

Michigan EMS

Medication In-Service: Ketamine

Instructor Resource Guide

Format: Lecture

Purpose: This EMS continuing education (CE) is designed to familiarize Michigan's Southeast Region paramedics with the administration of ketamine when indicated by protocol. The Southeast Region includes the following medical control authorities (MCA):

- Detroit East MCA (DEMCA)
- Genesee County MCA
- Health Emergency Medical Services (HEMS) MCA
- Lapeer County MCA
- Macomb County MCA
- Monroe County MCA
- Oakland County MCA
- St. Clair County MCA
- Washtenaw/Livingston MCA

Please contact the OCMCA by email at QI@OCMCA.org with any questions regarding the contents of this Instructor Resource Guide

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Medication In-Service: Ketamine

The following lesson plan and outline have been provided to the Southeast Regions MCAs and LSAs. You may use this information to apply for EMS credits, as needed.

Lesson Plan

Specific Topic Title: Medication In-Service - Ketamine

Credit Category: Preparatory

Credits: MFR: 0 L EMT: 0 L SPEC: 0 L EMT-P: 0.5 L I/C: 0 L

Format: 30-minute lecture

Presenter: TBD

Date: TBD

Time Duration: 30 minutes

CE Description: This EMS continuing education (CE) is designed to familiarize Michigan's Southeast Region paramedics with the administration of ketamine when indicated by protocol. This will include an overview of the pharmacokinetics and pharmacodynamics of ketamine as well as a detailed description of when and how paramedics should administer ketamine. The Southeast Region includes the following medical control authorities (MCA):

- Detroit East MCA (DEMCA)
- Genesee County MCA
- Health Emergency Medical Services (HEMS) MCA
- Lapeer County MCA
- Macomb County MCA
- Monroe County MCA
- Oakland County MCA
- St. Clair County MCA
- Washtenaw/Livingston MCA

Rationale: On June 1, 2018 the Southeast Region will begin utilizing the new State of Michigan EMS protocols that include the use of ketamine. This is a new medication for paramedics in the Southeast Region. This training is designed to ensure Paramedics are able to safely and effectively deliver ketamine as directed by protocol.

Course Objectives:

By the conclusion of this course the student will be able to:

- Identify the location of ketamine in the SEM Drug Box, as well as how it may be packaged.
- Describe the pharmacokinetics and pharmacodynamics of ketamine.
- List the indications and contraindications of ketamine.
- Describe how to administer ketamine, as well as list the applicable medication concentration, route and dose(s), per the applicable protocols.

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Course Outline

1. Introduction

- a. As of June 1, 2018, the following medications were added to the Southeast Michigan Regional Medication Boxes (SEM Drug Box).
 - Ketamine
 - Ketorolac
 - Push Dose Epinephrine
 - Ondansetron ODT

2. Identify the location of ketamine in the SEM Drug Box, as well as how it may be packaged.

- a. Location of ketamine on the SEM Drug Box schematic.

3. Describe the pharmacokinetics and pharmacodynamics of ketamine.

- a. Class of medication
- b. Mechanism of action
- c. Packaged concentration
- d. Route of administration
- e. Onset and duration of action
- f. Half-life
- g. Side effects

4. List the indications and contraindications of ketamine.

- a. Indications
- b. Contraindications
- c. Additional information to consider

5. Describe how to administer ketamine, as well as list the applicable medication concentration, route and dose(s), per the applicable protocols.

- a. Pain Management (procedure section)
- b. Excited Delirium (adult treatment section)
- c. Patient Restraint (procedure section)
- d. Patient Sedation (procedure section)
- e. Administration - Step by Step
- f. Section 9 Medications – Ketamine 9-29

6. Conclusion

Total course length: 30 minutes

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Course Content

1. Introduction

- a. As of June 1, 2018, the following medications were added to the Southeast Michigan Regional Medication Boxes (SEM Drug Box).
- Ketamine
 - Ketorolac
 - Push Dose Epinephrine
 - Ondansetron ODT

This CE course focuses on the administration of ketamine. This versatile medication can provide analgesia, patient sedation, chemical patient restraint, and assist with the management of a patient presenting with Excited Delirium Syndrome (ExDS). While this new medication will undoubtedly benefit patients, training is necessary to assure ketamine is administered safely in the prehospital setting. Since this is a completely new medication for paramedics in the Southeast Region, all aspects of the medication will be detailed. Upon completing this continuing education, students will be prepared to confidently and effectively ketamine, as directed by protocol.

2. Identify the location of ketamine in the SEM Drug Box, as well as how it may be packaged.

- a. Location of ketamine on the SEM Drug Box schematic.

Ketamine will be located on the middle shelf in the SEM Drug Box, within the left compartment. It will be stored with the other controlled substances found in the drug box (see figure a.), which include: midazolam, fentanyl, and morphine.

Figure a.



Figure b.



Ketamine will be packed in a single 10mL vial containing 1000mg of medication (see figure b.). The vial will be clear in color. Ketamine is typically clear or slightly yellowish in color. (4) Only one vial will be supplied in the SEM Drug Box. Providers need to be aware that the 1000mg vial (100mg/mL) of ketamine supplied in the drug box greatly exceeds the amount of ketamine that will be administered in a single dosage. The supplied concentration was carefully selected to accommodate IV/IO, IM and IN administration.

Ketamine will not be supplied in the A-Pack.

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3. Describe the pharmacokinetics and pharmacodynamics of ketamine.

a. Class of medication

Ketamine is a N-Methyl-D-aspartate (NMDA) receptor antagonist, which is a type of anesthetic. Common examples of NMDA receptor antagonists include nitrous oxide and phencyclidine (PCP).

b. Mechanism of action

Ketamine's primary mechanism of action is thru NMDA receptor antagonism. NMDA receptors are stimulated by glutamate and contribute to movement, behavior, learning, and memory. Ketamine briefly blocks glutamate from stimulating NMDA receptors. This causes the desirable effect of dissociative amnesia through a combination of analgesia, amnesia, and hypnosis. (1)

c. Packaged concentration

Remember, ketamine will be supplied in the SEM Drug Box in a vial containing 1000mg in 10mL, which is 100mg/mL. Providers need to be aware that the 1000mg of ketamine supplied in the drug box greatly exceeds the amount of ketamine that will be administered in a single dosage. Again, the supplied concentration was carefully selected to accommodate IV/IO, IM and IO administration.

d. Route of administration

Depending on the intended use and applicable protocol ketamine may be administered several ways. Administration routes include: IV/IO, IM, and IN.

Administration route by protocol (see section 5 of this instructor guide for details):

- **Excited Delirium** (adult treatment section): IM
- **Pain Management** (procedure section): IV/IO or IN
- **Patient Restraint** (procedure section): IM
- **Patient Sedation** (procedure section): IV/IO, IM or IN

e. Onset and duration of action

- **IV/IO:** Onset of action will occur with 30 seconds and the effects will last 10-15 minutes.
- **IM:** Onset of action is typically 3-4 minutes for the desired effect. While slower the onset of action is slightly longer when administered IM, the duration of action increases to 20-30 minutes.
- **IN:** Onset of action occurs within 2 minutes and effects will last about 20-20-30 minutes30 minutes

f. Half-life

Ketamine has a half-life of about 15 minutes. This time frame correlates to the duration of action, listed above (3. e.).

g. Side effects

While ketamine has an excellent safety profile, it is not without side effects. The cardiovascular system is stimulated by ketamine administration. This may cause an increased blood pressure and pulse rate following ketamine administration. Be sure to monitor the patient's blood pressure and pulse rate.

Emergence reactions are rare, but may occur following ketamine administration. Emergence reactions are associated with hallucinations and nightmares. This occurs when the patient "emerges" or recovers from the sedative effects of ketamine. The patient may appear to be "glassy eyed" in these situations.

Emergence reactions are also more common in large doses. The 4mg/kg IM dosage for ExDS, patient restraint, and patient sedation will be more likely to cause an emergence reaction than the 0.2mg/kg IV dosage used for analgesia.

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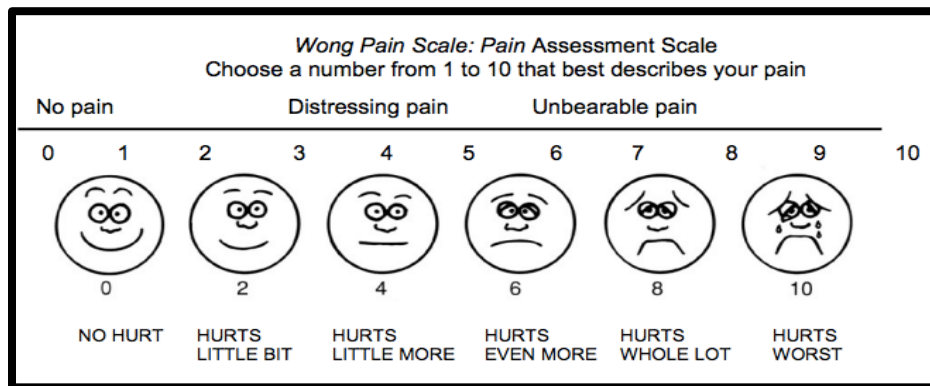
4. List the indications and contraindications of ketamine.

a. Indications

Ketamine **SHOULD** be administered in the following situations:

- **Pain Management**

Southeast Region paramedics should administer ketamine when a patient presents with acute pain that is “significant”. According to **Pain Management** (procedure section), “significant” pain is rated greater than 4 on the Wong Pain Scale.



NOTE: If a patient is unable to tolerate Ketamine or has significant pain (described as greater than 8 on the Wong Pain Scale), opioid analgesia may be administered (morphine or fentanyl).

Management of pain in the prehospital setting should begin with Basic Life Support (BLS) interventions. Initiate pain management by placing the patient in a position of comfort. Always reassure the patient to help control anxiety caused by the acute pain.

If the patient still presents with “significant” pain rated greater than 4 on the Wong Pain Scale after BLS interventions, administer ketamine, as indicated. Remember that the goal is to reduce the patient’s pain to a tolerable level, not completely eliminate the pain.

- **Excited Delirium Syndrome (ExDS)**

Patients presenting with ExDS are an “*imminent physical threat to personnel and/or themselves*”. The **Excited Delirium** (adult treatment section) lists the indication for midazolam as the initial medication. The protocol goes on to indicate that if the patient remains combative after 5 minutes, administer ketamine 4mg/kg IM.

- **Patient Restraint**

Patient restraint requires a coordinated approach and appropriate deployment of physical and often chemical restraints. According to the **Patient Restraint** (procedure section), restraint is indicated “*When an ill or injured person who is behaving in such a manner as to interfere with their examination, care and treatment to the extent they endanger their life or the safety of others.*” Per this protocol, midazolam or ketamine are acceptable medications to utilize for chemical restraint.

If de-escalation techniques are ineffective and the patient meets this criteria, ketamine (or midazolam) may be administered, typically after physical restraints are applied, especially if the patient continues to fight against the physical restraints.

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- **Patient Sedation**

Per the **Patient Sedation** (procedure section), administration of ketamine for sedation is appropriate for the following circumstances:

1. Electrical therapy (cardioversion or transcutaneous pacing)
2. Post-intubation sedation
3. CPAP/BiPAP only under Medical Control direction

Keep in mind that not all patients undergoing the medical procedures, listed above, will require ketamine administration. Always assess the need for sedation on a patient-by-patient basis.

- b. **Contraindications**

Ketamine should NOT be administered in the following situations:

- **Allergy or hypersensitivity to ketamine**

Contraindications are sometimes dose specific. The doses listed in all protocols that include ketamine are relatively low doses. Allergy to ketamine is the only contraindication at the doses listed in the applicable protocols.

5. Describe how to administer ketamine, as well as list the applicable medication concentration, route and dose(s), per the applicable protocols.

- a. **Pain Management** (procedure section)

Ketamine is included in the Pain Management to treat acute pain. Specifically, ketamine is indicated for patients experiencing significant pain rated >4 on the Wong Pain Scale. This pain rating is taken after BLS interventions such as patient positioning and reassuring have been accomplished.

As with any analgesia, the goal is to reduce the patient's pain. EMS providers should not expect to completely eliminate the pain. Explain to the patient that the medication will help to reduce the pain but is not likely to eliminate the pain completely.

- **Ketamine concentration**

Remember, ketamine is supplied in a vial containing 1000mg in 10mL (100mg/mL). Ketamine is clear or slightly yellowish in color. Only 1 vial will be supplied in the SEM Drug Box.

- **Ketamine routes of administration**

The pain management procedure allows for IV/IO and IN administration.

Intravenous (IV) / Intraosseous (IO) Administration:

IV/IO administration should be performed slowly. Remember, whenever ketamine is administered IV/IO it must be diluted with normal saline. (3) Always dilute the ketamine with an equal volume of normal saline prior to IV/IO administration.


Intranasal (IN) Administration:

IN administration of ketamine is no different than any other IN administration. Recall the maximum volume is 1mL per nostril so do not dilute the ketamine for IN administration.

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- Ketamine dose(s)

Per this protocol, administer ketamine as follows:

6. For patients with significant pain (described as greater than 4 on the Wong Pain Scale), consider Ketamine.
- a. Adults (or > 80 lbs.)
 - i. 0.2 mg/kg IV/IO or 0.5 mg/kg IN (if available)
 - ii. Maximum single dose 25 mg
 - iii. May repeat after 10 minutes to a maximum dose of 50 mg
 -  b. Pediatrics (or < 80 lbs.)
 - i. 0.2 mg/kg IV/IO or 0.5 mg/kg IN (if available)
 - ii. Maximum single dose 25 mg
 - iii. May repeat after 10 minutes to a maximum dose of 0.4 mg/kg IV/IO or 1.0 mg/kg IN

Reassess the patient's pain on the Wong Pain Scale after 10 minutes. If the pain remains the initial dosage of ketamine may be repeated. The picture above provides the initial and repeat doses.

For patients with pain rated greater than 8 on the Wong Pain Scale or patients unable to tolerate ketamine consider administration of opioid analgesia. Southeast Region paramedics may administer either fentanyl or morphine, if indicated.

8. If a patient is unable to tolerate Ketamine or has significant pain (described as greater than 8 on the Wong Pain Scale), opioid analgesia may be administered. Patients should receive only one opioid medication.

MCA Selected Opioid Analgesia

- Morphine 0.1 mg/kg IV/IO (maximum single dose 10 mg) may repeat one time. Total dose may not exceed 20 mg.
- Fentanyl 1 mcg/kg IV/IO (IN, if available) Maximum single dose 100 mcg, may repeat one time. Total dose may not exceed 200 mcg.
- Hydromorphone 0.5 mg IV/IO (for extended transports), may repeat every 10 minutes, for a maximum dose of 2 mg.

If pain is persistent after both doses of ketamine contact Medical Control for permission to administer fentanyl or morphine. The combination of ketamine and an opioid is extremely effective method of pain management.



9. For patients with refractory pain after Ketamine administration, contact medical control for opioid administration.

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b. Excited Delirium (adult treatment section)

Ketamine is included in the Excited Delirium Adult Treatment, which is an adult treatment. These patients are often an imminent physical threat to EMS providers and themselves. As such, physical restraint should ideally be coordinated with law enforcement, if available, and rapidly followed by administration of midazolam 10mg IM or 5mg IN, when the patient continues to fight against the restraints (Law enforcement may not be available in these situations). After five minutes, if the patient remains combative administer ketamine 4mg/kg IM.

- **Ketamine concentration**

Remember, ketamine is supplied in a vial containing 1000mg in 10mL (100mg/mL). Ketamine is clear or slightly yellowish in color. Only 1 vial will be supplied in the SEM Drug Box.

- **Ketamine routes of administration**

The Excited Delirium Protocol allows for IM administration of ketamine.

Intramuscular (IM) Administration:

It is recommended that IM administration of ketamine should be performed in the vastus lateralis, but other IM sites are also approved, when administered in conjunction with the Excited Delirium Protocol. The IM route is likely the safest when being administered to an ExDS patient. The vastus lateralis is suitable for the large volume of medication that will be injected, is free from nerves and major blood vessels, and is easy to access. (1)

- **Ketamine dose(s)**

Per this protocol, administer ketamine as follows:

Give midazolam first



**5. If the patient remains combative, following restraint by law enforcement:
a. Administer Midazolam 10 mg IM or 5 mg IN**

Administer ketamine, if needed after five minutes.

9. After 5 minutes, if the patient remains combative administer Ketamine 4mg/kg IM.

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c. Patient Restraint (procedure section)

Ketamine is indicated in Patient Restraint as a chemical restraint is secondary to midazolam.

Per protocol, patient restraint may be indicated when: "...an ill or injured person who is behaving in such a manner as to interfere with their examination, care and treatment to the extent they endanger their life or the safety of others."

Physical Restraint Procedure

1. Ensure that enough personnel are available to properly control the patient and establish the restraints.
2. Explain the purpose of the restraints.
3. Physically control the patient and apply restraints.
 - A. If patient continues to resist physical restraints, consider chemical restraint.

In this situation the patient should be administered midazolam 10mg IM or 5mg IN. After five minutes, if the patient remains combative administer ketamine 4mg/kg IM.

- **Ketamine concentration**

Remember, ketamine is supplied in a vial containing 1000mg in 10mL (100mg/mL). Ketamine is clear or slightly yellowish in color. Only 1 vial will be supplied in the SEM Drug Box.

- **Ketamine routes of administration**

Patient Restraint allows for IM and IN administration.

Intramuscular (IM) Administration:

Remember, IM administration should be performed in the vastus lateralis. This site is suitable for the large volume of medication that will be injected, is free from nerves and major blood vessels, and is easy to access. (1) However, other IM injection sites are approved for ketamine administration.

- **Ketamine dose(s)**

Per this protocol, administer ketamine as follows:



Chemical Restraint Procedure

1. Administer **Midazolam 10 mg IM or 5 mg IN.**
2. Monitor capnography, if available.
3. **After 5 minutes if the patient remains combative administer Ketamine 4mg/kg IM.**

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d. Patient Sedation (procedure section)

Ketamine is included in the Patient Sedation to provide sedation for patients undergoing medical procedures that may be uncomfortable or painful. The goal is to provide enough sedation to allow the procedure to be performed without unnecessarily reducing the patient's level of consciousness. Per the Patient Sedation, ketamine may be utilized in conjunction with the following procedures:

- Electrical therapy (cardioversion or transcutaneous pacing)
- Post-intubation sedation
- CPAP/BiPAP only under Medical Control Order

As with any procedure, explain what is being performed to the patient. Explain to the patient that the medication will help to reduce the pain but will not likely eliminate the pain completely.

- **Ketamine concentration**

Remember, ketamine is supplied in a vial containing 1000mg in 10mL (100mg/mL). Ketamine is clear or slightly yellowish in color. Only 1 vial will be supplied in the SEM Drug Box.

- **Ketamine routes of administration**

Patient Sedation allows for IV/IO, IM and IN administration of ketamine.

Intravenous (IV) / Intraosseous (IO) Administration:

IV/IO administration should be performed slowly. Remember, whenever ketamine is administered IV/IO it must be diluted with normal saline. (3) Always dilute the ketamine with an equal volume of normal saline prior to IV/IO administration.

Intramuscular (IM) Administration:

Remember, IM administration should be performed in the vastus lateralis. This site is suitable for the large volume of medication that will be injected, is free from nerves and major blood vessels, and is easy to access. (1) However, other IM injection sites are approved for ketamine administration.

Intranasal (IN) Administration:

IN administration of ketamine is no different than any other IN administration. Recall the maximum volume is 1mL per nostril so do not dilute the ketamine for IN administration.

- **Ketamine dose(s)**

The adult and pediatric dose of ketamine is identical which greatly eases administration. Repeat doses of ketamine are not permitted in this protocol. In addition, Only one sedation medication may be given pre-radio if authorized by the MCA. Medical Control must be contacted if a different sedation medication is needed.

Pediatric Sedation:

(Titrate to minimum amount necessary)

- Midazolam 0.05 mg/kg IM/IV/IO titrated slowly (IN, if available); may repeat once in 5 minutes to a maximum of 0.1 mg/kg.
- Fentanyl 1 mcg/kg IM/IV/IO titrated slowly (IN, if available); may repeat every 5 minutes to a maximum of 3 mcg/kg.
- Ketamine 4 mg/kg IM OR 1-2 mg/kg IV/IO titrated slowly (1-2 mg/kg IN, if available)

Adult Sedation:

(Titrate to minimum amount necessary)

- Midazolam 1-5 mg (0.05 mg/kg) IM/IV/IO titrated slowly (IN, if available); may repeat once in 5 minutes to a maximum of 0.1 mg/kg.
- Diazepam 5-10 mg (0.1 mg/kg) IM/IV/IO titrated slowly, may repeat every 5 minutes to a maximum of 0.3 mg/kg.
- Fentanyl 50-100 mcg (1 mcg/kg) IM/IV/IO titrated slowly (IN, if available); may repeat every 4 minutes to a maximum of 3 mcg/kg.
- Ketamine 4 mg/kg IM OR 1-2 mg/kg IV/IO titrated slowly (1-2 mg/kg IN, if available)



Possible orders post radio contact

1. Additional sedation as needed.
2. Sedation for CPAP/BiPAP

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e. Administration – Step by Step

1. Remove ketamine from the SEM Drug Box

Ketamine is located in the middle shelf of the SEM Drug Box in the left compartment with the other controlled substances.

2. Verify the correct medication and concentration

The supplied medication is ketamine 1000mg/10mL (100mg/1mL). Always verify with a partner that the correct medication is on hand and the correct weight based dosage has been determined.

3. Draw up medication

The dose of ketamine administered will be dependent upon the applicable protocol. After verifying the correct medication and dose with a partner, draw up the medication from the vial. Once the syringe has the correct amount of ketamine, again confirm with a partner that the correct dose for the patient is in the syringe, per protocol.

4. Administer the medication, per protocol

a. Intravenous/Intraosseous (IV/IO)

IV/IO administration should be performed slowly. In addition, dilute ketamine with equal parts normal saline prior to injection.

Protocol	Route	Dose
Pain Management (procedure section)	IV/IO	<p>Adult (or > 80 lbs.): 0.2mg/kg</p> <ul style="list-style-type: none"> Maximum single dose 25mg May repeat after 10 minutes to a maximum dose of 50mg <p>Pediatric (or < 80 lbs.): 0.2mg/kg</p> <ul style="list-style-type: none"> Maximum single dose 25mg May repeat after 10 minutes to a maximum dose of 0.4mg/kg
Patient Sedation (procedure section)	IV/IO	<p>Adult: 1-2mg/kg IV/IO titrated slowly</p> <ul style="list-style-type: none"> MUST contact medical control for repeat doses or additional sedation as needed. <p>Pediatric: 1-2mg/kg IV/IO titrated slowly</p> <ul style="list-style-type: none"> MUST contact medical control for repeat doses or additional sedation as needed.

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b. Intramuscular (IM)

Administer ketamine IM as follows:

1. Expose and locate the injection site, if possible and clean the injection site with an alcohol prep.

NOTE: Exposing the injection site may be difficult during an encounter with a patient that requires chemical restraint, such as the case with excited delirium. In extreme situations, IM injection of ketamine may be performed through clothing, if necessary to support patient and provider safety. Thorough documentation in the patient care record (PCR) should support this method if utilized.)

2. Inject the dose of medication into the muscle.
3. Immediately place the needle in a sharps container.
4. Place a bandage over the injection site and massage for 5-10 seconds to allow the medication to absorb more quickly.

Protocol	Route	Dose
Excited Delirium (adult treatment section)	IM	Adult: 4mg/kg <ul style="list-style-type: none"> • Administer midazolam FIRST. • After 5 minutes if the patient remains combative administer ketamine. Pediatric: NOT APPROVED FOR PEDIATRICS
Patient Restraint (procedure section)	IM	Adult: 4mg/kg <ul style="list-style-type: none"> • Administer midazolam FIRST. • After 5 minutes if the patient remains combative administer ketamine Pediatric: NOT APPROVED FOR PEDIATRICS
Patient Sedation (procedure section)	IM	Adult: 4mg/kg <ul style="list-style-type: none"> • MUST contact medical control for repeat doses or additional sedation as needed. Pediatric: 4mg/kg <ul style="list-style-type: none"> • MUST contact medical control for repeat doses or additional sedation as needed.

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c. Intranasal (IN)

Administer ketamine IN as follows:

1. Draw up appropriate dose (volume) of medication.
2. Attach atomizing device to syringe.
3. Use one hand to support back of patient's head as needed.
5. Place tip of atomizing device snugly against nostril aiming slightly upward and outward.
6. Rapidly administer **one half** of the dose of medication, briskly pushing plunger. Then, repeat with other nostril delivering the remaining volume of medication.

Note: Maximal dose per nostril is 1 cc.

Protocol	Route	Dose
Pain Management (procedure section)	IN	Adult (>80lbs): 0.5mg/kg <ul style="list-style-type: none"> • Max single dose 25mg • May repeat after 10 minutes to a max dose of 50mg Pediatric (<80lbs): 0.5mg/kg <ul style="list-style-type: none"> • Max single dose 25mg • May repeat after 10 minutes to a max dose of 1mg/kg
Patient Sedation (procedure section)	IN	Adult: 1-2mg/kg <ul style="list-style-type: none"> • MUST contact medical control for repeat doses or additional sedation as needed. Pediatric: 1-2mg/kg <ul style="list-style-type: none"> • MUST contact medical control for repeat doses or additional sedation as needed.

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f. Ketamine Medication Section 9-29

Every medication available in the SEM Drug Box and A-Pack is now detailed in “Section 9 Medications” of the State of Michigan EMS Protocols ([Click here to access the digital link](#)). Ketamine is referenced Medications Section 9-29. EMS providers should utilize this as a quick reference or refresher. The following information relevant to the Michigan State Protocols is found in this protocol:

- Applicable Protocols
- Indications
- Contraindications
- Dosing:
 - Adult
 - Pediatrics
- Expected Effects
- Side Effects

Please inform all personnel of the valuable information contained in the Medication Section. This is a new addition to the State of Michigan protocols and is great resource.

6. Conclusion

The addition of ketamine to the SEM Drug Box provides an effective means to provide analgesia, sedation, and chemical restraint. EMS providers are now able to select an appropriate medication for analgesia, sedation, and chemical restraint

Thank you for your participation in this continuing education. Please forward any questions or concerns regarding the content of this instructor resource guide to the OCMCA:

Email: QI@OCMCA.ORG
Phone: 248-975-9704

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