

Exhibit A:
Low-Dose Ketamine Infusion Reference Guide

What is Ketamine?

- Ketamine is an N-methyl-D-aspartate (NMDA) receptor antagonist.
- For purposes of this guideline, “low dose” will be defined as Ketamine for analgesic use that is limited to doses < 0.3mg/kg/hr up to a maximum dose of 30 mg/hr.

What does it do?

- Ketamine is an anesthetic that in low doses works as an analgesic. In low doses, Ketamine **reverses hyperalgesia** (heightened pain sensitivity) and **opioid tolerance**.
- Ketamine inhibits the reuptake of dopamine and serotonin and elevates circulating epinephrine and norepinephrine levels, **thus increasing the heart rate, blood pressure, cardiac output and vascular resistance. (See “What Do I Need To Know”)**
- Ketamine reduces the overall amount of opioids used to medicate the patient. The patient may require additional medication for pain, including opioids for pain control, but the total amount needed may be less.
- May provide analgesic benefit for patients with neuropathic pain

How does it work?

- Ketamine binds to receptors in both the peripheral nervous system and central nervous system as an antagonist to the NMDA receptors. Ketamine inhibits the binding of excitatory amino acids to these receptors, blocking the transmission of painful stimuli.
 - Onset for IV Loading Dose: Within 30 seconds with full effect within one minute.
 - Half-Life of Ketamine: 2 to 3 hours after discontinuation of the infusion

What do I need to know?

- Patients with known seizure disorders and/or known elevated intracranial pressure should not receive low-dose Ketamine infusions
- **Precaution should be taken for** patients with tachycardia, hypertension, or head injuries (ketamine can raise intracranial pressure)
- **Potential Adverse Effects and Treatment** include:
 - Vomiting
 - Increased salivation (Glycopyrrolate or Atropine as ordered)
 - Increased intracranial pressure
 - Vivid dreams/Hallucinations (common) - **Lorazepam as ordered**
 - Anxiety (common)- **Lorazepam as ordered**
 - Hypotension
 - Hypertension

What do I need to do?

Acute Pain Service (APS) Nurse

- Confirm baseline (pre infusion) vital signs are on the patient flow sheet
- Complete a baseline pain and sedation assessment
- **Program the secure infusion device according to Ketamine order set.**

- Independent Double Check initiation of therapy, changes in programming and loading doses with bedside RN or APS Team member
- Documentation of patient assessment and side effects

Bedside RN

- Confirm baseline (pre infusion) vital signs are on the patient flow sheet
- Complete a baseline pain and sedation assessment
- Program IV pump with maintenance solution (e.g. carrier fluid)
- **Designate IV site for Ketamine Infusion.**
- Obtain pump for maintenance IV fluid, secure infusion device/s (i.e. PCA pump), appropriate tubing and pump keys.
- Once medication is received from pharmacy, check that it is labeled correctly and verify medication to patient.
- Setup IV tubing when Low Dose Ketamine and Opioid PCA are delivered with the same carrier fluid and IV site with the Opioid PCA being the closest to the site of entry.
- Notify the APS Team when the secure infusion device and medication is available for the APS Team to initiate therapy.
- Independent Double Check, initiation of therapy, changes in programming and bolus doses with APS Team member (Nurses/Physicians)
- Monitor for any ketamine-related side effects (for example, hallucinations, increased salivation, hypertension)
- Shift Check/Safety Check
- Clear total given each day (between 2300 and 2400)

Documentation:

- Vital signs with pulse oximetry, pain assessment and sedation score per medication orders
- Pain assessment and side effects per medication orders
- Amount of medication (in milligrams) given and clearing total given each day between (2300-2400)

APS Team

- APS physician/nurse will be present for administration of all loading doses and initiation of a low-dose Ketamine Infusion
- Will respond to changes in patient condition and/or questions

REMEMBER

➤ *Low Dose Ketamine Infusion* is **ONLY** to be ordered by the Acute Pain Service.

This includes;

Initiation of therapy

Bolus dose

Adjustments to rates and 1 hr. limit

➤ *Notify the APS Team when the secure infusion device and medication is available for the APS Team to initiate therapy*

➤ *Notify the appropriate pain service for issues or questions regarding the Low Dose Ketamine:*

-Adult Acute Pain Service

-Pediatric Acute Pain Service

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