

**NORTH CAROLINA BAPTIST HOSPITAL  
DEPARTMENT OF NURSING  
POLICY AND PROCEDURE BULLETIN**

PREPARED BY: Pain Policies Committee

SUBJECT: **Intravenous Patient Controlled Analgesia (PCA)**  
**(Adults and Children over 5 years of age)**

**I. POLICY:**

Physicians will order IV PCA and nurses will manage patients receiving IV PCA as outlined below.

**II. PURPOSE:**

To enable patients to self-administer intravenous analgesics within preset programming parameters in a manner that provides safe and effective pain management.

**III. EQUIPMENT:**

- A. CADD Infusion Pump (standard or non-standard).
- B. Tubing with an in-line siphon valve, Y extension with a one way female check valve.
- C. Prescribed narcotic analgesic bag from pharmacy or stocked in accudose.
- D. CADD pump key.

**IV. DEFINITIONS:**

- A. Demand Dose: The amount in ml (mcg or mg) administered each time patient activates the PCA pump.
- B. Demand Dose Lockout: Time period between doses during which the PCA pump cannot be activated. Allows time for the dose to take effect before patient can get another dose (minimum 3 minute delay between doses).
- C. One Hour Limit: The maximum dose in ml (mcg or mg) of medication the patient can receive in one hour.
- D. Clinician Bolus: Additional dose other than the prescribed PCA dose that requires programming by RN or MD.
- E. Continuous Rate: Continuous infusion of medication (ml/hr) to provide continuous pain medication in addition to PCA dose.
- F. Reports: A review of the total ml's given and number of doses given hour by hour.

- G. Standard Concentration: May be ordered by any service; includes  
Morphine Sulfate 1 mg/ml,  
Hydromorphone 0.2mg/ml,  
Fentanyl 10 mcg/ml,  
These standard prescriptions are approximately equianalgesic on a ml basis.
- H. Non-Standard Concentration: Requires consultation from the Regional Anesthesia and Acute Pain Management Service (RAAPM) unless (RAAPM) oncology or palliative care patients.  
Includes: IV PCA with a continuous rate and prescriptions other than Morphine Sulfate, Hydromorphone, Fentanyl and concentrations greater than standard concentration.

V. **PROCEDURE**:

- A. Patients should be assessed for their appropriateness to receive PCA. Assessment should include age (infants and children under 5 are not appropriate candidates for PCA), mental status (confused, agitated or restless patients should not receive PCA), developmental level (patients must be able to understand how to use PCA). Additionally, patients with an altered level of consciousness, psychological instability or diminished intellectual capacity should not receive PCA.
- B. Physicians from any service may order standard IV PCA. All **initial** PCA orders must be **written** on the preprinted PCA Order Sheet or entered electronically. **NO PHONE OR VERBAL ORDERS WILL BE ACCEPTED FOR INITIAL PCA ORDERS.**
- IV PCA with a continuous rate (non-standard PCA) may be ordered only by the RAAPM Service, Oncology, or by any service for palliative care. IV PCA with a continuous rate should be ordered using standard concentrations. (Refer to Appendix A-IV PCA Dosing Parameter Guidelines Table).
- C. A consultation from the Regional Anesthesia and Acute Pain Service is required for administration of non-standard prescriptions. Patients weighing  $\leq 20$  kg and pediatric patients with nonstandard orders or concentrations will be managed by the RAAPM Service. RAAPM consultation is NOT required for oncology or palliative care patients.
- D. Dose changes may be written on a standard physician order sheet or entered electronically. Orders for additional narcotics must be indicated "In addition to current PCA give \_\_\_\_\_ mg/mcg of \_\_\_\_\_ PO/IV/IM/SQ."
- The prescriber should check for other narcotic orders when making dose changes.**
- E. A standard concentration requires the use of a **standard pump** from Central Service.
- F. A non standard concentration and an order for a continuous rate requires the use of a **non-standard pump** from Central Service.
- G. Provide an education card to patient and provide patient/family education on the use of PCA.

- H. Two RN's or an RN and a physician must verify programming information prior to starting a PCA infusion or when any changes are made.
- I. Trace the PCA tubing to the point of origin of connection (intravenous or central line) before connecting the device. If the device is already in place, verify point of origin of connection.
- J. Monitoring of the patient is completed on initiation and with any changes made every 2 hours times 12 hours, then every 4 hours:
- Vital signs and SaO<sub>2</sub> on the Patient Care Record or electronically.
  - Pain assessment and patient observation on the back of the Analgesia Infusion Flowsheet Q4H.
  - Amounts infused/volume remaining on the Infusion Flowsheet Q4H and change of shift.
- K. If patient continues to complain of pain while receiving the ordered dose of PCA medication per hour, the nurse will do the following:
- Reassess patient
  - Assess patient's pain
  - Validate whether patient is using PCA correctly
  - Trouble shoot for pump malfunction
  - The Nurse will then notify physician regarding clinically significant data and/or to receive additional PCA orders. Telephone or electronic orders may be accepted for PCA changes.
- L. Naloxone (0.4mg) must be available on unit (i.e. in Accudose or Emergency Drug Tray).
- M. If a patient goes to the operating room while receiving IV PCA, an order to discontinue the PCA must be obtained. The PCA pump **CANNOT** go to the OR.
- N. PCA Pump Operation
1. Pump Basics:
    - a. To power on: Insert battery. Pump will boot up and begin an automatic review (To skip review, push the down arrow).
    - b. To silence alarms: Press **VIEW/SILENCE**
    - c. To review program: Press **VIEW/SILENCE**
    - d. When screen is blank screen saver: Press **VIEW/SILENCE** and main screen will appear.
    - e. To view reports: Press **REPORTS**. To scroll between reports, keep pressing Reports.
    - f. To program the pump: Press **VIEW/SILENCE** to go to first screen. Use arrows to scroll to desired amount, and press **ENTER** to save into memory.
    - g. To start/stop the pump: Press **START/STOP** and then press **YES**.

- h. To power off: Remove battery.
2. Setting up pump for new patient:
    - a. When the New Patient Marker Screen is displayed: Press  to insert the New Patient Marker.
    - b. A confirmation screen will appear: Press  if it is a new patient. Press  if not appropriate.
    - c. Press  to continue.
  3. Program pump for new patient:
    - a. Power on: pump will perform self-test and beep 6 times when ready to program. Screen will say "Stopped, Press View to Advance".
    - b. Press .
    - c. Using Standard Pump:  
Screen will read "Continuous Rate": This screen will always say 0.00. Clinician is not allowed to program a continuous rate using a standard pump. Press .
    - d. Using Non Standard Pump:  
Note: Pump must be stopped (not running) and in LLO to program. Use Key to unlock side of pump to put in LLO.
    - e. Screen will read "Demand Dose": Use arrows to scroll to desired dose, press .
    - f. Screen will read "Demand Dose Lockout": Use arrows to scroll to desired lockout, press .
    - g. Screen will read "set 1 Hour Limit": Use arrows to scroll to desired limit, press .
    - h. Screen will read "Reservoir Volume": Use arrows to scroll to desired volume. Press .
  4. Prime Tubing:
    - a. Remove tubing from package and spike IV bag.
    - b. Prime by gravity (there is an anti-siphon valve at end of tubing to successfully prime, give the bag a push) or prime using prime button on pump.
    - c. Attach cassette to bottom of the pump. While holding the cassette on the pump, use the side of key to push in and turn the latch. Then use the key to lock the side of the pump.
    - d. Place the bag in the lock box and lock pump in the lock box.
    - e. Screen will read "Cassette Locked": Press  to continue.
    - f. Screen will read "Prime Tubing?": Press .
    - g. If you need to prime: Press .
    - h. Screen will read "Disconnect tubing from patient, open clamps and hold Y down to prime".
    - i. Hold the  button and it will prime.

- When priming complete take finger off of the **YES** button and pump will ask “Continue priming?”
  - Press and hold **YES** if you need to continue or press **NO**, if you are done.
- g. Screen will read “Start the pump?: Press **NO/YES**.”
5. Start the Pump:
- a. Push **START/STOP** and then press **YES**. Pump will go through a review of all the screens and then will automatically switch to LL2 (security mode) and begin to run.
6. To Change the Demand Dose While Pump is Running:
- a. While pump is running, unlock security shell with key (do not unlatch cassette).
  - b. Screen will read “Cassette Unlocked, Lock Level Changing to LL1, View to Continue”.
  - c. Press **VIEW/SILENCE** until you see the Continuous Rate or Demand Dose screen. (Press **NO** for continuous rate screen).
  - d. Select **YES** for Demand Dose screen. Scroll to desired rate, Press **ENTER** to save change.
  - e. Use key to relock pump. Screen will read “Cassette Locked, Lock Level Changed to LL2.”
7. To start a Clinician Bolus:
- a. A clinician bolus is an additional dose other than the prescribed PCA dose that requires programming by an RN or MD.
  - b. A clinician bolus may be delivered while the pump is running and the bolus can be stopped while in progress. A clinician bolus CANNOT be started while a Demand Dose is in progress.  
**(Bolus must be verified by two people, 2 RNs or an RN and MD).**

**Procedure to Start a Clinician Bolus**

- a. Press **Prime/Bolus** until the Clinician Bolus Code appears on display.
  - b. Press **NO** to scroll to 997 (the clinician bolus code).
  - c. Press **ENTER**.
  - d. Press **YES** or **NO** to select the desired amount.
  - e. Press **ENTER** to start the Clinician Bolus.
8. Review Program:
- a. Press **VIEW/SILENCE** several times.
9. Review Total Amount Given and Attempts for Demand Dose:
- a. Press **REPORTS** until desired report appears.

10. To Clear Reports:
  - a. Press **REPORTS** until desired report appears.
  - b. Press **ENTER** to clear.
  
11. Change IV Bag: (Pump will alarm when there is 5-ml remaining)
  - a. If pump is infusing: Press **STOP** and answer **YES**.
  - b. Use key to unlock the security shell.
  - c. Remove and change IV fluid. Place new one in security shell, close door and lock the lock box with key.
  - d. Use key to unlock the side of the pump (do not unlatch cassette).
  - e. Push **BACK** to Reservoir Volume screen and push **ENTER**.
  - f. Screen will read "Reset Reservoir Volume to Previous Amount?" Press **YES**.
  - g. Relock pump with key. Pump will confirm it is locked.
  - h. Press **VIEW/SILENCE** to continue.
  - i. Pump will read "Prime Tubing" Press **NO**.
  - j. Pump will read "Start the Pump". Press **YES** pump will go through its review and restart.
  
12. Tubing Change:

Prime tubing by gravity.

  - a. If pump is running, press **STOP/START** and answer **YES**.
  - b. Use key to unlock the security shell.
  - c. Use key to unlock and unlatch the old tubing from the bottom of the pump.
  - d. Use the key to latch and lock the new tubing onto the bottom of the pump. Close the security shell and lock it with the key.
  - e. Push **VIEW/SILENCE** to continue.
  - f. Screen will read "Reset Reservoir Volume to previous amount?" Press **YES**.
  - g. Screen will read "Prime Tubing?" Press **YES** if you need to prime and follow instructions. Press **NO** if no priming is needed.
  - h. Screen will read "Start the pump?" Press **NO**.
  - i. Push **REPORTS**, screen will read "Milliliters Given". Press **ENTER** to clear.
  - j. Press **STOP/START** and **YES** pump will go through review and begin to run.
  
13. Alarms/Troubleshooting:
  - a. 9-Volt Battery Low: Battery is low, but pump is operable. Push **VIEW/SILENCE** and change battery soon.
  - b. 9-Volt Battery Depleted, Install Good Battery: Install fresh battery, pump cannot run on a depleted battery.
  - c. High Pressure, Pump Stopped: Check tubing for a kink, closed clamp, and patient site. Push **START/STOP** to restart the pump.

- d. Upstream Occlusion: Fluid is not flowing from the bag to the pump. Push **START/STOP** to silence the alarm. Unlock the security shell and reposition the tubing.
- e. Reservoir Volume is Low: Press **VIEW/SILENCE** to silence the alarm. Pump will alarm when there is 5 ml left.
- f. Reservoir Volume is Zero: Push **VIEW/SILENCE** to silence the alarm. Install a new bag.
- g. Error Detected: There is a problem with the pump, remove from service.

14. Discontinuing PCA

- a. Waste any drug and record in Accudose or on the Narcotic Administration Record as follows:
  - 1) Drug, amount wasted.
  - 2) Signature of nurse wasting and witness with time.
  - 3) Method of wasting, i.e., squirting in sink.

O. Adverse Reactions.

- 1. Patients receiving PCA should be monitored for potential adverse reactions including:
  - a. Uncontrolled pain
  - b. Hypotension
  - c. Excessive somnolence
  - d. Confusion
  - e. Oxygen saturation < 93%
  - f. Respiratory rate < 10 breaths per minute
  - g. Uncontrolled nausea/vomiting or itching
  - h. Urinary retention
- 2. Adverse reactions will be reported to the physician for appropriate medical interventions.
- 3. For serious adverse reactions such as respiratory or cardiovascular depression:
  - a. Initiate appropriate emergency support
  - b. Stop PCA infusion but do not turn off PCA pump or clear any settings
  - c. Notify physician immediately.
  - d. Administer Naloxone as ordered.
  - e. Notify Risk Management.
  - f. Document reaction appropriately.

**VI. PATIENT/FAMILY EDUCATION**

- A. Explain to patient and family the purpose and operation of PCA.

- B. Instruct patient and family that ONLY the patient is to press the PCA pump button.
- C. Instruct patient to press the PCA button at the onset of pain and not to wait until the pain is severe.
- D. Instruct the patient to report any of the following symptoms: Inadequate pain relief, nausea and vomiting, itching or confusion (may be noticed by a family member).
- E. Provide patient/family with PCA education card provided with PCA.
- F. Instruct patient/family to inform nursing staff if PCA tubing becomes disconnected.

**VII. DOCUMENTATION:**

- A. Name and quantity of drug received and any waste on the Narcotic Administration Record/Accudose.
- B. PCA administration including cumulative total dose of drug delivered should be documented every 4 hours and at change of shift. Pain assessment and observations are documented on the Analgesia Infusion Flow Sheet. The vital signs and SaO<sub>2</sub> are documented on Patient Care Record or electronic record.
- C. Adverse reactions and events in the Progress Notes.
- D. Document any education on the Interdisciplinary Patient/Family Education Sheet.

**VIII. REFERENCES:**

American Pain Society (2003). Principles of analgesic use in the treatment of acute pain and cancer pain (5<sup>th</sup> ed.). Glenview, IL: APS.

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McCaffery, M., & Pasero, C. (1999) Pain: Clinical Manual. St. Louis, MO: Mosby.

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Weiner, R. S. (2002). Pain Management: A Practical Guide for Clinicians (6<sup>th</sup> ed.). Danvers, MA: CRC Press LLC.

Attachments:           Appendix A: Suggested IV-PCA Dosing Parameters Guidelines

Appendix B: Patient Controlled Analgesia (PCA) Education Card

Effective Date: 10/86  
Review/Revise: 8/87  
8/88  
10/89  
2/96  
9/96  
10/97  
12/98  
2/99  
7/02  
2/03  
8/05  
12/05  
2/07

APPENDIX A

**SUGGESTED IV-PCA DOSING PARAMETER GUIDELINES\***  
**(Adults and Children greater than 5 years of age)**

\* These parameters should be used as guidelines only. Wide patient variability exists and doses must be titrated to account for patient's age, medical condition, surgical procedure and/or narcotic tolerance

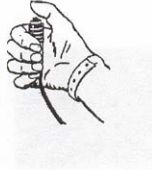
<b>IV-PCA MEDICATIONS</b>	<b>CONCENTRATION</b>	<b>DOSAGE</b>	<b>DELAY</b>	<b>ONE-HOUR LIMIT</b>
Morphine	1 mg/ml	0.02 mg/kg (1.4 ml for 70 kg)	10 min	6 ml for 70 kg 4 ml for 40 kg 2 ml for 20 kg
Hydromorphone (Dilaudid)	0.2 mg/ml	4 mcg/kg (1.4 ml for 70 kg) 0.28 mg	10 min.	6 ml for 70 kg 4 ml for 40 kg 2 ml for 20 kg
Fentanyl	10 mcg/ml	0.2 mcg/kg (1.4 ml for 70 kg)	10 min	6 ml for 70 kg 4 ml for 40 kg 2 ml for 20 kg

## APPENDIX B

### Patient Controlled Analgesia (PCA)

You are using a PCA pump to give yourself pain medicine. This way you get pain relief when you want and without waiting.

When you push the button on the PCA pump, you get your pain medicine. It quickly goes into your blood stream for fast relief of pain. It is best to push the button when pain starts because it takes longer to get pain relief if you wait until the pain gets bad.



**You are the only person who should push the button. Family and visitors are NOT to push the button.**

Tell your doctor or nurse if:

- Your pain does not get better
- You start to itch
- You have nausea or start vomiting
- You feel sleepy all the time
- You feel confused