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CLINICAL BULLETIN			
Bulletin #	Title		Date Issued
#2022-02-07-01	Availability of Ketamine Formulations and Applicability to Maine EMS Protocols		February 7, 2022
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N/A	Maine EMS	MDPB	3
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Since adding ketamine to the formulary in 2018, Maine EMS has always recommended a common single concentration of Ketamine as a means to promote safety. To facilitate use of Ketamine across all possible indications presented in the protocols, the MDPB and Maine EMS, under guidance from our Clinical Pharmacist, have recommended the 500 mg/5 ml concentration of Ketamine which allows for both IV and single injection IM uses in a safe manner.

Maine EMS has become aware that some manufacturers of Ketamine have ceased production of this concentration and remaining manufacturers are having difficulty keeping up with demand. This issue is not expected to resolve until the Fall of 2022.

At present, there are multiple products of varying concentrations of Ketamine available from pharmacies, including (but not limited to):

- 1) 500 mg/5 ml (100 mg/ml)
- 2) 500 mg/10 ml (50 mg/ml)
- 3) 100 mg/10 ml (10 mg/ml)
- 4) 200mg/20 ml (10mg/ml)

Ketamine is found in the following Maine EMS Protocols with the following dosing schemes:

- 1) Universal Pain management (*Green 22, page 104*) (*alternate therapies includes fentanyl/acetaminophen/etc.*):
 - a. **IV** - 0.2 mg/kg to a MAX dose of 25mg Repeat every 15 minutes as needed for pain to a cumulative MAX dose of 1 mg/kg OR,
 - b. **IN** - 0.5 mg/kg to a MAX dose of 25 mg Repeat 0.25 mg/kg IN in 15 minutes as needed for pain x 1

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- 2) Post ETT/BIAD pain control (*Blue 6, page 25*) (*alternate therapies includes fentanyl for pain, midazolam for anxiolysis*):
 - a. **IV/IO** - 0.2 mg/kg, max single dose of 25 mg. May repeat x 1 in 5 minutes.
 - b. **IM** - 0.4 mg/kg, max single dose 50 mg, may repeat x 1 in 10 minutes
- 3) Anxiolysis in CPAP control (*Blue 10, page 29*) (*alternate therapies include midazolam*):
 - a. **IV/IO** - 0.2 mg/kg, max single dose of 25 mg, may repeat x 1 in 5 minutes,
 - b. **IM** - 0.4 mg/kg, max single dose 50 mg, may repeat x 1 in 10 minutes
- 4) Management of Agitation/Delirium with Aggressive Behavior (*Orange 5, page 143*) (*alternate therapies include midazolam*):
 - a. **IM** – 4 mg/kg

As this shortage continues, Maine EMS and the MDPB expect that you may encounter alternate concentrations of Ketamine, ***some of which WILL NOT allow for appropriate dosing via the IN or IM route depending on the weight of the patient.*** This may particularly impact the IN route with 100 mg/10 ml concentrations as well as the IM route for management of severe agitation/delirium with aggressive behavior with any concentration other than 500 mg/5 ml. Please recall, the maximum volume absorbed by the intranasal route is 1 ml (per nostril) and the maximum volume administered via the IM route should not exceed 5 ml (per injection site).

If you are supplied a dose of Ketamine other than 500 mg/5 ml, IM Ketamine SHOULD NOT BE USED in the instance of agitation/delirium with aggressive behavior.

Providing appropriate doses of Ketamine with any of the other concentrations would require multiple IM injections. In the context of the expected behavior demonstrated by patients for whom Ketamine would be indicated, the MDPB believes that requiring multiple IM injections could pose a safety risk to responding EMS

Clinicians and any other individuals supporting the response. Additionally, there is risk of under-dosing of the patient, resulting in untoward effects of the medication. In this case, please use Midazolam.

Utilizing different concentrations of a medication increases the risk of accidental dosing errors. Please always practice diligence in checking the concentration of ANY provided medications. This practice is especially important during the time of this shortage when multiple different concentrations may be provided based on manufacturer availability.

When the shortage of the 500 mg/5 ml concentration of Ketamine is resolved, we expect to return to prior practice and recommend this concentration of Ketamine as a standard across the state.

Thank you for your attention to this issue and for your continued efforts on behalf of the pre-hospital patients in Maine.

For EMS Agencies or Clinicians who would like, the MDPB has created a small, badge-sized card that can be printed and laminated for reference.

Ketamine Injectable Concentration Reference

- 1) 10 mg/ml (AKA 200 mg/20 ml)
DO NOT use for IM or IN administration
- 2) 50 mg/ml (AKA 500 mg/10 ml)
DO NOT use for IM administration
- 3) 100 mg/ml (AKA 500 mg/5 ml)
MAY use for IM or IN administration