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WHITE PAPER

Ketamine: How, when, why, and why not for Maine EMS Providers

Opiates and benzodiazepines have been mainstay medications for managing pain and anxiety in patients treated in the field and in the hospital. Both classes, however, come with significant risk, particularly when it comes to the risk of respiratory depression. The EMS provider who cannot not manage a patient's pain or anxiety with those two classes of medications without risking respiratory depression and other side effects is often left without suitable alternatives.

For this reason, the Medical Directions and Practice Board will be adding ketamine to the 2017 protocols as an alternate agent in select protocols. Specifically, it will be available for management of anxiety and agitation in the patient undergoing non-invasive positive pressure ventilation, as an alternative or adjunct agent for the management of acute pain in many conditions, and as an adjunct agent for the management of the patient with agitated (excited) delirium who poses a threat to himself.

Ketamine has some unique attributes that makes it a useful tool for EMS providers. Unless a large dose is pushed quickly IV, it rarely causes respiratory depression, even when given in the highest doses. It is effective through almost any route. It actually increases heart rate and blood pressure rather than causing the cardiovascular depression seen with opioids. In short, it treats pain and anxiety in one package without causing respiratory or cardiovascular depression. Historically there was a belief that it was contraindicated in patients with head injuries or other potential causes of increased intracranial pressure but this has been disproven and there are now many head injury centers that use ketamine preferentially as a sedating agent.

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With offices located at the Central Maine Commerce Center, 45 Commerce Drive, Suite 1, Augusta, ME 04330

Ketamine is not without its issues. Nausea and vomiting are typical at sedating doses and may occur even with sub-sedating doses. It can cause hypersalivation (increased secretions), potentially requiring some suctioning in a patient who has an altered mental status (although a conversation with OLMC for a little dose of atropine can address this). It is a derivative of phencyclidine (PCP) and patients may experience mild agitation and dissociative hallucinations. Although this typically happens only with sedating doses, anecdotal reports suggest patients using long term sedating agents such as benzodiazepines, opioids, or other psychoactive drugs of abuse may experience disassociative effects even at pain / anxiolysis dosing. The hypertension and tachycardia that ketamine produces may cause increased myocardial oxygen demand and, unfortunately, actually causes a decrease in myocardial contractility so it is poorly suited for patients with cardiovascular emergencies. Finally, many emergency departments and emergency clinicians are relatively inexperienced with the use of ketamine in sub-dissociative doses and may not be comfortable with EMS use of the medication for a patient they will subsequently be managing.

For many providers, this is an agent they've never used or been exposed to. Therefore, an introduction to the medication is in order.

Generic name: Ketamine

Class: Dissociative anesthetic, non-opioid analgesic, anxiolytic

Maine EMS approved routes of administration: IV, IM, IN

How supplied: 200 mg as a 20 ml vial of a 10 mg / ml concentration, 500mg as a 10 ml vial of a 50 mg / ml concentration, and 500-1,000- mg as a 5 or 10 ml vial of a 100 mg / ml concentration. The 100mg/ml concentration is most suitable for IM administration but it is challenging to draw up the appropriate doses for IV/IN pain or anxiety dosing given how small the volume will be. The 50 mg / ml concentration will be easiest to administer for pain and anxiolysis and the volumes will be appropriate for IN administration but the IM dosing for agitated delirium may require two separate injections at different sites. The MDPB recognizes services will have available what their pharmacy partners supply and agencies should plan accordingly.

Dosing:

Pain:

IV: 0.2 mg / kg to a maximum single dose of 25 mg repeated every 15 minutes as needed to a maximum cumulative dose of 1 mg / kg

IN: 0.5 mg / kg to a maximum single dose of 25 mg, may repeat 0.25 mg / kg to a maximum dose of 25 mg repeated once in 15 minutes as needed

Anxiety associated with NIPPV:

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IV: 0.2 mg / kg to a maximum single dose of 25 mg repeated once in 5 minutes as needed

IM: 0.5 mg / kg to a maximum single dose of 50 mg repeated once in 5 minutes as needed

Agitated Delirium

IM: 4 mg / kg IM once

Contraindications:

Any medical condition in which an increase in blood pressure or heart rate would be hazardous, infants less than 3 months of age, and any patient with known or suspected schizophrenia. Use with caution in any patient with a cardiovascular emergency.

Common Adverse Reactions:

Note: These are typically seen at sedation doses (greater than 2 mg / kg), not at analgesic or anxiolytic doses: Sedation, agitation, irrational behavior, increased blood pressure, increased pulse rate, non-epileptic tonic-clonic movements, nausea and vomiting, laryngospasm, and respiratory depression / arrest (if sedation doses are administered as an IV bolus).

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