TRIHEALTH, INC.
NURSING POLICY

TITLE: PATIENT CONTROLLED ANALGESIA (PCA) **(NUR-35)**	
SKILL LEVEL: RN	
IMPLEMENTED DATE: 04/98	**REVIEWED/REVISED DATE(S): 12/08, 09/10, 02/12, 09/13, 05/15, 11/16, 06/17, 09/17, 04/18**
AFFECTED AREAS: TriHealth Nursing	
POLICY OWNER: TriHealth Pain Committee	
APPROVED BY: Corporate Nursing Policy & Procedure Committee, Practice Council and Site CNO's	
APPROVAL SIGNATURE: (Signed Originals on File) _____ **Practice Council** _____ **Site Chief Nursing Officer, Bethesda North Hospital** _____ **Site Chief Nursing Officer, Good Samaritan Hospital**	

Related Policies: Subcutaneous Infusion; Medication, Titration of Continuous Infusions in Adult Patients

Policy Statement: This policy guides the care of all patients receiving PCA at TriHealth. The TriHealth PCA flow sheet is to be utilized when a patient is receiving PCA analgesia. For continuous infusions of Morphine, Lorazepam, Midazolam and Fentanyl please follow the Titration of Continuous Infusions in Adult Patients.

Definitions:

Patient controlled analgesia (PCA) -- refers to the administration of IV analgesia by the patient using a programmed delivery method. In the majority of cases, PCA is used for post-operative pain management. (Pasero & McCaffery, 2011) On demand dosing of opioids at a set minimum interval may be used with or without a continuous infusion. Patient control of boluses allows a patient to self-administer and control the prescribed dose of medication.

End tidal Carbon Dioxide ($EtCO_2$) -- refers to the amount of carbon dioxide produced at the end of each breath. $EtCO_2$ monitoring (Capnography) provides the earliest detection of hypoventilation and no breath. When the ability to exhale is compromised, such as in hypoventilation or airway obstruction, CO_2 removal will fall behind production and arterial CO_2 will accumulate. CO_2 levels and respiratory rates are inversely related. As respiratory rates decrease, CO_2 accumulates and vice versa. For example: a person hypoventilating with a low respiratory rate can have high levels of $EtCO_2$ and a person hyperventilating will have low levels of $EtCO_2$.

Opioid tolerant -- Patients who are on as least one week of schedule opioid analgesics equivalent or exceeding 60 mg of morphine-equivalents per day. This equals at least daily doses of morphine 60 mg or oxycodone 30 mg. or hydromorphone 8 mg or fentanyl transdermal patch 25 mcg/hr or oxymorphone 25 mg. (FDA, 2014)

Opioid naïve -- Any patient who has not received opioids on a regular basis for two weeks prior to admission, home visit or clinic visit. (FDA, 2014)

Available PCA Options- All patients will initially receive a PCA from the 'Naïve' column. If it is determined their pain control needs require frequent PCA syringe exchanges, or the current safety settings on the syringe pumps do not allow for the doses to be administered the pharmacy should be contacted to adjust the PCA entry in the EMR to dispense a "tolerant" option.

PCA Options for Naïve Patients	PCA options for the Tolerant Patients
Morphine 30mg/ 30ml	Morphine 250mg/ 50ml
Hydromorphone 30mg/ 30ml	Hydromorphone 60mg/ 60ml
Fentanyl750mcg/ 30mg	Fentanyl 2500mcg/ 50ml

Procedure:

- The continuous mode or basal rate is not routinely used for opioid naïve patients, sleep apnea patients, and patients with renal impairment or the elderly. (Polomano, et al, 2008), (San Diego Patient Safety Task Force, nd). Continuous or basal rate may be used for an opioid tolerant patient. For opioid tolerant patients, including palliative care patients, you may consult the pharmacist for equianalgesic dose calculation assistance.

- PCA on demand dosing may also be used as a backup medication for other routes of pain control in special populations (examples: Palliative Care, Oncology and Orthopedics) or during the weaning process of changing the patient from IV pain medications to oral medications. In selected populations with severe pain, such as orthopedics, the physician managing the pain regimen may order oral analgesic medication and IV PCA. This type of regimen is ideally managed by one physician. (Pasero & McCaffery, 2011). Patients can receive IV or subcutaneous PCA in all care settings including inpatient, ICU and home.

- Alaris $EtCO_2$ monitor will be worn by all patients on intravenous PCA infusion for the first 24-hours and can be extended with a physician order.

- This therapy should be used with caution with patients with altered mental status, psychological instability, or who are intellectually or physically challenged.

- Only PCA orders written through TriHealth Connect will be filled by Pharmacy. The provider should select orders based on whether the patient is opioid naïve versus opioid tolerant. Orders for continuous infusions are contained within the opioid tolerant orders (Weber, et al, 2008).

- The PCA line may be infused with compatible solutions and/or medications. Never prime PCA tubing while connected to the patient.

- Verify that the label on the PCA cord reads "Only the patient should press this button." (Pasero & McCaffery, 2011).

- Using pain booklets and verbal instructions, covering rationale and operations of the pump pre-operatively is the best approach. If the patient is experiencing pain and is unable to administer a PCA dose, instruct family members to contact the nurse.

- Assess the patient every hour for the first 6 hours upon initiation and dosage increase or interval change, then at least every 2 hours.

- Documentation on the PCA flow sheet is started by the RN starting the therapy and ends with discontinuation of the PCA therapy.

- The Patient's family will be instructed that ONLY the patient pushes the PCA button. (Pasero & McCaffery, 2011), (San Diego Patient Safety Task Force, nd).

- Two nurses need to verify the right dose, right drug/dilution, right rate, and right mode and right patient against the physician order (San Diego Patient Safety Task Force, nd) and both document on the PCA flow sheet with date, time & initials whenever:

    - Initial syringe set up and change of dose is made
    - There is a change in caregiver
    - The medication is changed to another narcotic
    - The basal or PCA rate is changed
    - The patient has transferred from another unit, the operating room or post anesthesia care unit

  - The infusion is discontinued or narcotic is wasted. (ISMP, 2008), (Paul, et al, 2010), (ISMP, 2007).
  - Call the sending unit to resolve any discrepancies noted

- Total drug infused (mg or mcg) will be documented and volume cleared at 6am, 2pm, and 10pm. The total drug infused (mg or mcg) and the number of attempts made to receive the drug is recorded. The pump will retain a rolling 24 hours history.

- If there is a change of drug or concentration, the pump memory should be cleared. The totals infused at the time of change are documented on the PCA flow sheet. Record changes on the flowsheet.

- PCA tubing is changed every 96 hours and PCA syringe every 24 hours.

- Call Physician

  - If patient's pain is not controlled
  - An increase in $EtCO_2$ of 10 mmHg from baseline or > 60mmHg, respiratory rate <6, sustained for longer than 15 minutes. (physician may order different parameters).
  - $EtCO_2$ greater than 50 mmHg sustained for longer than 15 minutes (physician may order a different parameter).
  - $EtCO_2$ less than 10 mmHg sustained for longer than 15 minutes (physician may order a different parameter).
  - Respiratory rate less than 6 sustained for longer than 15 minutes (physician may order a different parameter).

- If patient is overly sedated (level 4 or greater on Sedation Scale of 1-5) or respirations of 10 or less per full minute - Stop pump and administer Narcan as ordered. (Chumbley & Mountford, 2010).

- If PCA is no longer appropriate treatment for the patient. Obtain an alternate form of pain management when physician is contacted.

- For medications administered by the PCA pump as a continuous infusions (such as, Morphine, Lorazepam, Fentanyl or Midazalam) the use of the PCA flow sheet is not required along with the associated assessments.

- When a patient on a PCA pump (continuous or intermittent) is moved within the facility the RN will provide SBAR report on the "Ticket to Ride" indicating the drug as well as the dose. The RN will also provide the receiving unit verbal report indicating the patient has a PCA pump with the ordered medication and dosage.

- When the patient with a PCA pump is moved from one facility to another (e.g. BNH nursing floor to Radiation facility) the patient will be moved by Patient Transport Service utilizing MICU Transport Team (PTS Dispatch Guidelines, 2017)

Admission Documentation

Record in appropriate section of the medical record and TriHealth PCA flow sheet.

Direct Inquiries to:
Competency: Patient Controlled Analgesia, #MS20
Pain Management Committee

References:

Chumbley, G., Mountford, L.(2010). Patient-controlled analgesia infusion pumps for adults. *Nursing Standard*, *25(8)*, 35-40.

FDA. (2014). FDA Blueprint for Prescriber Education of Extended-release and long acting opioid analgesics. Retrieved from http://www.fda.gov/downloads/Drugs/DrugSafety/Information%20by%20drug%20class/UCM277916.pdf

ISMP. Misprogramming PCA concentration leads to dosing errors. *Sentinel Event Alerts*/ August 28, 2008 issue. Retrieved February 8, 2012 from http://www.ismp.org/d/specialfollowup.pdf. Level VI.

ISMP. The five rights: A destination without a map. *ISMP Medication Safety Alert.* 2007,12*(2)* retrieved January 30, 2008 from http://www.ismp.org/newsletters/acutecare/articles/20070125.asp.Level VI.

Maddox, R.R., Williams, C.K. (2012). Experience with capnography for PCA patients. Anesthesia Patient Safety Foundation, 26*(3),* 47-50.

Pasero, C., McCaffery, M. *Pain: Clinical manual. 3rd ed*. St. Louis: Mosby; 2011. Level VI

Pasero, C., (2015). Unconventional use of a PCA pump: Nurse-activated dosing. Journal of PeriAnesthesia Nursing, 30(1), 68-70. Doi:10.1016.j.jopan.2014.11.004

Patient Transport Services (2107). Patient transport Services Protocols (3/8/17)

Paul ,J.E., Bertram,B., Antoni. K., et al. (2010). Impact of a Comprehensive Safety Initiative on Patient-controlled Analgesia Errors. *Anesthesiology*,*113(6)*,1427-1432.

Polomano, R.C., Rathwell, J.P., Krenzischeck, D.A. & Dunwoody, C.J. (2008). Emerging trends and new approaches to acute pain management. *Pain Management Nursing*, 9(1), 33-41. Level VI.

San Diego Patient Safety Task Force. Patient Controlled Analgesia (PCA) Guidelines of Care for the Opioid Naïve Patient. http://www.hasdic.org/documents/Tool-Kit-PCA.pdf. Accessed January 31, 2012. Level VI.

Weber, L.M., Ghafoor, V.L., Phelps, P. (2008). Implementation of standard order sets for patient-controlled analgesia. *American Journal of Health System Pharmacists*, 15(65), 1184-1191. Level VI.

Evidence Table: yes

Alaris® $EtCO_2$ module pocket programming guide

What is end-tidal carbon dioxide (EtCO2)?

• A measurement of breath-to-breath exhaled CO2
• Reflects alveolar ventilation
• The EtCO2 module helps measure the respiratory rate by exhaled breath
• Continuous respiratory rate *(ventilation breath to breath)* monitoring indicates hypoventilation faster than SpO2 monitoring for opioid administration

Key steps to successful EtCO2 monitoring and patient-controlled analgesia (PCA)

• Patient and family education
• Proper FilterLine set positioning
• Adherence to established hospital protocols for assessment
• Sedation level assessment
• Respiratory rate and quality assessment
• Trend data assessment

To view EtCO2 display:

1. Attach patient disposable
2. Press CHANNEL SELECT
3. Press ENTER on keypad to retain view
4. Review display

To set/change alarm limits:

1. Press CHANNEL SELECT
2. Press LIMITS
3. Select limit parameter to be changed
4. Enter numeric value using keypad or up/down arrow keys
5. Press CONFIRM
6. Press MAIN SCREEN

To view EtCO2 trend data:

1. Press CHANNEL SELECT
2. Press TREND
3. Press PAGE UP and PAGE DOWN to navigate through trend data pages; move cursor using up/down arrow keys
4. Press ZOOM to change time period
5. To exit, press EtCO2
6. Press MAIN SCREEN

To view PCA/EtCO2 trend data:

NOTE: *Shared trend data can be viewed when the Alaris PCA module is attached to the same Alaris PC unit as the monitoring module.*

1. Press CHANNEL SELECT
2. Press OPTIONS
3. Select PCA/EtCO2 trend data, and navigate as described in “To view EtCO2 trend data section”
4. To exit, press EtCO2 Main
5. Press MAIN SCREEN

To change waveform height or time scale:
1. Press CHANNEL SELECT
2. Press OPTIONS
3. Select WAVEFORM HEIGHT or WAVEFORM TIME SCALE
4. Select 60 mmHg or 99 mmHg/5 or 10 seconds
5. Press MAIN SCREEN

To set/change pre-silencing alarm:
1. Press SILENCE to pre-silence monitoring alarms for 2 minutes

NOTE: *Infusion alarms will not be silenced.*

2. Press CANCEL SILENCE to cancel silence before 2 minutes

This guide includes selected information and suggestions, not comprehensive instructions on setting up and operating the Alaris System. For complete instructions with warnings and cautions, refer to the Alaris System directions for use. **carefusion.com**

End Tidal Carbon Dioxide ($EtCO_2$) Guidelines for use with PCA Infusion Pumps

Monitoring Guidelines:

A. Setup

1. Alaris $EtCO_2$ (Capnography) monitor will be worn by all patients on intravenous PCA infusion for the first 24 hours and can be extended with a physician order.
2. Assess and document respiratory rate, pulse oximetry reading, $EtCO_2$, sedation score, pain level (0-10), Every hour for six hours, then every 2 hours thereafter.
3. Instruct patient and family on the cannula and the $EtCO_2$ monitor.
4. The pre set alarm protocols:
   - **High $ETCO_2$ alarm setting is 50, RN/RT may adjust up to 60 using clinical judgment. Alarm limit >60 requires a physician order.**

   Any change to pre set alarm protocols below require a physician order:
   - **Low $ETCO_2$ 10**
   - **Adult respiratory rate high 35 and respiratory rate low 6**
   - **Pause time is set 1 below the low respiratory rate.**
   - **No breath alarm - Adult 30 seconds**
   - **Wave form time scale 5 seconds**
   - **FICO2 High is 8**
5. Oxygen may be delivered up to 5L through CapnoLine.

B. Patient monitoring and documentation

1. The $EtCO_2$ numerical value and respiratory rate will be documented in TriHealth Connect (EPIC) for the first 24 hours until therapy is discontinued or monitoring is discontinued by a physician order.
2. Monitoring may be suspended while the patient is eating or ambulating and resumed when finished.

C. Normal Values

1. End tidal CO_2 = 30-45 mmHg (Note: $EtCO_2$ under normal conditions can be 2-5 mmHg lower than an arterial $PaCO_2$ on an arterial blood gas sample. Normal $PaCO_2$ from an ABG sample is 35-45 mmHg).
2. Fractional Inspired Carbon Dioxide ($FiCO_2$) is 0 mmHg. This is the “O” baseline on the capnogram.
3. Adult respiratory rate 6 to 35.

D. The physician managing the PCA should be notified of the following:

1. An increase in $EtCO_2$ of 10 mmHg from baseline or > 60mmHg, respiratory rate <6, sustained for longer than 15 minutes. (physician may order different parameters).
2. $EtCO_2$ greater than 50 mmHg sustained for longer than 15 minutes (physician may order a different parameter).
3. $EtCO_2$ less than 10 mmHg sustained for longer than 15 minutes (physician may order a different parameter).
4. Respiratory rate less than 6 sustained for longer than 15 minutes (physician may order a different parameter).

E. Troubleshooting: **ALWAYS ASSESS YOUR PATIENT FIRST**

1. Excessive patient secretion or build-up of liquids in the airway tubing may occlude the sampling line.
2. Try disconnecting filter line set and then reattach.
3. If the alarm persists, change the nasal cannula tubing.
4. COPD patients with known chronic hypercapnic respiratory failure or morbidly obese (BMI>50) due to CO_2 retention may require an increase in the high $ETCO_2$ greater than 60. **Changes greater than 60 require a physician order.**
5. Consult RT (Respiratory) if additional troubleshooting is required.