

PATIENT CONTROLLED ANALGESIA (PCA)

Recommended for patients 6 yrs & older; Assess the individual child's cognitive maturity ~ we have successfully used PCA in a 5 yr old.

Prerequisites:

- Understand the concept of analgesia upon demand (press for it)
- Able to cope with latency of onset & mandatory lockout for safety.
- Physically able to press the handset button
- No contra-indications (wrt medical condition /allergies/ cognitive limitations)
- Parents should be instructed **NOT** to press PCA for the child (especially if he/she is sleeping)

CADD or Graseby syringe pumps are used (Check availability)

- clear old patient data & select appropriate Programme
- check that appropriate syringe type / size or cartridge is used (this should last at least 24-48h)
- check that settings are appropriate for the drug used & child's weight

Compulsory Pump Settings:

Please programme

- Bolus
- Lockout
- Max. Dose Limit in 1 hour (check that this is NOT for a 4h interval)

Optional Pump Settings: Loading dose

Background Basal Infusion

Recommended limits are printed on the order form & should not be exceeded

Note that the Lockout time range varies with the opiate profile

with a minimum interval of 5 min for Morphine & 3 min for Fentanyl

Continuous basal infusions are NOT recommended as a routine unless child is adequately monitored /pain is expected to be severe eg scoliosis. Start with 0.5-1.0 ml/h; try not to exceed 1.5 ml/h. Wean the background infusion by 25-50% after 24-48h.

Steps to adhere-to at daily morning round:

1. note total opiate use in 24h (in mg or mcg)
2. note successful vs total demands
3. clear old data & adjust bolus or background as needed
4. check that contents should last at least 24-48h

Dilution:

There are 2 standard ways of diluting the narcotic infusions according to weight: for patients weighing $< 50\text{kg}$ or $\geq 50\text{kg}$

(specific dilution order set is available in the CLMM);

All orders must be clearly written, dated & signed

The syringe/cartridges should also be similarly labelled

PRESCRIPTION: MORPHINE

- $< 50\text{kg}$

Syringe preparation

Morphine = Body Weight (mg)
in 50ml total volume

1 ml = 20 mcg/kg

1 ml/h = 20 mcg/kg/h

- Recommended Settings:

Bolus = 1 - 2 ml

Lockout = 5 min

Max. I-h Limit = 200 - 300 mcg/kg/h

Basal Infusion = 0 - 15 mcg/kg/h

Loading Dose = 100 - 200 mcg/kg

- 50kg and above (like adults)

Syringe preparation

Morphine = 50mg in
50ml total volume

1 ml = 1 mg

1 ml/h = 1 mg/h

- Recommended Settings:

Bolus = 1 - 2 ml

Lockout = 5 min

Max. I-h Limit = 15mg

Basal Infusion = 0 - 1.5ml/h

Loading Dose = 0.1 - 0.2 mg/kg

NB: Background Infusion of 2ml /h on top of PCA boluses are associated with increased sedation & episodes of desaturation; as opposed to simple morphine infusions in children (Study by Berde et al) and need to be adequately monitored.

CADD cartridges of various volume capacities (50 ml - 10 ml) require corresponding dilutions to achieve the same final concentration. Please have a 2nd person verify dilution & the math.

PRESCRIPTION: FENTANYL

- | | |
|--|---|
| <ul style="list-style-type: none">• < 50kg• Syringe preparation
Wt. x 15 (mcg) Fentanyl
in 50ml total volume
[1 ml = 0.3 mcg/kg]• Recommended Settings:
Bolus = 1 - 3 ml
Lockout = 3 - 4 min
Max. I-h Limit = 4 mcg/kg
Basal Infusion = 0 - 1.5mcg/kg/h
Loading Dose = 0.5 - 2 mcg/kg | <ul style="list-style-type: none">• 50kg and above• Syringe preparation
Fentanyl 25 mcg /ml
in 50ml total volume
[1 ml = 25 mcg]• Recommended Settings:
Bolus = 1 - 2 ml
Lockout = 3 - 4 min
Max. I-h Limit = 250 mcg
Basal Infusion = 0.5 - 1.5 ml/h
Loading Dose = 25 - 100 mcg |
|--|---|

NB: For the opioid tolerant ASA 1-2 patient with severe pain, syringe preparation can increase to 0.5mcg/kg in 1 ml i.e.
Wt x 25 (mcg) Fentanyl in 50 mls total volume

Monitoring & trouble-shooting

1. Inadequate analgesia

Check patient history from the pump.

If there are multiple unsuccessful attempts, increase the bolus and 1 h max *and* re-educate the child on PCA usage.

If child has problems pressing handset, nurse or parent can help her with this.

Perils of over administering should be indoctrinated appropriately.

The lockout interval may vary from 5 – 8 min but to NOT < 4min for morphine.

Dose increments are usually associated with increased side-effects.

NCA (NURSE CONTROLLED ANALGESIA) or AACA (Authorised Agent Controlled Analgesia)

At present, only CICU, NICU and HD are capable of supporting this..

The principles & charting are the same as for PCA. Programming is more conservative with strict instructions to press only if pain scores exceed 3-4.

- The lockout period is 10-15 min for morphine & 5-10min for fentanyl
- The maximum 1 h limit is set 20-25% lower
- Typically we limit boluses to no more than 4 per h at the start

OPIATE INFUSIONS

These follow the dichotomous weight-based PCA prescription; limits should not be exceeded; syringe boluses should not exceed 2 mls & require sufficient interval (15 min) for assessment of response.

LOW-DOSE KETAMINE INFUSIONS

Indicated if :

- The pain is hard to control despite adequate opioids.
- Used to curb opiate tolerance
- Used improve quality of analgesia
- Reduces opiate requirements & thereby ameliorating opioid induced hyperalgesia (OIH) & opiate side- effects

Dilution:

It is recommended to use lockable PCA pump to prevent tampering)

This is diluted as per morphine to create a **1ml/h = 20 mcg/kg/h**

Generally patients are rational & not over sedated with infusions of 1 ml/h but some will complain of dizziness, excessive salivation, hallucinations & a dis-embodied feeling

PCA KETAMINE

Indicated if : frequent intense pain or procedural intervention render PCA opiate or opiate infusion ineffective.

Dilution: Body Weight (mg) in 50 ml N/S

Low dose 1 ml /h = 20 mcg/kg/h

Lockout 10-15 min

Background not to exceed 1ml/h

Higher concentration or higher dose dilution:

Body Weight x 5 (mg) in 50 ml ; 1ml/h = 100 mcg/kg/h

if require more intense sedation/ analgesia eg for dressing changes provide more drug per bolus; keep infusion to < 1ml/ h

PCA KETAMINE-MORPHINE COMBINATION

Indicated if: pain is hard to control despiteadequate opioids.

Dilution: Both ketamine & morphine combined (1:1) into one PCA

Allow 4-5 presses per hour & increase lockout interval to 10-15min.

Difficult to adjust dose if patient is intolerant to adverse effects of ketamine so a trial of a separate Low-dose Ketamine infusion allows more flexibility in dose adjustment

Other adjuncts: Dexmedetomidine infusion

Clonidine (1mcg/kg q6-8h IV / PO)

Gabapentin, Pregabalin

Optimising good use of PCA modality

Load opiate or dispense 2 -3 boluses if pain not well controlled

Educate on proper use: encourage pre-emptive 2 boluses before movement & Physiotherapy

Treat side-effects which may deter optimum use

Escalate analgesia by increasing bolus as well as being quick to add an analgesic adjunct

Weaning & discontinuation

PCAs are usually required for 2 - 3 days, but may be continued for much longer period if indicated eg in Oncology, Trauma & Burns, Scoliosis

Once the child is taking orally, start him / her on oral non-opiate analgesics q 6 - 8h (whilst still on the PCA). This will help with weaning the PCA & will provide better analgesia.

Convert the 24h opiate requirement to an oral opiate round the clock with PRN prescription of 10-20% of this amount. Either Mist morphine or Oxycodone (Oxynorm) make good conversions; sustained-release formulations & trans-dermal applications are neither suited to nor recommended for Acute Pain management.

Discontinue PCA when:

minimal use of bolus demands (Eg < 4-8 presses per 24h)

minimal 24h opiate requirement (Eg < 0.1-0.3 mg/kg morphine in 24h)

patient or surgeon request (providing pain is well controlled)

Drips may need to be re-sited if painful or inflamed.

Additional adjuncts are required if pain is really severe