

TITLE

MANAGEMENT OF PATIENT-CONTROLLED ANALGESIA (PCA) INTRAVENOUS INFUSIONS FOR ACUTE PAIN - ADULT

SCOPE

Provincial: Acute Care

DOCUMENT

HCS-292-01

APPROVAL AUTHORITY

Clinical Operations Executive Committee

INITIAL EFFECTIVE DATE

March 1, 2022

SPONSOR

Medical Director, Acute Pain Service, Department of Anesthesia, Calgary Zone

REVISION EFFECTIVE DATE

Not applicable

PARENT DOCUMENT TITLE, TYPE, AND NUMBER

Not applicable

SCHEDULED REVIEW DATE

March 1, 2025

NOTE: The first appearance of terms in bold in the body of this document (except titles) are defined terms – please refer to the Definitions section.

If you have any questions or comments regarding the information in this document, please contact Policy Services at policy@ahs.ca. The Policy Services website is the official source of current approved policies, procedures, directives, standards, protocols, and guidelines. Only the electronic version of this document, as hosted on the Policy Services website or www.ahs.ca, is valid.

OBJECTIVES

- To standardize medication administration by means of intravenous (IV) **patient**-controlled analgesia (PCA) for acute **pain** management in adult patients being cared for in a hospital setting.
- To outline safe care and monitoring requirements of patients following the administration of IV PCA.

APPLICABILITY

Compliance with this document is required by all Alberta Health Services employees, members of the medical and midwifery staffs, students, volunteers, and other persons acting on behalf of Alberta Health Services (including contracted service providers as necessary).

ELEMENTS**1. Points of Emphasis**

- 1.1 PCA is a method of delivering analgesic medications (i.e., opioids) intravenously by using a SMART (Safer Medication Administration through Technology) infusion pump that allows the patient to self-administer specific amounts of analgesic medication (PCA dose) by pushing a button on a hand-held control device (bolus button) to reduce their pain.
- 1.2 The modes of delivery for PCA IV are: PCA (bolus) only and PCA (bolus) plus continuous infusion.

- 1.3 An order from an **authorized prescriber** is required for:
- PCA IV initiation, dosage adjustments, parameters for dose adjustments, and discontinuation of the infusion.
- 1.4 Opioid medications administered via the IV route are **high-alert medications** (refer to the AHS *Management of High-Alert Medications* Policy Suite and supporting resources for education on Insite). Also refer to the AHS *Provincial Parenteral Manual* for information related to infusion medications.
- 1.5 An **independent double-check** (refer to the AHS *Independent Double-Check* Guideline and the AHS *Management of High-Alert Medications* Procedure) shall be performed when:
- initiating programming of the infusion;
 - administering a **clinician bolus** (via PCA);
 - adjusting pump parameters (where applicable); and
 - changing PCA solution bags.
- 1.6 Independent double-checks may be performed for any change in **pump settings** (i.e., dose adjustments), or as determined by site processes or the **health care professional** (this is called a “second check” in Connect Care).
- The health care professional shall request a co-sign to document in Connect Care from another health care professional who is competent to administer medication by means of IV PCA for analgesia.
- 1.7 Refer to the AHS *Vascular Access Device Infusion Therapy: Adult & Pediatric* Clinical Care Topic.
- 2. Health Care Professional Requirements**
- 2.1 Health care professionals performing activities related to the administration of PCA infusions shall follow regulatory and AHS organizational requirements for education and training. Zone requirements and/or educational resources are available on Insite.
- 3. Infusion Management Considerations**
- 3.1 When managing the IV PCA for analgesia, the health care professional shall:
- establish a maintenance line infusing concurrently to maintain patency of the venous access device;
 - assess each patient for pain using a valid **pain assessment tool** (refer to Appendix A: *Valid Pain Assessment Tools [Self Report –*

Unidimensional)). A pain management plan and/or functional pain goal(s) should be established with the patient;

- c) increase monitoring in patients receiving pain control by PCA plus continuous infusion as there is a greater risk of over-sedation and respiratory depression;
 - d) verify IV PCA pump settings and medications against the medication orders when the health care professional assumes care of the patient at the beginning of the shift and with any transitions in care as per the AHS *Invasive Infusion Line and Tubing Verification Policy*; and
 - e) deliver PCA IV infusion via the drug library of a SMART infusion pump.
- 3.2 If a patient experiences a clinical adverse event that could be attributed to the PCA IV infusion (including respiratory depression), the pump shall be sent to Clinical Engineering for investigation.

4. Infusion Preparation, Equipment, and Set-Up

- 4.1 Premixed PCA opioid solution for IV PCA administration is provided by Pharmacy. Communication with Pharmacy is required to ensure a sufficient supply of the IV PCA solution (e.g., provide updates on rate, usage).
- 4.2 Health care professionals at certain sites may be able to mix PCA solutions when Pharmacy Services has limited resources.
- 4.3 Equipment:
 - a) PCA solution bag labelled with the correct medication and concentration;
 - b) two (2) SMART infusion pumps, or one (1) SMART infusion pump with at least two (2) channels;
 - (i) One (1) pump/channel (with drug library) dedicated to the PCA IV infusion, and the other pump/channel is dedicated to the maintenance line.
 - c) SMART infusion pump access key;
 - (i) lock box if used at site;
 - d) manufacturer-recommended PCA tubing;
 - (i) with one (1) y-injection port near the proximal end for the maintenance IV line; or
 - (ii) with portless PCA tubing, connect to maintenance line with y-connector;

- e) IV infusion bag of maintenance solution; and
 - f) maintenance IV solution pump tubing.
- 4.4 For set-up, the health care professional shall:
- a) follow the manufacturer's instructions for priming the PCA IV tubing;
 - b) prime the maintenance IV solution tubing;
 - c) program the SMART infusion pump with the designated drug library for the IV PCA infusion according to the medication orders;
 - d) ensure the maintenance IV infusion line is prepared as ordered and rate is sufficient to maintain patency for delivery of the PCA medication;
 - (i) The maintenance IV infusion line is attached to the PCA line at the y-injection port on the PCA tubing or portless PCA tubing connected via y-port on the maintenance line.
 - e) connect the PCA IV tubing directly to the IV site cannula, injection cap, or a saline lock (also called extension set, y-connector). Extension tubing shall not be used;
 - f) clearly label the PCA IV tubing in accordance with the AHS *Invasive Infusion Line and Tubing Verification Policy*; and
 - g) close and lock the door to the PCA pump. Do not start the PCA infusion until Section 5 is completed.

5. Infusion Initiation

- 5.1 The health care professional shall confirm the presence of complete medication orders from an authorized prescriber on the patient's **health record** (refer to the AHS *Medication Orders Policy Suite*).
- 5.2 The authorized prescriber shall include the following in the medication orders:
- a) medication;
 - b) concentration;
 - c) route;
 - d) pump settings;
 - e) monitoring requirements;
 - f) naloxone; and

- g) other medication(s) to manage potential side effects such as nausea and vomiting or pruritus.
- 5.3 In accordance with the AHS *Medication Administration* Policy, the health care professional shall confirm that **informed consent** (express or implied) for the treatment/procedure (including medications to be administered) was obtained from the patient unless a valid exception to informed consent applies, as per the AHS *Consent to Treatment/Procedure(s)* Policy Suite.
- 5.4 Prior to initiation, the health care professional shall:
- a) confirm monitoring parameters, either as ordered, or per established PCA practices (e.g., AHS *Provincial Parenteral Manual*). Refer to Section 6;
 - b) review orders for opioid reversal agents (e.g., naloxone) and other medications for the management of potential expected side effects (e.g., antiemetics and antipruritics);
 - (i) Assess for any other actual or potential issues relevant to the use of PCA.
 - c) complete the baseline assessment, including but not limited to:
 - (i) pain score (refer to Appendix A: *Valid Pain Assessment Tools [Self Report – Unidimensional]*);
 - (ii) sedation level (refer to Appendix B: *Examples of Sedation Level Assessment Tools*); and
 - (iii) respiratory rate;
 - d) instruct the patient on the use of the PCA bolus button; and
 - e) provide patient education on:
 - (i) the use of the PCA bolus button and demonstrate;
 - Confirm the patient understands and has the ability to operate the PCA bolus button.
 - (ii) potential side effects and complications, and the importance of reporting these to the health care professional;
 - (iii) the rationale for only the patient to use the PCA button (and not the **family**);
 - Only patients are to administer PCA boluses, as proxy administration by family and/or friends may lead to potential complications (e.g., over-sedation, respiratory depression).

- 5.5 The health care professional shall confirm patient identity and perform an independent double-check prior to starting the PCA and maintenance infusion (refer to the AHS *Patient Identification Policy*).
- 5.6 Once Section 5 has been completed, the health care professional may start both infusions (IV PCA and maintenance solution).

6. Assessment, Monitoring, and Maintenance

- 6.1 Ongoing monitoring sequence and assessment shall include the pain score, sedation level, and respiratory rate. The monitoring sequence should be ordered by the authorized prescriber as follows:
- every hour for the first four (4) hours; then
 - every two (2) hours for the next eight (8) hours; and
 - every four (4) hours for the duration of the infusion.
- 6.2 Monitoring frequency shall be increased as indicated by patient condition, presence of PCA continuous infusion, or as ordered.
- 6.3 If a clinician bolus is given, the monitoring sequence shall be to monitor the pain score, sedation level, and respiratory rate:
- at five (5) minutes, 15 minutes, and one (1) hour after each clinician bolus administered; then
 - resume previous monitoring.
- 6.4 The health care professional shall revise the pain management plan and goals according to the patient's response.
- Adjustments to the PCA infusion may be required based on the patient's response within the parameters of the PCA medication orders.

7. Documentation

- 7.1 Health care professionals shall document all assessments, interventions, and responses to interventions in the patient's health record.
- 7.2 Initial documentation shall include the following:
- baseline patient assessment;
 - date and time of initiation;
 - medication(s);
 - route;

- e) pump settings;
 - f) pump identification number;
 - g) patient teaching;
 - h) assessment of patient's ability to use the PCA bolus button;
 - i) patient's response; and
 - j) any other relevant assessment findings, actual or potential.
- 7.3 Ongoing documentation shall include the following:
- a) assessments;
 - b) changes to PCA infusion dosage;
 - c) patient teaching;
 - d) patient's response to therapy;
 - e) any unexpected/adverse findings, including interventions taken; and
 - f) communication with members of the health care team, including the **most responsible health practitioner (MRHP)**.
- 7.4 The health care professional shall document the following with all transfers of care (e.g., from unit to unit, or hospital to hospital), or more frequently as per site process:
- a) PCA doses given;
 - b) PCA doses attempted;
 - c) total dose amount in milligrams per micrograms (mg/mcg); and
 - d) where applicable, clear pump totals.
- 7.5 All independent double-checks shall be documented in the health record.
- 7.6 Record the pump identification number in the patient's health record and with any pump exchange.

DEFINITIONS

Authorized prescriber means a health care professional who is permitted by federal and provincial legislation, their regulatory college, Alberta Health Services, and practice setting (where applicable) to prescribe medications.

Clinician bolus (via PCA) means the administration of extra dose(s) of the opioid analgesic to the patient by the health care professional. A clinician bolus is typically equal to the ordered PCA dose. It is given when a patient reports moderate to severe pain in order to quickly improve and manage pain.

Family means one or more individuals identified by the patient as an important support, and who the patient wishes to be included in any encounters with the health care system, including but not limited to, family members, legal guardians, friends, and informal caregivers.

Health care professional means an individual who is a member of a regulated health discipline, as defined by the *Health Professions Act* (Alberta), and who practises within scope and role.

Health record means the collection of all records documenting individually identifying health information in relation to a single person.

High-alert medications means medications that bear a heightened risk of causing significant patient harm when used in error. (Institute for Safe Medication Practices [ISMP], 2012).

Independent double-check means a verification process whereby a second health care professional conducts a verification of another health care professional's completed task. The most critical aspect is to maximize the independence of the double-check by ensuring that the first health care professional does not communicate what they expect the second health care professional to see, which would create bias and reduce the visibility of an error.

Informed consent means the patient's agreement (or alternate decision-maker) to undergo a treatment/procedure after being provided, in a manner the patient can understand, with the relevant information about the nature of the treatment/procedure(s), its benefits, potential risks and alternatives, and the potential consequences of refusal.

Most responsible health practitioner (MRHP) means the health practitioner who has responsibility and accountability for the specific treatment/procedure(s) provided to a patient and who is authorized by Alberta Health Services to perform the duties required to fulfill the delivery of such a treatment/procedure(s), within the scope of their practice.

Pain means a subjective experience encompassing both noxious sensation and suffering. Pain is best understood from the patient's perspective and description of that experience. The patient's experience of pain is expressed within the context of the illness, family, social network, community, culture, and spiritual orientation. The patient's pain affects this matrix of relationships and is in turn altered by them.

Patient means all persons, inclusive of residents and clients, who receive or have requested health care or services from Alberta Health Services and its health care providers. Patient also means, where applicable:

- a) a co-decision-maker with the person; or
- b) an alternate decision-maker on behalf of the person.

Pump settings means the mode of delivery that is programmed into the SMART pump that may include but is not limited to the following: continuous rate, continuous plus bolus, intermittent bolus, clinician bolus, bolus dose, bolus lockout interval, and hourly limit.

REFERENCES

- Appendix A: *Valid Pain Assessment Tools (Self Report - Unidimensional)*
- Appendix B: *Examples of Sedation Level Assessment Tools*
- Alberta Health Services Governance Documents:
 - *Consent to Treatment/Procedure(s) Policy Suite (#PRR-01)*
 - *Independent Double-Check Guideline (#PS-60-01)*
 - *Invasive Infusion Line and Tubing Verification Policy (#PS-15)*
 - *Management of High-Alert Medications Policy Suite (#PS-46)*
 - *Medication Administration Policy (#HCS-244)*
 - *Medication Orders Policy Suite (#PS-93)*
 - *Patient Identification Policy (#PS-06)*
- Alberta Health Services Resources:
 - *Provincial Parenteral Manual*
 - *Vascular Access Device Infusion Therapy: Adult & Pediatric Clinical Care Topic*

© 2021, Alberta Health Services, Policy Services



This work is licensed under a Creative Commons Attribution-Non-commercial-Share Alike 4.0 International license. The licence does not apply to AHS trademarks, logos or content for which Alberta Health Services is not the copyright owner. This material is intended for general information only and is provided on an "as is", "where is" basis. Although reasonable efforts were made to confirm the accuracy of the information, Alberta Health Services does not make any representation or warranty, express, implied or statutory, as to the accuracy, reliability, completeness, applicability or fitness for a particular purpose of such information. This material is not a substitute for the advice of a qualified health professional. Alberta Health Services expressly disclaims all liability for the use of these materials, and for any claims, actions, demands or suits arising from such use.

APPENDIX A**Valid Pain Assessment Tools (Self Report - Unidimensional)**

Measure	Indicator	Considerations
Numeric Rating Scale (NRS)	<ul style="list-style-type: none"> Asks patients to rate their pain from 0 to 10 Scored 0-10 with the anchors of 0 being no pain and 10 being pain as bad as it can be 	<ul style="list-style-type: none"> Used in adults, older adults Well established evidence of reliability, validity and ability to detect change Quick and easy to use
Modified Verbal Descriptor Scale (VDS)	<ul style="list-style-type: none"> A list of adjectives used to describe different levels of pain intensity 4 point (or more) VDS descriptors (e.g., no pain, mild, moderate and severe) 	<ul style="list-style-type: none"> Used with adults to explain pain intensity (no pain is 0, mild is 1 to 3, moderate 4 to 6, severe 7 to 10) Established validity and reliability
Faces Pain Scale - Revised (FS-R)	<ul style="list-style-type: none"> Revised to be compatible with scoring with other self-rating scales 6 gender neutral faces range from No pain to as much pain is possible Scored 0 to 10 	<ul style="list-style-type: none"> Intended for use in children and the elderly. Well established evidence of reliability, validity and ability to detect change Quick and easy to use

Note: Other valid self-report unidimensional and multidimensional pain assessment tools are available. In addition, valid behavioural pain assessment tools are available for adults and elders unable to self-report pain.

APPENDIX B**Examples of Sedation Level Assessment Tools**

Measure	Indicator	Reference
Pasero Opioid-Induced Sedation Scale (POSS)	1 = Awake and alert 2 = Slightly drowsy, easily aroused 3 = Frequently drowsy, arousable, drifts off to sleep during conversation 4 = Somnolent, minimal or no response to verbal and physical stimulation S= Normal sleep, easy to arouse	Pasero C. Assessment of sedation during opioid administration for pain management. J PeriAnesthesia Nurs. 2009 Jun;24(3):186-90.
Richmond Agitation Sedation Scale (RASS)	+4 = Combative +3 = Very agitated +2 = Agitated +1 = Restless 0 = Alert and calm -1 = Light sedation -2 = Moderate sedation -3 = Deep sedation -4 = Unarousable	Ely EW, Truman B, Shintani A, Thomason JWW, Wheeler AP, Gordon S, et al. Monitoring sedation status over time in ICU patients: the reliability and validity of the Richmond Agitation Sedation Scale (RASS). JAMA 2003; 289:2983-2991.
Ramsay Scale (RS)	1 = Awake, patient anxious and agitated or restless or both 2 = Awake, patient cooperative, orientated and tranquil 3 = Awake, patient responds to commands only 4 = Asleep, a brisk response to a light glabellar tap or louder than usual conversation level 5 = Asleep a sluggish response to a light glabellar tap or loud verbal commands or strong glabellar tap 6 = Asleep, no response to a light glabellar tap or loud noise	Ramsay MA, Savege TM, Simpson BR, Goodwin R. Controlled sedation with alphaxolone-alphadalone. BMJ. 1974; 2:656-659.

Note: Other tools are available to assess sedation level. These are examples of tools that are used in AHS settings. Refer to your program resources for instructions on assessment and documentation when using these or other sedation level assessment tool.