = patients weight (kg) = 23mg

Volume (ml) of morphine 10mg/ml = 23mg divided by 10 = 2.3ml

Dilute calculated volume = 2.3ml of morphine up to 50ml with sodium chloride 0.9% using a 50ml BD Plastipak luer lock syringe.

2. Administration

To be administered via an Alaris PCAM device. Only medical or nursing staff that have completed Alaris IVAC PCAM competency based training can change syringes in the Alaric PCAM device.

The Alaris device will be programmed to deliver a bolus dose when required by the patient. A further dose can only be delivered after a 5 minute lockout delay.

A 1ml bolus dose delivers 20micrograms/kg/ml morphine, except when the child's weight is more than or equal to 50kg when the final concentration will be 50mg in 50ml, equalling 1mg/ml and a 1ml bolus dose will deliver 1mg.

Example:

A child weighing 23kg

1ml bolus dose delivers 20micrograms/kg morphine

1ml bolus dose delivers 20micrograms x 23 morphine

1ml bolus dose delivers 460micrograms morphine

Storage/Stability¹

Morphine sulphate is a controlled drug and must be stored in the controlled drug cupboard and registered in a controlled drug register.

Licensed Status¹

Morphine 10mg/ml solution for injection is a licensed product not licensed for use in children under 12 years.

Compatibility²

Solution compatibility Glucose 5%, Glucose 10%, Sodium chloride 0.9%

Solution incompatibility Contact pharmacy for further information

Additive compatibility Contact pharmacy for further information

Additive incompatibility Contact pharmacy for further information.

References

1. Summary Product Characteristics, Morphine 10mg/ml injection. Accessed 26/6/2019. Wockhardt. <https://www.medicines.org.uk/emc/product/2244>
2. BNF for Children 2020

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Reviewed & Updated by Dr Colum Slorach

Reviewed by: *Lynsay McAulay*

Approved by Dr Padma Rajagopal
Keir Greenhalgh

Checked by: Lynsay McAulay,
Senior Pharmacist, Paediatrics

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