

Ketamine (Low Dose): Continuous Intravenous Infusion**Related Standards & Resources**

1. Parenteral Drug Therapy Manual – Monographs - [Ketamine](#)

Skill Level: Advanced skill:

Registered Nurses knowledgeable about pharmacology, principles of pain management and with infusion pump education (Q3 yearly review) working on Medical-Surgical areas, Outpatient Anesthesia Pain Clinic, Palliative Care unit and in Critical Care areas (not on 1 south, Mental Health units, Residential Care or Holy Family Rehab Unit)

Need to Know:

1. Low dose (2 to 30 mg/hour) ketamine is used to treat:
 - Neuropathic pain
 - Incident pain associated with multiple bone metastases or other painful conditions
 - Hyperalgesia
2. Ketamine is an anesthetic agent and a NMDA (N-Methyl-D Asparate) receptor antagonist that clinical evidence has shown helps to reduce neuropathic pain, incident pain such as a painful procedure i.e. wound packing, and hyperalgesia (uncontrolled increasing pain).
3. After I.V. or S.C. administration, onset is rapid, usually within 30 seconds, with duration of 5 to 10 minutes.
4. Potential side effects to watch for with an IV ketamine infusion include:
 - Tachycardia
 - Dysphoria (disquiet or restlessness)
 - Hypertension
 - Salivation
 - Nausea
 - Emergence phenomena which include the following:
 - Dysphoria
 - Vivid dreams
 - Excitement/agitation
 - Irrational behavior
 - Confusion
 - Hallucinations
5. When low dose ketamine is used these potential side effects are infrequent.

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6. The co-administration of protective agents such as benzodiazepines helps minimize and prevent side-effects.
7. Ketamine preserves respiratory drive and self-protective muscles; therefore the risk of respiratory depression is minimal.
8. There are no antagonists to ketamine.

PRACTICE GUIDELINE

Equipment:

1. Alaris pump and Alaris IVAC tubing OR Smith CADD Solis pump (Only on Palliative Care Unit)

Assessment:

A) Initial

Baseline pulse, blood pressure, respiratory rate, POSS **or** RASS sedation level, orientation to date, time, place and person, pain score and patient's desired comfort level.

B) Ongoing

1. Assess Q1H x 4 hours: BP & P, [Pasero Opioid Sedation Scale](#) (POSS) sedation level (if IV ketamine used with opioids) **or** [Richmond Agitation & Sedation Scale](#) (RASS) sedation level (if IV ketamine used only with no opioids), respiratory rate & pain score, then
2. Assess Q4H and PRN: BP & P, POSS (with opioids) sedation level **or** RASS (without opioids) sedation level, respiratory rate & pain score.
3. Monitor every 4 hours for potential side effects.

Interventions:

Note: concentration of medication in bag (**mg/mL**) and dose ordered as **mg/h**.
RN's need to **calculate the infusion rate in mL/h** according to the concentration

Two RNs independently double check drug concentration (mg/mL), ordered dose (mg/h) and infusion rate in mL/h then cosign when initiated or medication bag changed

1. Ketamine to be infused using an Alaris pump or Smith CADD Solis pump (only in Palliative Care). Programming is in mL/h and is dependent on the concentration of the ketamine in the medication bag sent from pharmacy. E.g. If the ketamine is in 5 mg/mL concentration and the prescriber order reads "infuse ketamine IV at 10 mg/h" the pump should be programmed to deliver 2 mL/h.

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2. Notify Acute Pain Service /Chronic Pain Service or Palliative Care physician (depending on the service the patient is covered by) if :
 - Inadequate pain control (i.e. pain rating greater than patient's desired comfort level for 3 consecutive pain ratings)
 - POSS Sedation score = 3 or greater (see [Appendix A](#))

or

 - RASS Sedation score = - 3 to 5 (see [Appendix B](#))
 - Respiratory rate less than 8/min.
 - Patient has dysphoria
3. If patient has dysphoria (disquiet, restlessness) or vivid dreams. Note: This may be treated with low dose benzodiazepines (e.g. lorazepam or oxazepam), and encouraging the patient to listen to music of his/her choice or to engage in a pleasant activity. Reassure the patient that these side effects should decrease.
4. Care for patient in a quiet, calm, space.

Patient and Family Education:

1. Review the potential rare side effects of dysphasia, vivid dreams, salivation, cardiac stimulation (tachycardia with the patient).
2. Let patient know that we need their help reporting their level of pain so that we can try to keep their discomfort within his/her comfort zone.

Documentation:

For Medical-Surgical, Palliative and Critical Care areas:

1. 24 hour Patient Care Flowsheet
****OR****
Palliative Care Unit Nursing Flowsheet and Palliative Care Unit Interdisciplinary Progress Record:
 - Record initiation of ketamine infusion
2. 24 hour Pain Management flow sheet:
 - Record pain scale, sedation score, respiratory rate and side effects.
 - Record the ketamine IV concentration in **mg/mL** under "drug & concentration" and the infusion rate in **mL/h** under the "continuous infusion rate". (The Alaris and CADD pumps are both programmed in mL/h)
e.g. If the ketamine prescriber's order reads "infuse ketamine IV at 10 mg/h of ketamine 1 mg/mL" then record the infusion in mL/h as 10 mL/h
3. Clinical Record:
 - Record BP and Pulse

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4. Medication Administration Record (MAR):
 - Record the initiation of ketamine intravenous infusion
 - Two RNs independently double check drug concentration (mg/mL), ordered dose (mg/h) and infusion rate in mL/h then co-sign MAR when initiated or medication bag changed
 - Bracket the intravenous administration and drug dose parameters for the hours of duty RN administering medication worked
 - Initial the time stopped ketamine intravenous infusion

For Outpatient Anesthesia Pain Clinic:

1. Pain Clinic Anesthesia Treatment Records (PHC-OP094)
 - Record initiation of ketamine infusion, ketamine concentration and infusion rate
 - Record pain scale, sedation score, respiratory rate, BP, pulse and side effects as per protocol
2. Medication Administration Record (MAR)
 - Record initiation of ketamine intravenous infusion
 - Two RNs independently double check drug concentration (mg/mL), ordered dose (mg/h) and infusion rate (mL/h) then co-sign MAR when initiated or medication bag changed
 - Initial the time ketamine intravenous infusion stopped

References:

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Appendix A

Pasero Opioid-Induced Sedation Scale (POSS)		
Score	Meaning of Score	
S	Sleep, easy to rouse	Acceptable ; no action necessary; may increase opioid dose if needed
1	Awake and alert	Acceptable ; no action necessary; may increase opioid dose if needed
2	Slightly drowsy, easily roused	Acceptable ; no action necessary; may increase opioid dose if needed
3	Frequently drowsy, rousable, drifts off to sleep during conversation	<p>Unacceptable;</p> <ul style="list-style-type: none"> remove PCA button if in use, hold next oral dose of opioid and NOTIFY prescriber /APS for adjustment of opioid orders monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory consider administering a non-sedating, non-opioid analgesic for pain i.e. acetaminophen or NSAID
4	<p>Somnolent, minimal or no response to verbal and physical stimulation</p> <p>(use trapezius muscle squeeze for physical stimulation - do not use sternal rub)</p>	<p>Unacceptable;</p> <ul style="list-style-type: none"> stop opioid oxygen by mask 10 L/min and monitor vital signs administer naloxone as per order IMMEDIATELY page Prescribing Service STAT PROVIDE AIRWAY and BREATHING SUPPORT DO NOT re-commence opioid therapy prior to patient being seen by the prescribing service physician

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Appendix B

Richmond Agitation and Sedation Scale (RASS)		
+ 4	Combative	Violent, immediate danger to staff
+ 3	Very Agitated	Pulls or removes tube(s) or catheter(s); aggressive
+ 2	Agitated	Frequent non purposeful movement, fights ventilator
+ 1	Restless	Anxious, apprehensive but movements not aggressive or vigorous
0	Alert and calm	
- 1	Drowsy	Not fully alert, but has sustained awakening to voice (eye opening and contact greater than or equal to 10 seconds)
- 2	Light Sedation	Briefly awakens to voice (eye opening and contact less than 10 seconds)
- 3	Moderate Sedation	Movement or eye opening to voice but no eye contact
- 4	Deep Sedation	No response to voice, but movement or eye opening to physical stimulation
- 5	Unarousable	No response to voice or physical stimulation