

Ketamine

(Controlled substance - proper use/waste documentation required per site policy)

Drug classification: General anesthetic, N-methyl-D-aspartate (NMDA) antagonist

Pharmacokinetics:

- Bioavailability: Oral 16%, sublingual 30%, intramuscular 93%, rectal and topical bioavailability poor
- Protein binding 20-30%, volume of distribution (2.5-3.5 L/kg), distribution half-life 7-11 minutes
- Onset/duration of effect:
 - Analgesic effect: Onset: Oral/subcutaneous: 15-20 minutes, IV: rapid onset, duration: 2-6 hours, up to 24 hours
- Metabolism: Hepatic via hydroxylation and N-demethylation to active metabolite = norketamine (~ 1/3rd as potent as parenteral ketamine as an anesthetic)
- Elimination: Primarily renal, half-life 1-2 hours (ketamine), 2.5-3 hours (norketamine)

Usual indications: Induction and maintenance of general anesthesia, pain management for refractory pain/hyperalgesia, and sedation

Standard drip preparation:

- IV continuous infusion: 2 mg/mL (500 mg in 250 mL sodium chloride 0.9%)
- Subcutaneous infusion: 4 mg/mL (400 mg in 100 mL sodium chloride 0.9%), requires infusion via subcutaneous pump (i.e. Kerlin® pump)

Administration Guidelines

Dosing:

- Pain management: Subanesthetic doses are utilized for pain management
 - Ketamine IV continuous infusion, start at 0.05 mg/kg/hr, titrate by 0.05 mg/kg/hr every 4 hours until goal: <provider to determine goal>, max 0.3 mg/kg/hr
 - Ketamine subcutaneous continuous infusion, start at 0.08 mg/kg/hour, titrate by 0.08 mg/kg/hr every 8 hours until goal: <provider to determine goal>, max 0.4 mg/kg/hr
 - Ketamine 0.5 mg/kg PO every 6 hours, mix with orange juice for administration (alternatives: fruit juice or syrup)
- Induction and maintenance of general anesthesia (requires presence of anesthesiologist)
 - Ketamine 0.5 mg - 2 mg/kg IV followed by continuous infusion of 15-90 mcg/kg/minute (0.9 - 5.4 mg/kg/hour)

Monitoring:

- Vital signs/sedation level/pain score: baseline, then every 15 minutes for 1 hour then every 4 hours during infusion. Repeat with any dose adjustments.
- Pulse oximetry: baseline, every 15 minutes for 1 hour, then every 4 hours during infusion

Complications

- Adverse reactions are less with the oral route, are dose related and can be minimized with prophylactic measures (prophylaxis with benzodiazepines is recommended)
- Adverse reactions can include:
 - CNS: Psychotomimetic phenomena (delirium/hallucinations), dizziness, diplopia, blurred vision, nystagmus, altered hearing
 - CV: Hypertension, tachycardia
 - GI: Hypersalivation, nausea and vomiting
 - GU: renal toxicity (*high doses, prolonged duration > 5 months, reversible*)
 - Erythema and pain at injection site

Additional Information

- High-dose IV infusions require anesthesiologist.
- Low-dose IV infusions for pain management are approved use by the palliative care/hospice/oncology/intensivist providers only. Administration is restricted to 7th medical or 7th ICU floors. Ketamine is expected to be used concurrently with narcotic medications.

References: J Palliat Med 2010;13(7):903-8, J Palliat Med 2011;14(9):1074-77, Eur J Pain (2009), doi:10.1016/j.ejpain.2009.09.005, J Palliat Med 2012;15(4):474-83, AAHPM Concurrent Session 2012 AAHPM & HPNA Annual Meeting, Ketamine drug information, copyright 1978-2012 by Lexicomp, Inc.