Intravenous Patient Controlled Analgesia (IV PCA)

Revised June 2010 by Professional Practice Team
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Introduction

Patient Control Analgesia (PCA) is one of the most successful methods of pain relief to be introduced in the last few years. The primary purpose of PCA is to allow the patient to self-administer an analgesic dose of medication predetermined by the physician. PCA enables the patient to assess and manage his/her own pain level. This method of pain control has been found to be very effective because the patient feels more in control of his/her life situation (Smith, Duell, & Martin, 2000, Reiff & Niziolek, 2001).

Other benefits of Intravenous PCA include:

- The total opioid requirements of patients using PCA are often less than those of patients using conventional intramuscular dosing (Sherwood & Benzon, 1999).

- This method of pain control is less time consuming for the nurse (Smith. et. al., 2000).

PCA can be administered through intravenous, subcutaneous, or epidural routes. This package will discuss intravenous administration of PCA.

1. Verification of Competency
   2. In-service with CPL or designate
   3. Review of Learning Package
   4. Written quiz with a pass of 90%
   5. Bedside competency checklist/demo
Learning Expectations

1. Define PCA and the purpose.
2. Identify three advantages of PCA.
3. State the pharmacological action of prescribed opioids.
4. Describe the action and appropriate use of Naloxone.
5. Demonstrate the set up a PCA pump for administration.
6. Describe the care required for a patient receiving IV PCA.
7. Describe patient/family teaching and safety measures for PCA.
8. Demonstrate documentation.
Intravenous Patient Controlled Analgesic

The primary purpose of PCA therapy is that the patient determines the amount of analgesia received according to their pain and activity level. The PCA therapy includes a programmable pump, which delivers a predetermined dose on demand, with the protection of time interval and dose limiting lockouts. The programmable pump provides the health care professional with information about the number of doses, the timing, frequency, the number of demands and dosage delivered to each patient.

PCA Inclusion/Exclusion Criteria

<table>
<thead>
<tr>
<th>Inclusion Criteria</th>
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<tbody>
<tr>
<td>❖ Patients requiring acute and chronic pain management, for example postoperative,</td>
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<td>trauma, and patients with chronic or terminal disease.</td>
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<td>❖ Patient is mentally alert and is able to understand and comply with instruction</td>
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<td>and to give a valid informed consent.</td>
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<td>❖ Patient is not allergic or sensitive to the prescribed narcotic.</td>
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<td>❖ Patients who have the physical ability to activate the PCA.</td>
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<td>❖ Patients with adequate respiratory, cardiovascular, hepatic and renal function as</td>
</tr>
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<td>judged by the attending physician.</td>
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<table>
<thead>
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<th>Exclusion Criteria</th>
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<tr>
<td>❖ Patients with limited respiratory reserve.</td>
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<td>❖ Patients with history of drug abuse.</td>
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<td>❖ Patients with history of chronic sedation and tranquilizer use.</td>
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<td>❖ Patients with psychiatric disorder.</td>
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</table>
PCA Pump

The current PCA pump being used at Rouge Valley Health System is the LifeCare PCA® Infusion System with Hospira MedNet® Software Enabled. LifeCare allows safe and effective delivery of analgesics within programmed limits. Hospira MedNet Software contains drug library software designed to improve medication management at the patient’s bedside and offer protection against medication errors that may lead to adverse drug events.

Definition and Terms

Pump Settings

- **Loading Dose**: is usually administered in the Post Anesthetic Care Unit. A bolus dose is delivered to reach a minimum effective analgesia level.
- **PCA dose**: the dosage that is delivered each time the patient activates the device.
- **Lockout Interval/Delay Time**: a time delay between the doses that separates the doses.
- **Hour Limit**: The 1 hour maximum set dose allowed.
Mode

The PCA can be set in one of three different modes:

- **PCA**: a dose of narcotic delivered to the patient only on demand
- **Continuous**: a pre-set continuous rate of infusion, no PCA dose available to patient
- **PCA/Continuous**: a pre-set continuous rate of infusion plus PCA dose available to patient

Safety Features

The primary safety feature of the LifeCare PCA Infusion System is the integral barcode reader. The barcode reader identifies the drug and concentration of the Hospira prefilled and custom-filled vials inserted into the device.

- **Soft Limits** (Upper and/or Lower): The medication dose between these limits is an acceptable range per your facility’s best practices.
  - Soft Limits can be overridden. If a dose is programmed outside of the Upper and Lower Soft Limits, however an override alert will appear.

- **Hard Limits (upper and/or lower)**. These are values which can not be overridden. A Hard Limit Alert notifies the user that the programmed dose is NOT allowed within the facility’s best practices and must be changed.
Front of PCA

Wireless Antenna

LED Screen
Displays the current total delivered since the shift totals were cleared

Barcode Reader

LCD Screen
Displays programming options and prompts

Exit
Return to main display

Soft Keys
Perform a variety of functions correlating to the programming prompts

Numeric Key Pad

Enter
To accept various screen options

Clear Key

Silence/Volume
Used to silence alarms, mute the keypad for 2 minutes and control the volume

Battery Indicator

Start/Pause

AC Power Indicator

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**Back of Pump**

**Patient Pendant**
Allows the patient to request a PCA dose by pushing the button.

**Locking Pole Clamp**
When the door is locked the clamp may be tightened but not loosened. APCA key is required to lock and unlock the door.

**Ethernet Jack**
Allows the device to be connected to a local area network.

**AC Power Cord**

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**Side of PCA**

**Set Up Instructions**

**Loading the Vial**

**Lock**

**Start Up Instructions**

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Equipment

Assemble the following equipment:

- PCA infuser pump
- IV solutions, tubing
- Narcotic syringe
  
  - Check the Eight rights of medication administration (The right dose of the right medication to the right patient at the right time, by the right route for the right reason, right frequency and the right site)
- PCA tubing
- 24hr PCA flow sheet
- Vital sign monitoring equipment

Pump Setup

1) **Manually prime PCA tubing**
2) **Loading a Syringe** (Refer to the diagram below)

- Squeeze *cradle release mechanism* and bring it to the top position.
  
- Holding the syringe with the label and graduated markings facing you will ensure the bar-coded label faces the barcode reader on the right side of the *Syringe compartment.*
- Insert bottom of the *Syringe* into the middle of the *lower black bracket.*
- Gently press upper end of glass syringe into *upper black bracket.*
  
  - The barcode reader will flash a red light as it scans the barcode and the device will power on, starting the self-test. The device may also be powered up by pressing the ON/OFF key.
- Squeeze the top of the *cradle release mechanism* and push down until the syringe snaps into the *Injector.*
- Unclamp the slide clamp (if clamped).

**CAUTION:** Do not load the top portion of the vial into upper clip first. The lower vial lip may crack or chip when inserted into the lower clip. Cracked vials may not show evidence of damage until pressure is applied by starting an infusion.
3) **Powering On the PCA Device**

- Once the vial is loaded into the injector the PCA will automatically power on and show the following screen:

*NOTE:* The PCA can also be powered on by pressing the **On/Off** key on front of the pump.

- Press the **Continue>** soft key to advance to the programming screen. The System Settings screen allows you to adjust the Screen Contrast, Volume, and Date & Time.

4) **Setting Up a PCA Program**

    a) New Patient Screen

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If a new patient, select “yes”> (previous history and settings will be cleared)
If NOT a new patient, select “No”> and history and settings will be remain the same.

b) Drug and Concentration Confirmation

- The DRUG AND CONCENTRATION CONFIRMATION screen will now appear.
- **NOTE**: If the barcode on the vial was unable to be detected by the barcode reader a **BAR CODE NOT READ** message will be displayed on the screen. Make sure the **BARCODE** on the vial is facing to the right. You may need to remove and replace the vial until the bar code is read.
- Press **CONFIRM>** to continue

c) Selecting a CCA (Clinical Care Area)

- Select the appropriate CCA that reflects your patient population using the soft keys.

d) Initial Loading Dose

- Set Loading Dose? Press the **YES>** soft key to program a Loading Dose.

- Using the numeric key pad enter a **Loading dose**, then press the **ENTER>** button.

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*NOTE: With the LifeCare PCA® device a clinician has the option to program and administer the initial loading dose before completing the remainder of the programming, or defer delivery until after programming is complete.

- Deliver Loading Dose Now? Press the YES> soft key to administer the Loading Dose now.

- Follow the directions on the screen, and press the START/PAUSE button to start the infusion.

*NOTE: To interrupt or discontinue the delivery of a Loading Dose at any time during the infusion press the START/PAUSE button again. The screen will display the amount delivered. To resume the Loading Dose infusion press the YES> soft key.

e) Programming an Infusion

- The SELECT DELIVERY MODE screen allows you to select between PCA Only, PCA + Continuous, and Continuous Only modes.

For PCA Mode:

- From the Select Delivery Mode screen, press the PCA > mode soft key.
  
  ➢ Using the numeric keypad, enter a PCA DOSE, then press the ENTER button.
  ➢ Using the numeric keypad, enter a Lockout Interval/Delay Time, then press the ENTER button.
  ➢ Using the numeric key pad, enter Dose Limit (1hr limit), then press the ENTER button.

*NOTE: An infusion will stop when the dose limit is reached. The pump message will display “1 HR LIMIT REACHED”.

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A loading dose can be delivered anytime during setup or operation, even if the Dose Limit has already been reached or will be exceeded after delivery. Setting a new dose limit will NOT erase the previous dose history.

f) Confirmation Screen

- After programming is completed a one page confirmation screen appears. Prior to locking the device and removing the key, the clinician must review each programmed parameter and ensure that the displayed program agrees with the physician’s order.

*NOTE:* An infusion cannot be started without pressing the CONFIRM> soft key on this screen.

- THE PROGRAM MUST BE VERIFIED BY ANOTHER RN/RPN USING AN INDEPENDENT DOUBLE CHECK PRIOR TO STARTING THE INFUSION

*NOTE:* If you want to make a change before confirming the program press the PREVIOUS> soft key to take you back into the program

- Press the CONFIRM> soft key to confirm the right program.
- Following the instructions on the screen, close and lock the door.

5) Main Screen Display

- After the Loading Dose or PCA Dose has been administered, the main screen will display PCA LOCKOUT. When a PCA dose is available, the main screen will display PCA AVAILABLE.

*NOTE:* Partial delivery of a PCA dose can be a result of interrupting delivery by pressing START/PAUSE button, opening the door, loss of power, reaching the dose limit, an empty syringe, or a malfunction alarm.

- The main screen displays the:
  - LED Display of Dose Delivered
  - LED Walking Stick signifying infusion when patient presses the bolus button
  - Drug name and concentration
6) Checking the History

- Press the HISTORY button twice to access the current program
- Press HISTORY again to view the total amount delivered. This includes the amount delivered toward the Dose Limit and Loading Dose
- **Press HISTORY again to access**: PCA Summary for Last 1 and 24 hours
  - *In the Last 1 and 24 hour history format, the number of PCA doses completed, partial doses and denied doses in the last hour and in the last 24 hour are displayed*
- **Press HISTORY again to access**: PCA Summary Hour by Hour
  - In the Hour by Hour history format, the number of PCA doses completed, partial doses and denied doses that occur in each one hour period during the last 24 hours is displayed.
- Press HISTORY again to access the Event Log, which includes date/time detailed events
- Review and document shift totals per PCA Standard of Care
- Press the EXIT button to return to the Main Delivery screen

7) Making Changes to a Program

- To make changes the key must be turned to the unlock position.
- **Unlock the door** using the security key.
- Select appropriate change (i.e. Change Rx>)
- This screen allows the clinician to change portions of the program without the need to reprogram the entire order.
- Selecting the NEXT> soft key, displays the options on the next screen.
- Press the NEXT> soft key to return to options screen that displays mode.
Changing PCA Mode

- Selecting the NEXT> soft key, displays the options on the next screen.
- Press the NEXT> soft key to return to options screen that displays mode.
  - Press the MODE> soft key to change the mode. The current programmed mode will flash.
  - Press the appropriate mode soft key (i.e. PCA + CONT>)
  - The PCA will take you through the current program settings which are blinking.
  - Press Enter to accept PCA Dose.
  - Press Enter to accept lockout interval.
  - Set continuous rate if required, Press Enter
  - Set 1 hour limit, Press Enter
  - Press the SAVE & EXIT> soft key. This will save the changes and return the user to the Confirmation Screen.
  - A second nurse needs to verify the change using an INDEPENDENT DOUBLE CHECK
  - Press the Confirm> soft key, close and lock the door.

8) **Hard Limit Alerts**

- A Hard Limit Alert appears when a dose entered is outside of the Hard Upper or Hard Lower Limits established by your facility for the drug and/or CCA selected.
- Hard Limits **can not be overridden** and the value must be changed in order to continue programming the infusion. The following is a visual depiction of a Hard Limit Violation, notice that only available soft key is CHANGE>.
  You must select this soft key to continue.
9) **Soft Limit Alerts**

- A Soft Limit Alert screen appears when the entered dose is above or below the customized Upper and/or Lower Soft Limits.
- Because there are times when a physician’s order may go outside of these limits, *Soft Limits can be overridden.*

*NOTE: The cautionary symbols or are displayed on the screen to indicate that a Soft Upper or Soft Lower Limit Override has been selected.*

10) **Changing an Empty Syringe**

- Press the SILENCE/VOLUME button to silence the alarm (if you had a true alarm).
- Manually CLAMP IV PCA Line
- Insert key and unlock the door. This will pause the infusion.
● **Remove old syringe** by grasping syringe on both sides and pulling straight out. A “CHECK SYRINGE” alarm will sound. The only way to silence this alarm is to insert a syringe with the barcode facing the barcode reader.

● **Load in a new syringe.*** Remember to raise cradle to top position and load syringe with barcode facing bar code reader.

● **Press the CONFIRM> soft key** to confirm medication and concentration

● The next screen will ask if you want to CLEAR HISTORY>, CLEAR RX>, CLEAR BOTH>, or CONTINUE>.

● Select appropriate soft key CONTINUE>.

● **Purge?** Press NO>.

● Review the entered parameters and if correct, press the CONFIRM> soft key.

● **A second nurse needs to verify the change using an INDEPENDENT DOUBLE CHECK**

● Close and lock the door.

11) **Changing a Medication**

● Prime **new** IV PCA tubing with new ordered medication

● Manually **CLAMP** both new and old IV PCA Line

● Using the security key, **unlock and open the door.**

● **Remove the current syringe and insert the new IV PCA tubing and new ordered medication**

● **Press the CONFIRM> soft key** to confirm the Right Drug and Right Concentration,

  ○ Consider all EIGHT medication rights

● Since the drug has changed since the last program, the message “WARNING! DRUG AND/OR CONCENTRATION CHANGE DETECTED! CONTINUE OR REMOVE VIAL IF INCORRECT” appears on screen.

● **Press the CONTINUE> soft key**, to advance to the programming screens.

● **Press the CLEAR HISTORY> soft key**, to clear the existing history.

● **Press the CONFIRM> soft key** to confirm clearing the history.

● **Purge?** Press NO>

● If loading dose required

  ○ Set Loading Dose? **Press the YES> soft key.**

  ○ Using the numeric key pad, enter a Loading Dose. Press ENTER button.

  ○ **Press the DELIVER LATER> soft key** to deliver the Loading Dose after the programming is complete.

● From the Select Delivery Mode screen, **press the** appropriate mode (i.e. **PCA ONLY > soft key**).
● Using the numeric keypad enter a **PCA dose press ENTER**.
● Continue with subsequent programming as required.
● Follow the instructions on the screen
● Close and lock the door and press the **START/PAUSE** button.

### 12) **Discontinuing a Program**

- **Unlock the door** to pause the infusion. Close the clamp on the PCA tubing.
- Document totals (i.e, attempts, injections, shift totals etc.) as per RVHS PCA Policy (P-5)
- **Remove syringe** by firmly grasping syringe on both sides and pulling straight out.
- Press the **ON/OFF button** to power off the LifeCare PCA.

**NOTE:** *The device will maintain the history and settings last programmed for 4 hours. If the device is powered on in less than 4 hours a NEW PATIENT? Screen will appear, giving the clinician an opportunity to save or delete previous settings.*

- The amount of narcotic wasted needs to be observed and verified by a second RN/RPN who will co-sign the wastage on the Narcotic Sheet.
- Document “PCA discontinued” on the PCA flow sheet.
- Bring PCA pump to the designated unit area where housekeeping can clean it and it can be returned to appropriate Unit.

### 13) **OCCLUSION ALARM**

- **To address an occlusion alarm, you will relive the back pressure in the tubing:**
  - Make sure slide clamp is closed, even if it is cause of the occlusion, until the back pressure is relieved.
  - Open security door if closed.
  - **Remove back pressure by squeezing and releasing the cradle release handles**.
  - Identify and correct the cause of the occlusion. Release slide clamp. Alarm will self correct.
Pharmacology

Opioid analgesics are the gold standard of treatment for moderate to severe pain (Benzon, Raja, Borsook, Molloy & Strichartz, 1999). Opioid analgesics act by depressing pain impulse transmission at the spinal cord level by interacting with opioid receptors.

**Morphine (morphine sulphate)**

- A non-synthetic narcotic analgesic

**Indication:** Moderate to severe pain associated with post operative pain, acute MI, pulmonary edema, soft tissue, bone trauma and cancer pain.

<table>
<thead>
<tr>
<th>Contraindications</th>
<th>Side Effects</th>
<th>Overdose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute or chronic respiratory failure (unless mechanically ventilated)</td>
<td>Respiratory depression</td>
<td>Marked miosis, profound sedation or coma or cold clammy skin.</td>
</tr>
<tr>
<td>Hypersensitivity</td>
<td>Thrombocytopenia</td>
<td></td>
</tr>
<tr>
<td>Head injuries</td>
<td>Bradycardia</td>
<td></td>
</tr>
<tr>
<td>Acute bronchial asthma and bronchial spasms, because of histamine release, which constricts bronchial smooth muscle.</td>
<td>Allergic reactions (urticaria, skin rash or activation of other allergic phenomena such as asthma)</td>
<td></td>
</tr>
<tr>
<td>Prostatic hypertrophy or stricture of urethra because of the associated urinary retention tendencies.</td>
<td>Nausea and vomiting</td>
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</tr>
<tr>
<td>Acute alcoholism</td>
<td>Urinary retention</td>
<td></td>
</tr>
<tr>
<td>Convulsive disorders</td>
<td>Postural hypotension</td>
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<td></td>
<td>Behavioural changes (restlessness, tremors, delirium, disorientation etc.)</td>
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<td></td>
<td>Other - dry mouth, biliary tract spasm, sedation, perspiration or flushing.</td>
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**Cautious Use:**

- Morphine is a potent respiratory depressant, therefore it must be given with extreme caution and by titration of dosage.
- Narcotic drug dependency may occur if given over an extended period of time.
- May aggravate pre-existing convulsive disorders

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Demerol (Meperidine)

- Synthetic substitute for morphine
- CNS depressant

**Indication:**
- Acute pain
- May be appropriate for patients unable to tolerate morphine

**Action:**
- Depresses pain impulse transmission at the spinal cord level by interacting with the opioid receptors

<table>
<thead>
<tr>
<th>Contraindications</th>
<th>Side Effects</th>
<th>Overdose</th>
<th>Fetal/ Newborn Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypersensitivity</td>
<td>Respiratory depression</td>
<td>Respiratory depression, extreme somnolence progressing to stupor or coma, cold clammy skin, circulatory collapse</td>
<td>Depressed Apgar scores</td>
</tr>
<tr>
<td>Head injuries</td>
<td>Drowsiness, dizziness, confusion, headache, sedation, euphoria, increased intracranial pressure, seizures</td>
<td></td>
<td>Impaired Brazelton Neonatal Behaviour Assessment Scores</td>
</tr>
<tr>
<td>Acute abdominal conditions prior to diagnosis</td>
<td>Palpitations, tachycardia, change in BP</td>
<td></td>
<td>Impaired initiation of breastfeeding for up to 5 days</td>
</tr>
<tr>
<td>Patients taking MAO inhibitors or those patients who have received MAO inhibitors within 14 days</td>
<td>Nausea, vomiting, constipation, anorexia, abdominal cramps</td>
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</tr>
<tr>
<td>Convulsive disorders</td>
<td>Urinary retention, dysuria</td>
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<tr>
<td></td>
<td>Rash, urticaria, bruising, diaphoresis</td>
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**Cautious Use:**
- Caution in patients with atrial flutter or other supraventricular tachycardia due to possible vagolytic action
- Demerol may aggravate pre-existing convulsive disorders

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Fentanyl (Fentanyl Citrate)

- A potent, short acting opioid
- No active metabolites
- Less maternal sedation, nausea and vomiting than morphine
- Narcan required for newborn with approximately 20% births
- Onset 3-5 minutes
- Peak effect 5-15 minutes
- Duration of effect ≤ 1 hour
- Half life:
  - Maternal: less than 1 hour
  - Neonatal: 1-6 hours

Indications:
- For moderate to severe pain:
  - Until an anesthesiologist is available to provide an epidural
  - When an epidural is not preferred or is contraindicated

Actions: allergic reaction is rare

<table>
<thead>
<tr>
<th>Contraindications</th>
<th>Maternal Side Effects</th>
<th>Overdose</th>
<th>Fetal/ Newborn Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypersensitivity to Fentanyl or other narcotics</td>
<td>Respiratory depression, apnea</td>
<td>Cold, clammy skin</td>
<td>Decreased Fetal Heart Rate (FHR) Variability</td>
</tr>
<tr>
<td>Concurrent use (or use within the last 2 weeks) of monoamine oxidase inhibitors (MAOI)</td>
<td>Muscular rigidity</td>
<td>Seizures</td>
<td>Fetal acidosis or non-reassuring FHR</td>
</tr>
<tr>
<td>Obesity</td>
<td>Sedation</td>
<td>Severe drowsiness, restlessness or weakness</td>
<td>Depressed newborn respirations</td>
</tr>
<tr>
<td>Respiratory compromise (severe asthma, Cystic Fibrosis)</td>
<td>Bradycardia</td>
<td>Respiratory Depression</td>
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<td></td>
<td>Transient Hypotension</td>
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<td></td>
<td>Facial flushing</td>
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<td></td>
<td>Nausea/vomiting Constipation</td>
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Cautious Use:
- Women at high risk of emergency delivery (evidence of fetal compromise, twins)
- Preterm labour (increased risk of respiratory depression in the newborn)
- Women with a history of difficult intubation

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Women with decreased respiratory reserve (e.g. obesity) due to increased risk of delayed respiratory depression

- Severe renal or hepatic impairment or patients with reduced metabolic rates
- Women with hypertensive disease of pregnancy (increased sensitivity to hemodynamic effects of Fentanyl)
- Women who have received more than one dose of a longer acting narcotic (e.g. Morphine, Nubain)

Compatibility and stability:

- Protect unopened ampoules from the light
- Stable for 48 hours at room temperature when diluted in D5W and NS at concentrations of 5 mcg/ml
- Stable for 30 days at room temperature or in the fridge when diluted to 20 mcg/ml in NS

Conversion:

1 g = 1000 mg
1 mg = 1000 mcg (micrograms)

OR another way to look at it

0.001 mg = 1 mcg
Narcan (naloxone)

REFER TO: Medical Directive ADMIN PP 80K – Emergency Management of decreased level of consciousness and respiratory depress in Adult Patients receiving narcotic analgesic

- Opioid antagonist
- Competes with opioids at opiate receptor sites.
- IV onset 1-2 minutes, duration 45 minutes
- Available in concentrations of 1.0 mg/ml and 0.4 mg/ml
- For neonates and children use the 0.4 mg/mL concentration

Indications: Respiratory depression induced by natural or synthetic narcotics (opioids) in emergency situations

Actions: reversal of opioids and analgesia in post-operative patients

<table>
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<tr>
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<tbody>
<tr>
<td>Hypersensitivity</td>
<td>Drowsiness</td>
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<td></td>
<td>Nervousness</td>
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<td>Rapid pulse</td>
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<td>Increased systolic BP</td>
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<td>Ventricular tachycardia, fibrillation</td>
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<td>Nausea and vomiting</td>
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<td></td>
<td>Hyperpnea</td>
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Recommendations for use in Neonates:

1. Naloxone must be readily available for administration if neonatal depression occurs due to maternal opioid administration for labour and analgesia
2. As the duration of the action of Naloxone is shorter than most opioids, neonates who have been administered MUST be observed closely for at least 2 hours post administration for signs of respiratory depression.
3. Neonates who have not received Naloxone at birth but whose mothers received opioid analgesia within four hours of delivery MUST be observed for at least two hours post delivery.
4. It is important to remember that neonates who are not adequately warmed may not show signs of respiratory depression as readily.
5. Caution should be used in administering Naloxone to infants whose mothers are receiving long term narcotics, methadone or who are suspected of narcotic abuse.
6. According to NRP guidelines (2006), **Naloxone may be given IM but the onset of action may be delayed.**

Revised June 2010
Care of Patients receiving IV PCA

1. PCA Pump settings are to be verified with the ordering practitioners’ orders when receiving the patient and at the beginning of each shift by a Nurse who has demonstrated competence in IV PCA therapy.

2. Double checking of patient identification & PCA orders is done with initiation and upon pump refill by 2 Nurses.

3. Monitoring Guidelines

**Clinical Care Area: Med/Surg**

- Assessment of respiratory rate, sedation score, and pain control will be monitored and documented q2h x 24hrs and then q4h and prn while awake

**Clinical Care Area: Paediatrics & Sickle Cell**

- Assessment of Respiratory Rate Q1H for duration of PCA Therapy
- HR, Sedation scale and Pain Score Q1H x 12H and PRN, then Q2H x 24H then Q4H and PRN
- T, BP, Pupillary diameter Q4H and PRN
- Continuous Oxygen saturation for first 24H (document Q1H), then Q4H and PRN
- Notify responsible MD if any sudden change/deterioration of HR, BP, Pupillary constriction
Clinical Care Area: Obstetrics

- Obtain baseline Vital Signs prior to the initiation
- Oxygen saturation continuously (maintain above 95%)
- BP, heart rate, resp rate, pruritus, sedation score, pain score, nausea and vomiting:
  - q10 minutes x 30 minutes then q1h until D/C or more frequently if clinically indicated
  - Repeat above vital sign monitoring when dosage or setting are changed
- Bladder status q1h
- Assess Fetal heart rate and contractions as per guidelines
- Notify attending Anesthesiologist if:
  - Hypotension (SBP < 90 mmHg or > 20% drop from baseline)
  - Analgesia is unsatisfactory
  - Unable to manage side effects / complications
  - The 1 hour dose limit is reached before 1 hour
  - Respiration less than 10 breaths per minute
  - Sedation score = 3

4. Pain Scale(s)
- Use the appropriate Pain scale for the patient population the PCA is used for:
- Document the Pain scale used. The same pain scale should be used for the duration of the hospital stay for consistency.
- The Numeric Analogue Scale 0-10 scale is one pain scale is utilized in the ongoing assessment of pain. This can be used for most adolescent and adult patients.
  - $0 = \text{No pain}$  
  - $5 = \text{Moderate pain}$  
  - $10 = \text{Worst pain}$
- Other pain scales that can be used in the paediatric population include:
  - FLACC
  - OUCHER
  - FACES
5. Sedation score for all patient populations is assessed using the following scale:

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Alert</td>
</tr>
<tr>
<td>1</td>
<td>Drowsy; easy to rouse</td>
</tr>
<tr>
<td>2</td>
<td>Drowsy; difficult to rouse</td>
</tr>
<tr>
<td>3</td>
<td>Somnolent; very difficult to rouse</td>
</tr>
<tr>
<td>4</td>
<td>Normal sleep; easy to rouse</td>
</tr>
</tbody>
</table>

6. Page the PCA ordering practitioner for any problems with the patient’s level of pain control, the presence of side effects, if 1 hour limit is reached prior to 1 hour with unsatisfactory pain relief and/or if sedation score = 3.

7. The pump is to be cleared and documented at the end of each shift.

8. The nurse is responsible for checking effectiveness of the PCA therapy as per policy to ensure that the patient’s pain management is satisfactory. Assess the number of injections and the number of attempts/denials to evaluate the patient’s use of the PCA.
   - Record the number of injections & number of attempts/denials until the end of each shift.

9. Assess IV site hourly.

10. Change PCA tubing q72h.

11. Obtain a witnessing nurse for any narcotic wastage and document initials and signatures on the PCA flow sheet and narcotic sheet.

12. A critical principle in the use of PCA is that the patient controls the amount of analgesic delivered. This is very important for the safe use of PCA technology. Sedation usually precedes respiratory depression as opioid levels increase in the patient. The sedated patient is unable to
push the demand button and deliver additional opioid therefore avoiding opioid levels that could precipitate life threatening complications.

- The nurse may push the button to provide the patient with a dose of medication, **only** when the patient is in a critical care/monitored environment. (i.e., ICU, CCU PACU)

**Patient/Family Teaching Related to Intravenous PCA**

Nurses have an important role in providing both the patient and family with instructions about PCA therapy (Sherwin & Benzon in Benzon et al, 1999). Nurses must reassure the patients and their families and provide information about the safety features incorporated into PCA therapy to minimize fears about over dosage and/or addiction.

- It is important to emphasize that the patient and **not** the family should press the button when he or she is in pain.

- The patients understanding of PCA therapy should be assessed on an ongoing basis.

**Documentation**

- A 24hr PCA flow sheet is initiated once PCA therapy has begun and q24h at the beginning of day shift.
- All assessments are documented on the flow sheet. Any abnormal finding are documented on the Integrated Health Record.
- PCA order sets are available on the Intranet (under OrderSet)
- In Obstetrical area (s), document as required in OBTV.
- All wasted Narcotics are double signed for on the Narcotic Record/PCA flow sheet.

Revised June 2010
References


Hospira (2010) LifeCare PCA® Infusion System with Hospira MedNet® Software Enabled Self Paced In-service – Power Point,


### IVPCA Competency Checklist

**Name:** ____________________________________ **Date:** _______________________

<table>
<thead>
<tr>
<th>Verification of Competence Criteria</th>
<th>Competency Demonstrated Yes: Y No: N</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance of in-service</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completion of Self Learning Package</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completion of post-test (80% Accuracy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review of Policy</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Skill Demonstration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checks for patient allergies and identification with ordering practitioners orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear understanding of IVPCA Order Set</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensembles needed equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensures IV Access and identifies dedicated IVPCA line</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performs Double check of medication patient ID, and orders prior to initiation/pump refill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates how to manually prime and load/change syringe into device</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selects the appropriate Clinical Care Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirms Medication and concentration with Orders and display on pump screen match syringe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates how to program and change appropriate pump mode (ie: PCA only, PCA + Cont. etc.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Initials: CPL/Peer/Staff**

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Revised June 2010
### Verification of Competence Criteria

<table>
<thead>
<tr>
<th>Verification of Competence Criteria</th>
<th>Competency Demonstrated Yes: Y No: N</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrates how to program and give Loading dose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates how to set and change rate, lockout interval and hourly limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates and/or explains appropriate monitoring of patient as per guidelines (VS, Pain scale, Sedation scale etc)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understands how to over ride soft limit and correct hard limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates how to attach PCA tubing with IV extension set</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explains procedure to patient and family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates appropriate documentation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates knowledge, skills and judgment in need for the discontinuation of the IVPCA infusion, corrective actions and notification of the Anesthesiologist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates how to review and clear shift history</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Initials: CPL/Peer/Staff**

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**Clinical Practice Leader/Peer/Staff Member:** Please indicate with your Initials & Date beside each of the above criteria as they are met and/or demonstrated.

**Staff Member:** I, ____________________________, have attended the in-service on the LifeCare PCA Pump and feel that I am able to perform the above skills independently. I realize that it is my responsibility to maintain competence in caring for patients with a PCA and seek guidance/assistance when needed.

**DATE:** ____________________________  **Signature:** ____________________________

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Revised June 2010
Patient Control Analgesia (PCA)
Self Learning Package QUIZ

Instructions:
- All staff members are to complete the general PCA questions (section 1)
- In section 2, complete only the questions depending on what area you are working in (Surgery/Medicine, Paediatrics or Obstetrics).
- If you are working in all three areas, complete all questions.

NAME: ____________________
DATE: ____________________
Section 1-General PCA Questions

Intravenous PCA Competency Test

(26 marks)

(1) 1. State the primary principle of PCA: __________________________

_____________________________________________________________________

(3) 2. State 3 criteria that must be present before a patient is considered to be a candidate that would benefit from PCA:

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

(3) 3. State three factors that would exclude a patient from becoming a candidate for PCA:

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

(1) 4. A time delay between the doses that separates the doses is termed as:

a) The PCA dose
b) The hour limit
c) The lockout interval
d) The Continuous rate
5. The maximum set dose that is allowed within a given time frame is termed:
   a) The Loading dose
   b) The PCA dose
   c) The hour limit
   d) The continuous rate

6. State the three modes of delivery that may be used for PCA therapy:
   ______________________________________________________
   ______________________________________________________
   ______________________________________________________

7. Opioid analgesics act by: _________________________________
   __________________________________________________________________________

8. Morphine is a synthetic narcotic analgesic.
   TRUE          FALSE

9. Morphine is a potent respiratory depressant and therefore should be given with extreme caution.
   TRUE          FALSE

10. Demerol may be appropriate for patients who are unable to tolerate morphine.
    TRUE          FALSE

11. The narcotic antagonist used to treat narcotic induced respiratory depression is:
    a) nalorphine
    b) naloxone
    c) numorphan
    d) levophed
12. The usual route of delivery used to give Narcan in the case of narcotic induced respiratory depression is:
   a) po  
   b) IM  
   c) S/C  
   d) IV

13. Side effects of Narcan include:
   a) rapid pulse, nervousness and constipation  
   b) urticaria, drowsiness and nausea and vomiting  
   c) Increased BP, ventricular tachycardia, and fibrillation  
   d) Respiratory depression, palpitations and urinary retention

14. Side effects of morphine include:
   a) respiratory depression, bradycardia and urinary retention  
   b) hypertension, bradycardia and urinary retention  
   c) hyperpnea, bradycardia and nervousness  
   d) hyperpnea, bradycardia and urinary retention

15. On the in patient unit, PCA is to be activated by:
   a) patient only  
   b) patient and/or nurse  
   c) patient and/or family  
   d) all of the above

16. PCA pump settings are to be verified with Physician orders:
   a) on initiation of therapy  
   b) at the beginning of each shift  
   c) upon transfer to another unit  
   d) all of the above

17. Assessments for adult patients receiving IV PCA include:
   a) chest x-ray to confirm placement  
   b) RR and sedation scale q2h x 24hrs  
   c) RR, sedation scale and VAS scale q4h and prn  
   d) RR, sedation scale and VAS q2h x24hrs and then q4h for duration of therapy
18. The care that would be required for a patient on PCA therapy with a respiratory rate of <10 and/or a decreased level of consciousness would include the following.
1) apply O2 as ordered
2) administer a bolus dose of narcotic
3) administer Narcan as ordered
4) notify anesthesiologist

   a) 1, 3 and 4
   b) 1 and 4
   c) 2
   d) 3

19. The actions that the nurse should take upon discovery that a patient’s level of pain control is not at an acceptable level would include:

   a) administer Narcan as ordered
   b) notify Anesthesiologist
   c) reposition the patient
   d) all of the above

20. At the end of a shift the nurse would perform the following for a patient with PCA:

   a) document number of attempts
   b) document number of injections
   c) document total number of milligrams
   d) all of the above
Section 2

Medical/Surgical

43 year old female
Post operative Open reduction internal fixation of left shoulder
Allergies: none to medication, Latex sensitivity
No history of respiratory problems (i.e. COPD, Asthma, Emphysema)
IV Ringers Lactate at 125cc/hr, change to saline lock when drinking well
Patient has a Regional Nerve block of Bupivacaine 0.125% running at 5cc/hr for the
first 24hrs post operatively but it has been gradually increased to 12cc/hr with little
pain relief.

Anesthesiologist has ordered the commencement of:
PCA Morphine
Dose: 2mg
Lock out Interval: 5 minutes
4Hour limit: 20mg

Using the scenario above please answer the following questions:

1. What is the first item you notice that needs to be clarified with regard to the PCA
orders?

2. What are the signs and symptoms you need to be observing for when a patient is
using PCA Morphine?

3. When reviewing the patient scenario, what is another order that might concern
you when your patient is receiving PCA?
Paediatrics

(1) You are setting up the PCA pump for a child with Sickle Cell. The child’s weight is 20 Kg. If the dose range for a continuous dose is 0.04 mg/kg, and the PCA dose is 0.04 mg/kg. What would the hourly limit be if there is a lockout/delay for PCA of 100 minutes?

- a. 1.4 mg
- b. 0.8 mg
- c. 1.6 mg
- d. 2.0 mg

(1) Clinical Care Area on the PCA pump would you choose for the above situation?

(1) You are setting up the PCA pump for a post-op paediatric patient. The Child’s weight is 36kg. The order reads to start the PCA dose at 1 mg. The lockout/delay is 10 minutes

- a. Is this PCA dose in the correct range?
- b. What would the hourly limit be?
Obstetrics

(1) For your laboring patient, the anesthesiologist has ordered IV PCA Fentanyl 20 mcg/ml concentration, with a dose range of 30-40 mcg. As per the order the IV PCA infusion is to start at 30 mcg, with a lockout interval of 5 minutes and a maximum 1 hour limit of 150 mcg. You obtain the syringe from pharmacy and note that the syringe is prepared with: Fentanyl 1mg in 50 ml normal saline. This concentration will provide Fentanyl 20 mcg/ml. At RVHS, with the LifeCare PCA Infusion system, what PCA dose will you enter into the pump?

a. 1 ml  
b. 1.5 ml  
c. 30 mcg  
d. 1 mg

(1) The maternal half life of Fentanyl is:

a). 1-6 hours  
b). 3-5 minutes  
c). less than one hour  
d). unable to determine

(1) Maternal side effects of Fentanyl may include:

a). respiratory depression  
b). tachycardia  
c). seizures  
d). all of the above

(1) One fetal side effect of Fentanyl may be decreased FHR variability?

a). true  
b). false