PATIENT CONTROLLED ANALGESIA (PCA)

PURPOSE
This clinical practice support document provides clinicians the direction to safely initiate and manage patient controlled analgesia (PCA).

POLICY STATEMENTS
Initiation of Patient Controlled Analgesia (PCA) requires an Acute Pain Service (APS) Anesthesiologist order. The order must specify the patient’s weight, type and standard concentration of opioid, PCA settings, level of monitoring, scheduled adjuvants, and maintenance medications prescribed.

Pain management for patients on PCA is managed by the APS team. The PCA orders pre-empt all pain, sedative and side-effect medication orders written by subspecialists while the patient is under the care of the APS. These orders include: analgesics, sedatives, anti-emetics, and anxiolytics.

All dose and rate calculations, medication selection, pump programming requires double check by a 2nd RN or other qualified clinician (i.e. physician).

SITE APPLICABILITY
PCA is initiated and managed in all clinical inpatient areas of BCCH.

PRACTICE LEVEL/COMPETENCIES
Pain management using patient controlled analgesia (PCA) is a foundational level competency that requires knowledge, skill and clinical decision making acquired through education and clinical practice caring for children requiring pain management.

Competencies include:
- Performing comprehensive pain assessments in patients of different age groups
- Planning, implementing and evaluating care for patients experiencing pain
- Identifying and involving other resources as required (child life, physiotherapy, etc)
- Identifying equipment, medications and monitoring required to provide pharmacological interventions
- Recognizing potential side effects to opioids and performing appropriate nursing interventions
- Documenting appropriately and timely using appropriate documentation tools
- Demonstrating correct programming and use of the PCA module
- Responding to emergent situations related to opioid use in appropriate and timely manner

DEFINITIONS
Patient Controlled Analgesia (PCA): a technique whereby small amounts of intravenous medications are administered on demand by a patient-activated infusion pump. PCA can be bolus only or bolus +continuous so it is not necessarily patient activated only.

Arousal Score:

<table>
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<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td></td>
<td>Awake &amp; Alert, Orientated</td>
<td>Normal Sleep Easy to Arouse to Verbal Stimulation</td>
<td>Difficult to Arouse to Verbal Stimulation</td>
<td>Responds Only to Physical Stimulation</td>
<td>Does Not Respond to Verbal or Physical Stimulation</td>
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EQUIPMENT
- appropriate standard concentration opioid syringe for PCA infusion prepared by pharmacy
- microbore syringe tubing
- compatible IV solution and administration set
- Y-connector with anti-reflux valve
**PATIENT CONTROLLED ANALGESIA (PCA)**

- Alaris PCA syringe pump with clear lock box
- Alaris Large volume infusion module
- Alaris Patient Care Unit (PCU) or “brain” (a second PCU is required for maintenance or other infusions)
- Equipment functioning and readily available and naloxone available in unit MedStations

## PROCEDURES TO INITIATE PCA

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<tr>
<th><strong>RATIONALE</strong></th>
<th><strong>PROCEDURE</strong></th>
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<td>Medication orders that meet safe prescribing practices promote patient safety.</td>
<td><strong>1. CHECK</strong> chart for the Acute Pain Service (APS) anesthesiologist’s pre-printed PCA order. Refer to PCA Guidelines on reverse of order sheet.</td>
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<td>Pre-printed orders promote safe prescribing practices.</td>
<td><strong>2. CHECK</strong> chart for any patient allergies or contraindications to medication.</td>
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<td>Prevents child from receiving a medication to which they are known to be allergic or that is contraindicated in this case.</td>
<td><strong>3. REVIEW</strong> medication for action, use, side effects, adverse reactions, and safe dose per patient's weight. (Refer to reverse of prescriber order forms for calculation formulas).</td>
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| Health care providers who administer medications must have an understanding of the safe dosage of medications they administer to children, as well as the expected action, possible side effects and signs of toxicity. Reduces risk of medication administration errors. | **3. CHECK** medication against Medication Administration Record (MAR) and physician's order for:  
  a. correct patient  
  b. correct medication  
  c. correct route (IV)  
  d. safe dose range |
| Failure to correctly identify patients prior to procedures may result in errors. Reduces child and family’s anxiety. Evaluates and reinforces understanding of previously taught information and confirms consent for medication administration. | **4. PERFORM** hand hygiene. |
| Routine precautions. | **5. IDENTIFY patient and EXPLAIN procedure. PROVIDE PCA teaching pamphlet to patient and or family.** |
| Provides final check for correct medication and concentration. | **6. SCAN** patient ID if not already programmed into pump and **ENTER** or **CONFIRM** patient's current weight. |
| Priming tubing with opioid solution ensures immediate delivery of medication when infusion commenced. Manual priming versus automated priming is done at the discretion of the clinician. | **7. SELECT** appropriate pump profile based on patient's weight category – PCA 20-30 kg, PCA 30-40 kg, PCA 40-50 kg, PCA 50-60 kg, PCA 60-70 kg, PCA >70 kg. |
| **8. Manually PRIME** microbore tubing and Y-connector with anti-reflux valves with PCA solution and **CONNECT** PCA infusion set to a compatible solution. Refer to PCA Quick Reference Guide for instructions on automated priming using the PCA module. |
| Provides final check for correct medication and concentration. | **9. SCAN** medication barcode on the medication label and **CONFIRM** drug and concentration are correct. |
| **10. LOAD** PCA syringe and tubing into Alaris PCA syringe module. |
| **11. CHOOSE** correct PCA setting (bolus only or... |
### PATIENT CONTROLLED ANALGESIA (PCA)

<table>
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<tr>
<th>Continuous + bolus)</th>
<th>Ensures opioid solution is primed to end of tubing and accurate delivery will occur upon initiation.</th>
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<tbody>
<tr>
<td>12. Complete <strong>PRIMING</strong> procedure using the pump prime feature.</td>
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<td><strong>NOTE:</strong> When changing the tubing or initiating a new infusion <strong>best practice is to prime the tubing using the pump prime feature</strong> particularly for the slower running infusions (less than 0.5 mL/hour). The pump does not prompt you to prime the tubing. To use the pump prime feature, it must be done before connecting tubing to patient, and before pressing the start button. Select the “<strong>Options</strong>” key, than select “<strong>Prime set with Syringe</strong>”. Hold “Prime” soft key until fluid has been primed through entire set.</td>
<td>Ensures immediate delivery of medication when infusion commenced.</td>
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<td>13. <strong>ASSESS</strong> vascular access site for patency and <strong>CONNECT</strong> tubing to patient. <strong>ENSURE</strong> PCA infusion is connected immediately proximal (closest point possible) to the patient's vascular access. Ensure tubing is unclamped.</td>
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<td>14. <strong>PROGRAM</strong> Alaris syringe infusion pump following prompts on screen to enter prescription as per orders and set reservoir volume for entire volume in syringe. Refer to Quick Reference Guide as needed.</td>
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<td><strong>NOTE:</strong> a compatible solution must co-infuse with PCA via a separate pump at a rate of at least 20 mL/hour to ensure delivery of PCA bolus doses. If patient is fluid restricted, consult with APS anesthesiologist for alternate co-infusion rate.</td>
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<td>15. <strong>CONFIRM</strong> pump programming with second RN to ensure accuracy and <strong>DOCUMENT</strong> on Medication Administration Record (MAR).</td>
<td>Reduces risk of infusion errors.</td>
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<td>16. <strong>INITIATE</strong> PCA and perform site to source check of infusion system.</td>
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<td>17. <strong>INSTRUCT</strong> patient on use of PCA button and <strong>ENSURE</strong> that the patient has easy access to the PCA button.</td>
<td>Evaluates and reinforces understanding of previously taught information and confirms consent for medication administration.</td>
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<td>18. <strong>REVIEW</strong> PCA patient teaching as necessary. Contact the APS Nurse Clinician for patient/family education as required.</td>
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### IF THE PCA HAS ALREADY BEEN INITIATED

| 1. **ENSURE** the PCA opioid syringe for infusion in the PCA pump corresponds with the PCA order and is within a **safe dose range** for the child. | Health care providers who administer medications must have an understanding of the safe dosage of medications they administer to children, as well as the expected action, possible side effects and signs of toxicity. |
| 2. **CONFIRM** that PCA pump settings and patient weight programmed into pump are correct. | Reduces risk of medication administration errors. |
| **NOTE:** The RN must confirm pump settings at the |                                                       |
beginning of each shift, with any rate changes and with the transferring RN when patients are transferred.

3. **ENSURE** emergency equipment is functioning and readily available and ensure naloxone is available in unit MedStation.

   *Immediate interventions can be provided in case of adverse side effects.*

4. **REFER** to the Quick Reference Guide for instructions on changing medication syringe, changing program prescription, discontinuing therapy, reviewing history and troubleshooting alarms.

5. **CONFIRM** any program changes on the pump with a second RN.

### MONITORING GUIDELINES

1. **MONITOR:**
   - **while awake:**
     - Respiratory Rate, Heart Rate and **Arousal Score** every hour
     - Pain assessment every 4 hours and as needed (prn) using age/developmentally appropriate pain assessment tools
     - Continuous Pulse oximetry (SpO₂)
   - **while sleeping:**
     - Respiratory Rate (RR) and Heart Rate (HR) every hour
     - Arousal Score if RR shallow or RR less than 12/minute or less than 14/minute for ages less than 10 years
     - Continuous Pulse oximetry (SpO₂)

2. **EMERGENCY PROCEDURES:**
   - **If the respiratory rate is less than appropriate for the child’s age AND/OR arousal score is greater than 2:** rouse the patient, encourage breathing, stop the PCA, apply Oxygen (O₂) at 6-10 litres by face mask, apply or check SpO₂, and call the ordering physician.
   - **If the respiratory rate is less than appropriate for the child’s age AND unable to rouse the patient AND the SpO₂ is less than 90% on 6-10 litres O₂ by face mask:** stop PCA infusion, call a code blue, begin resuscitation procedures, and administer naloxone as ordered.

3. **ASSESS** for opioid side effects and **NOTIFY** physician. **IMPLEMENT** appropriate measures to alleviate symptoms as ordered or required. **REFER** to specific drug monographs in the pharmacy parenteral therapy manual.

### DOCUMENTATION

**DOCUMENT** on PCA pain flowsheet and other appropriate records. Refer to pain flowsheet instruction sheet for detailed instructions.

- date/shift
- patient weight (in kg)
- PCA information:
  - medication and standard concentration
  - continuous dose ___ mcg/kg/hr
  - bolus dose ___ mcg/kg/dose
  - 1 hour limit ___ mcg/kg/hr
- pain assessment tool used
- time
PATIENT CONTROLLED ANALGESIA (PCA)

- location of pain every 4 hours while awake and as required
- level of arousal – See Monitoring Guidelines above
- pain score (rating) using appropriate assessment tool for child (every 4 hours while awake and as required)
- injections/Attempts every hour as indicated on PCA pump
- total mL infused hourly as indicated on PCA pump. The total volume (mL) administered will be totaled every 12 hours. The total medication administered can then be calculated by multiplying the total volume (mLs) x concentration (mcg/mL) = total mcg of medication given.
- order changes, other analgesic and adjuvant medications given, activity level, complications, and side effects.

REFERENCES


