Monroe Livingston Region Program Agency

Division of Prehospital Medicine, University of Rochester
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To: All RSI Providers and Agencies

From: Jeremy T. Cushman, MD, MS, EMT-P
Regional Medical Director

Date: January 7, 2014

Re: Advisory 14-01: Ketamine

The 2014 Monroe Livingston Regional EMS Protocols include the addition of Ketamine to the Prehospital Formulary for RSI providers only. RSI Providers may use Ketamine as indicated in the protocols for Excited Delirium, RSI, and Facilitated Extrication once trained and authorized by the Regional Medical Director. The full set of the 2014 protocols will be released later this month, however in anticipation of that release, all RSI agencies wishing to add Ketamine to their formulary (it is not required at this time), must complete the following prior to carrying and using Ketamine:

1. Review and follow the directives of NYS BEMS Policy 10-04 (Attached).
2. Review Protocols 2.8B (Excited Delirium), 2.27 (Rapid Sequence Intubation), and 2.40 (Facilitated Extrication) (All Attached) which were approved by the Monroe-Livingston REMAC on January 21, 2013 and by the SEMAC on October 1, 2013.
3. Obtain a written letter of approval from your Agency Medical Director authorizing the use of Ketamine.
4. Update/Amend your Controlled Substance Operations Plan and submit for review and approval by the NYS BEMS. Use NYS BEMS Policy 10-04 for guidance.
    a. To reduce medication errors, please ONLY stock Ketamine 50mg/ml.
    b. Substock may not exceed 1000 mg.
5. Attached is a copy of the training program that will be provided by the MLREMS Program Agency in the first half of 2014 for all RSI providers for the use of Ketamine as indicated in the protocols for RSI (2.27), Excited Delirium(2.8B), and Facilitated Extrication (2.40). This training will be Mandatory for all RSI providers in order to retain credentials to perform RSI, regardless of the agency's decision to continue to carry and will be provided by Drs Ostrovsky, Cushman, or Shah.
6. Every use of Ketamine must be reported within 24 hours to the Regional Program Agency and include a copy of the PCR (or for emsCharts users the PRID) for quality assurance purposes.

With any questions, please do not hesitate to contact our office.

New York State
Department of Health
Bureau of Emergency Medical Services

POLICY STATEMENT

Supersedes/Updates:

No. 10 - 04

Date: May 24, 2010

Re: Ketamine for Prehospital EMS Services

This Policy Statement establishes the State Emergency Medical Advisory Committee (SEMAC) and the Department's criteria for including ketamine in an EMS agency's controlled substance formulary. Please take the time to read and understand this Policy Statement. Each individual EMS agency, its controlled substances agent and the medical director are responsible for adhering to all applicable laws, regulations and policies.

History:
In June of 2009, the SEMAC approved ketamine to be added to the State EMS Drug Formulary. As this requires a change to the prehospital use of controlled substances formulary, the Department must review and approve the medication, the process for inventory, security and training. Once done, the Commissioner makes a final ruling. This request was reviewed by the Department's Division of Legal Affairs, the Bureau of Narcotic Enforcement (BNE), the Bureau of Emergency Medical Services (BEMS) and given final approval by the Commissioner of Health.

Based on the potency of ketamine and the potential for serious issues of diversion and abuse, the Department is extremely concerned about its applications in the prehospital environment.

Conditions for Approval:
In order for the Department to approve the addition of ketamine to an EMS agency with a current Class 3C controlled substance license, the following conditions must be met and the Department must review and issue written approvals.

1. The Regional Medical Advisory Committee (REMAC) must develop protocols for the administration of ketamine and a quarterly evaluation of its use on the regional level.

2. The protocols must also be approved by the SEMAC and then by the Department.

3. The service medical director must approve, in writing, ketamine for use by the EMS service.

4. Only those individuals certified at the paramedic level may administer ketamine.

5. The EMS agency must submit an amendment to their Controlled Substance Operations Plan to include, but not be limited to the following:

   - A detailed description of the procurement; inventory process and security of ketamine.
   - A program for 100% quality assurance by the service medical director for instances where ketamine has been administered.
   - A separate Quarterly Report (attached) for ketamine stock and administrations. This must be received by the Department within 30 days of the end each quarter.

6. The EMS agency must submit for review and approval by the Department, the training program developed to in-service personnel. The program must include, but not be limited to training on the updated controlled substance plan, inventory, security, patient administration and reporting policies and procedures. The curriculum format must follow the BEMS required curriculum addition format.

7. Each substock (the controlled substance medications carried on each vehicle) is limited to a **MAXIMUM of 1,000 mg**.

8. ***KETAMINE MAY ONLY BE ADMINISTERED TO A PATIENT UNDER A DIRECT ON-LINE ORDER FROM A MEDICAL CONTROL PHYSICIAN.***

9. There are two (2) components of the reporting process:

    a. The EMS agency must submit a Ketamine Quarterly Report form (attached) within 30 days of the end of each quarter.
    b. The EMS agency medical director is required to provide a written report of the service's use of ketamine in the prior year no later than **January 31st of each year**. It must include, but not be limited to the following items:

        < The total number of administrations, amount or medication used and dose.
        < The amount of ketamine wasted.
        < A summary of the patient presenting problems.
        < A narrative summary highlighting the Quality Assurance reviews conducted for each ketamine administration.

10. All instances where a theft, loss or diversion, are suspected ***MUST BE REPORTED TO THE DEPARTMENT IMMEDIATELY***. This report must be made to the BEMS Central Office using the *Loss of Controlled Substances Report* form (DOH-2094). This form is available on line at http://www.nyhealth.gov/forms/doh-2094.pdf

11. **Prior** to including ketamine in the EMS agency's formulary, the medical director and the agent must receive written approval from the Department.

12. If the agency makes any changes or updates to the Controlled Substance Operations Plan, it must provide the specific changes to the Department in writing ***prior*** to implementation.

The Department continues to closely monitor the EMS agencies that maintain a Class 3C controlled substance license to insure that there is the strictest compliance with all of the applicable sections of Public Health Law, the Codes, Rules and Regulations – Part 800 and Section 80.136 of the Part 80 Rules and Regulations on Controlled Substances in New York State, as well as the EMS service's approved Controlled Substance Operations Plan.

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Narcotic Enforcement (BNE)
Bureau of Emergency Medical Services (EMS)

Ketamine Quarterly Report For Emergency Medical Service Agencies

This report must be submitted pursuant to PHL Article 33 within 30 days of the end of each Quarter. Reports must be submitted regardless of usage. Retain a copy of this Quarterly Report for a period of 5 years from the date of filing.

Quarterly Reporting Period: _____

Agency Name	NYS-EMS ID No.			NYS-BNE License No.
Address	City	State	Zip	Business Phone
Name of DEA Registrant	DEA License No.			Day Phone

	KETAMINE		RESPONSE/ TRANSPORT HISTORY
Total Quantity at Start of Quarter	Stock: _____ Substock: _____ TOTAL of above:_____	Total Number of EMS Response/Transports this Quarter	
Total Quantity Received from DEA Registrant		Total Number of Patients Receiving ketamine this Quarter	
Total Quantity Administered		Number of ketamine Administrations pursuant to Direct Medical Control	
Total Quantity Wasted		Number of Quality Assurance reviews conducted by the service medical director	
Total Quantity Lost (Attach copy of DOH Form 2094)		Number of Adverse Reactions to ketamine Administration	
Total Quantity Remaining at End of Quarter		Number of EMS Personnel Authorized to Administer ketamine	Flight Nurses _____ EMT-P _____ EMT-CC_____

I certify that on _____ I conducted an actual physical inventory of the controlled substance listed above. Losses have been reported on a "Loss of Controlled Substances Report" DOH Form 2094 and have been submitted to BNE and a copy of the form has been enclosed. Overages are explained on a separate attached report.

I affirm that this is a true and accurate record of the controlled substance utilization by the above named agency.

_____ _____ _____
Name of Agent (print) Signature of Agent Date

_____ _____ _____
Name of CEO (print) Signature of CEO Date

Sent completed report by due date to:

New York State Department of Health, Bureau of Emergency Medical Services
433 River Street 6th Fl., Troy, NY 12180
Telephone 518-402-0996 x2

DOH-4352 (4/05)

Drug Formulary

KETAMINE

Class

Anesthetic Induction

Description

Ketamine is a controlled substance medication that is a rapid-acting general anesthetic producing an anesthetic state characterized by profound analgesia, normal pharyngeal-laryngeal reflexes, normal or slightly enhanced skeletal muscle tone, cardiovascular and respiratory stimulation, and occasionally a transient and minimal respiratory depression.

Onset & Duration

Onset: Rapid – IV within 30 seconds half life 10-15 min.; IM within 3-4 minutes
Duration: IV 2 mg/kg lasts 5-10 minutes; IM 9 to 13 mg/kg lasts 12-25 minutes

Indications

1. Ketamine is indicated as the sole anesthetic induction agent for management of trauma patients in extreme pain requiring proper immobilization and/or extrication.

Contraindications

1. Ketamine is contraindicated in those in whom a significant elevation of blood pressure would constitute a serious hazard and in those who have shown hypersensitivity to the drug.

Adverse Reactions

1. Cardiovascular - blood pressure and pulse rate are frequently elevated following administration of Ketamine alone. However, hypotension and bradycardia have been observed. Arrhythmia has also occurred.
2. Respiration - Although respiration is frequently stimulated, severe depression of respiration or apnea may occur following rapid intravenous administration of high doses of Ketamine.

Laryngospasms and other forms of airway obstruction have occurred during Ketamine anesthesia.

3. Eye - Diplopia and nystagmus have been noted following Ketamine administration. It also may cause a slight elevation in intraocular pressure measurement.
4. Neurological - In some patients, enhanced skeletal muscle tone may be manifested by tonic and clonic movements sometimes resembling seizures.
5. Gastrointestinal - Anorexia, nausea and vomiting have been observed; however, this is not usually severe and allows the great majority of patients to take liquids by mouth shortly after regaining consciousness.
6. General: Anaphylaxis, local pain and exanthema at the injection site have infrequently been reported. Transient erythema and/or morbilliform rash have also been reported.

Ketamine continued...

Drug Interactions

Prolonged recovery time may occur if barbiturates and/or narcotics are used concurrently with Ketamine.

How Supplied

Injection: IM or IV 15 mg (15 mg/mL) and 30 mg (30 mg/mL)

Ketamine Hydrochloride Injection, USP is supplied as the hydrochloride in concentrations equivalent to Ketamine base.

Container	Concentration	Fill	Quantity
Fliptop Vial	100 mg/mL	5 mL	Box of 10
Fliptop Vial	50 mg/mL	10 mL	Box of 10

Color of solution may vary from colorless to very slightly yellowish and may darken upon prolonged exposure to light. This darkening does not affect potency. Do not use if a precipitate appears.

Store at 20 to 25°C (68 to 77°F).

Protect from light.

Dosing

Adult IV	1-4.5 mg/kg IV over 1 min.
Adult IM	6.5-13 mg/kg IM one dose

Pediatric IV	>3 months 1.5 mg/kg IV over 1 min.
Pediatric IM	>3 months 4-5 mg/kg one dose

Protocol

MA XX	Adult Pain Management
MA XX	Pediatric Pain Management

Special Considerations

1. Elevation of blood pressure begins shortly after injection, reaches a maximum within a few minutes and usually returns to preanesthetic values within 15 minutes after injection.
2. Because pharyngeal and laryngeal reflexes are usually active, Ketamine can not be used alone for advanced airway management such as intubation. Mechanical stimulation of the pharynx should be avoided, whenever possible, if Ketamine is used alone.
3. The incidence of emergence reactions may be reduced if verbal and tactile stimulation of the patient is minimized during the recovery period. This does not preclude the monitoring of vital signs.
4. The intravenous dose should be administered over a period of 60 seconds. More rapid administration may result in respiratory depression or apnea and enhanced pressor response.
5. Use with caution in the chronic alcoholic and the acutely alcohol-intoxicated patient.
6. This medication is a Class III controlled substance medication approved for prehospital use by the SEMAC and the Department.

2.8B EXCITED DELIRIUM SYNDROME

CRITERIA

For patients demonstrating the clinical triad of psychomotor agitation, physiologic excitation, and delirium in the setting of destructive, erratic, bizarre, or violent behavior. Common features include:

- Nudity or inappropriate clothing
- Failure to respond to law enforcement appropriately
- Unusual strength
- Lack of tiring
- Pain tolerance
- Tachypnea
- Diaphoresis
- Psychomotor agitation
- Tactile hyperthermia
- Altered mental status

CAUTION

Agitation may signal a physiologic deterioration of the patient and accompany hypoxia, hypoglycemia, cerebral edema, or other medical problems. Treatment of potential medical disorders should always be promptly evaluated once control of the patient is achieved through chemical restraint.

No patient will be transported without law enforcement presence if his or her emotional or mental status poses a threat to patient or crew safety. Follow 'Management of Violent and Potentially Violent Behavior' procedures (Policy 9.3).

EMT STOP

1. If patient is at immediate risk of harming themselves or others and exhibits the above clinical features:

   Midazolam (Versed) 5-10 mg IV/IM/IN. May repeat dose once.
   OR
   Ketamine 1-2 mg/kg IV or 2-4 mg/kg IM. May repeat dose once.

2. Once under control or dissociated, apply waveform capnography and monitor continuously in addition to EKG and vital sign monitoring.

3. Apply oxygen as needed to maintain saturation >94%.

4. If safe to do so, establish IV access if not performed already and provide 1000 ml Normal Saline bolus. May repeat once if lung sounds remain clear after first liter.

5. Initiate cooling measure to achieve normal body temperature.

6. Assess mental and physical status thoroughly including all other potential causes of aggressive behavior and/or altered mental status while attending to medical or trauma needs as per protocol. Blood glucose determination is mandatory.

7. ONLY if Ketamine has been administered: Midazolam 2.5 mg IV or 5 mg IM/IN if patient develops an emergency phenomenon defined by agitation, nightmares, or hallucinations that are unpleasant, aggressive, or potentially dangerous to EMS personnel.

ABSOLUTE ONLINE

If patient remains an immediate risk of harming themselves or others:

Additional Midazolam (Versed)
OR
Additional Ketamine

2.27 RAPID SEQUENCE INTUBATION

RSI PARAMEDIC ONLY

This procedure requires one provider that must be a paramedic who has been credentialed to perform this procedure by the System Medical Director.

The following indication for Rapid Sequence Intubation is standing order for the RSI Credentialed Paramedic. Absolute On-Line Medical Direction is required for performance of this procedure outside of this indication (eg: potential airway compromise, smoke inhalation, combativeness that threatens airway or spinal cord stability, etc).

STANDING ORDER INDICATION

Inability to tolerate laryngoscopy and **ALL** of the following:

1. GCS ≤8
2. Oxygen saturation less than 90% with 100% supplemental oxygen (via non-rebreather, CPAP, or BVM)
3. Transport time to the nearest appropriate Emergency Department >10 minutes

CONTRAINDICATIONS

1. Patient <40 kg (88 lbs)
2. Obvious facial, neck, and/or spinal deformity that would prevent establishing an airway

PROCEDURE

1. Prepare equipment and backup plan

2. Pre-oxygenate with 100% oxygen

3. Pre-treat
    a. Atropine 0.5 mg IV/IO push for signs or symptoms of symptomatic bradycardia

4. Sedate
    a. Etomidate (Amidate) 0.3 mg/kg IV/IO push OR
    b. Ketamine 1-2 mg/kg IV/IO push

5. Paralyze
    a. Succinylcholine (Anectine) 1.5 mg/kg IV/IO push
    A second dose of Succinylcholine (Anectine) 0.5 mg/kg IV/IO push may be given if initial dose ineffective
    OR
    b. Rocuronium 1 mg/kg IV/IO push

6. Intubate
    a. Orotracheal intubation (using manual in-line neck stabilization for trauma) may be attempted up to two times with an attempt being defined as placing a laryngoscope blade in the oropharynx. The patient must be ventilated between attempts. The patient's SpO_2 must be continuously monitored during each attempt.
    b. If unable to intubate after two attempts, place an alternative airway device.

7. Confirm Placement
    a. Following intubation or placement of an alternative airway device, ventilate patient with bag valve device and 100% oxygen.
    b. Auscultate for bilateral breath sounds, absence of epigastric sounds, confirm placement with waveform capnography.

Protocol continued on next page

2.27 RAPID SEQUENCE INTUBATION (Continued)

8. Monitor
    a. Continuously monitor placement with continuous waveform capnography.
    b. Ventilate to achieve $EtCO_2$ 38-42 mmHg.
    c. Treat and manage other conditions per appropriate protocol.
    d. Provide sedation as clinically indicated per 2.30.

ABSOLUTE ONLINE

Paralysis

Indicated only to facilitate ventilation, must use in conjunction with sedation and analgesia:

Rocuronium 1 mg/kg IV/IO

2.40 FACILITATED EXTRICATION

CRITERIA
Any adult or pediatric patient entrapped, who cannot otherwise be extricated due to extreme pain and/or anxiety

PARAMEDIC ONLY

1. Routine Medical Care.
2. Assess ECG rhythm (if possible), hemodynamic status, and stability of patient.
3. Identify and treat underlying cause of pain/anxiety as per Protocol 2.24 and/or 2.30, if appropriate.
4. Administer Ketamine 1-2 mg/kg IV/IO or 2-4 mg/kg IM. Additional doses of 2 mg/kg IM or 0.5-1 mg/kg IV/IO every 10 minutes.
5. Consider Midazolam 0.05 mg/kg (max 5 mg) if signs of emergence reaction appear:
    - Delirium
    - Visual hallucinations
    - Floating sensations
    - Altered body image
6. Consider Atropine 0.01 mg/kg IV/IO or IM (max 1 mg) if hypersecretion occurs.

NOTES

- Patient should have oxygen therapy (unless contraindicated) maintained throughout this procedure.
- A medically trained person (minimally an EMT) must be able to safely remain close enough to patient during extrication to monitor the patient's respiratory status.
- When possible, $EtCO_2$ monitoring should be continuously in place, unless impractical.

So, Now you're inducing with ketamine…

Indications and use for Excited Delirium, Rapid Sequence Intubation, and Facilitated Extrication

David C. Leisten, BA, CCEMT-P, CIC
Jeremy T. Cushman, MD, MS, EMT-P

University of Rochester
Division of Prehospital Medicine

This educational program is supported in part by

Henrietta Ambulance
Monroe Ambulance
Spencerport Volunteer Ambulance Service
Rural Metro Medical Services
Monroe-Livingston Regional EMS Council
Barnard Fire District
Monroe Community College
North Greece
Southeast Quadrant Mobile Critical Care Unit
Perinton Volunteer Ambulance Corps Inc.

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Objective

With recent changes to the Monroe-Livingston Regional EMS Protocols it is necessary to update the RSI-Credentialed Provider to the availability of Ketamine for management in select patient populations.

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Outline

- Controlled substance/handling concerns
- Pharmacology of ketamine
- Inclusion in previous protocols
- Introduction to facilitated extrication
- Case studies

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Effective January 1st, 2014 Ketamine will be available for management of the following patients:

- Excited Delirium – New in 2013
- Rapid Sequence Induction
- Facilitated Extrication – New Protocol

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Ketamine will **ONLY** be available to the RSI-Credentialed Providers, *but* all providers should be made aware of its availability and application in the protocols

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Rationale

Ketamine has been included in the protocols, having been identified as an ideal alternative to other sedation medications because of its:

- Minimal respiratory depression
- Benefit with reactive airway disease

Introducing *Ketamine*

Not just for horses anymore…

Controlled Substance

- Schedule III
  - Potential for abuse and may lead to low - moderate physical or high psychological dependence

- Agency adjustment of Controlled Substance Policies

Pharmacology

Ketamine

- Drug Class: Dissociative Anesthetic
  - Sedative and analgesic properties
- Mechanism of Action: Selectively disrupts association pathways of the brain between thalamus and limbic system
  - Competitive NMDA antagonist
- Concentrations
  - 10mg/mL, ***50mg/mL***, 100mg/mL

Pharmacokinetics

- Onset:
  - 60-90 seconds - IV/IO
  - 1-2 minutes - IM
- Duration:
  - 10-15 minutes - IV/IO
  - 15-20 minutes - IM

Pharmacokinetics

- Adverse Effects:
  - Nausea/Vomiting
  - ↑ BP
  - ↑ HR
  - ↑ ICP
  - Bronchodilitations
  - Increased Secretions
    - Salivation
    - Bronchial secretions
  - 'Emergence Phenomenon'

‘Emergence Phenomenon’

- Occurs upon emergence from sedation
- Affects up to 12% of patients
- Less common in IM administration
- Manifestations vary:
  - Dream-like states
  - Hallucinations
  - Vivid Imagery
  - Delirium
- Mitigate occurrence with utilization of benzodiazepines

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Contraindications

- Marked hypertension
- Marked tachycardia
- Cardiac ischemia

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Pearls to Ketamine Use

- Rapid administration may cause apnea
- The patient should continue to breathe, have muscle tone, and may be interactive
- Consider benzodiazepine use with findings of emergence phenomenon
  - No need to pre-treat, however
- May consider atropine for management of hypersalivation/secretions

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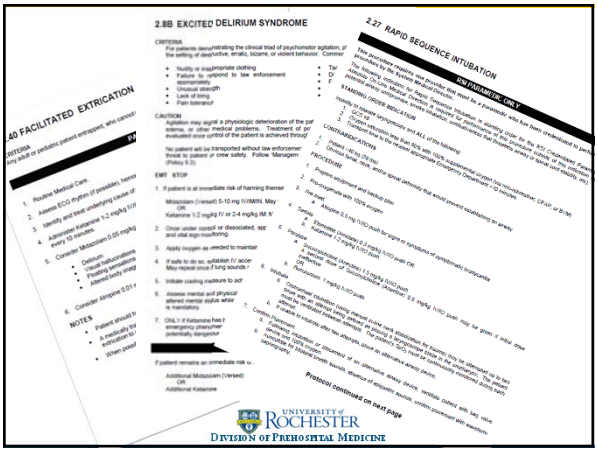

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2014 Changes

- Excited Delirium – 2.8B
  - Updated to include Ketamine
- Rapid Sequence Intubation – 2.27
  - Inclusion of ketamine
  - Removal of lidocaine
- Facilitated Extrication – 2.40
  - NEW Protocol

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2.8B – *Excited Delirium*

- Developed and introduced in 2013
- Updated to include ketamine for use in sedation of this patient population
- Refer to previous vodcast for training on signs, symptoms, and management of ExDS

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2.8B - Updates

- 2014 changes:
  - Increased maximum dosing of midazolam
    - 5-10 mg IV/IM/IN, may repeat *once*
  - Inclusion of ketamine
    - 1-2 mg IV or 2-4mg IM, may repeat *once*

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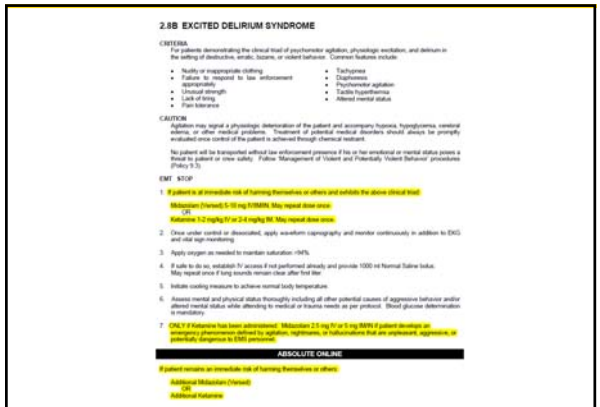

2.8B EXCITED DELIRIUM SYNDROME

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- Failure to respond to law enforcement appropriately
- Unusual strength
- Lack of tiring
- Pain tolerance
- Tachypnea
- Diaphoresis
- Psychomotor agitation
- Tactile hyperthermia
- Altered mental status

CAUTION

Agitation may signal a physiologic deterioration of the patient and accompany hypoxia, hyperglycemia, cerebral edema, or other medical problems. Treatment of potential medical disorders should always be promptly evaluated once control of the patient is achieved through chemical restraint.

No patient will be transported without law enforcement presence if his or her emotional or mental status poses a threat to patient or crew safety. Follow 'Management of Violent and Potentially Violent Behavior' procedures (Policy 9.3).

EMT STOP

1. If patient is at immediate risk of harming themselves or others and exhibits the above clinical triad:

   Midazolam (Versed) 5-10 mg IVIMIN. May repeat dose once.

   OR

   Ketamine 1-2 mg/kg IV or 2-4 mg/kg IM. May repeat dose once.

2. Once under control or dissociated, apply waveform capnography and monitor continuously in addition to EKG and vital sign monitoring.

3. Apply oxygen as needed to maintain saturation >94%.

4. If safe to do so, establish IV access if not performed already and provide 1000 ml Normal Saline bolus. May repeat once if lung sounds remain clear after first liter.

5. Initiate cooling measure to achieve normal body temperature.

6. Assess mental and physical status thoroughly including all other potential causes of aggressive behavior and/or altered mental status while attending to medical or trauma needs as per protocol. Blood glucose determination is mandatory.

7. ONLY if Ketamine has been administered: Midazolam 2.5 mg IV or 5 mg IM/IN if patient develops an emergency phenomenon defined by agitation, nightmares, or hallucinations that are unpleasant, aggressive, or potentially dangerous to EMS personnel.

ABSOLUTE ONLINE

If patient remains an immediate risk of harming themselves or others:

Additional Midazolam (Versed)

OR

Additional Ketamine

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2.27 – *Rapid Sequence Intubation*

<u>Changes</u>

- Updated in 2014 protocols to include ketamine for initial sedation
- Removed lidocaine from pre-treatment
- Added Rocuronium as an alternative paralytic for patients with contraindications to succinylcholine

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Currently Available

Pretreatment	• Atropine • Lidocaine
Sedation	• Etomidate • Midazolam
Paralytic	• Succinylcholine
Analgesia	• Morphine • Fentanyl

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2014 Protocols

Pretreatment	• Atropine
Sedation	• Etomidate • Ketamine • Midazolam
Paralytic	• Succinylcholine • Rocuronium
Analgesia	• Morphine • Fentanyl

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RSI Review

- One provider must be an RSI Credentialed Paramedic
- Standing order vs. absolute On-Line Medical Direction
- Contraindications:
  - Patient < 40 kg (88lbs)
  - Obvious facial, neck, and/or spinal deformity that would prevent establishing an airway
  - Contraindications to succinylcholine removed

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Procedure

- Prepare
- Pre-oxygenate
- Pre-treat
- Sedate
- Paralyze
- Intubate
- Confirm
- Monitor

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Prepare & Pre-Oxygenate

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Pre-Treatment

Atropine

- 0.5 mg
- Signs or symptoms of symptomatic bradycardia

Lidocaine

- Previously utilized for potential ICP
- Mixed literature attesting to effectiveness
- Removed from protocols to be more consistent with local hospital practices

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Sedation

Etomidate (*Amidate*) - 0.3 mg/kg IV/IO Push

- Short acting, non-barbiturate, non-benzodiazepine hypnotic agent
- Benefits:
  - Minimal cardiovascular effects
  - ↓ ICP
- Adverse Effects:
  - Respiratory depression
  - Hypotension
  - Myoclonus
  - Adrenal suppression

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Sedation Continued

Ketamine Hydrochloride (*Ketalar*) – 1-2 mg/kg

- Alternative to Etomidate (*Amidate*)
- Provides analgesic effects and sedative
- Preferential use in:
  - Reactive airway disease
- Consideration in:
  - Hypotensive patients
  - Septic Shock

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Paralyze

- Succinylcholine (Anectine) → 1.5 mg/kg IV/IO Push → Second dose if ineffective – 0.5 mg/kg IV/IO
- Rocuronium → 1 mg/kg IV/IO push

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Intubate

Orotracheal intubation may be attempted up to two times

- 'Attempt' – defined as placing a laryngoscope blade in the oropharynx
- Patient must be ventilated between attempts
- Continuously monitor SpO_2

If unable to intubate after two attempts, place an alternative airway device

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Confirm Placement

Following intubation or placement of an alternative airway device, ventilate with 100% oxygen

Auscultate breath sounds bilaterally, absence of epigastric sounds

Confirm placement with waveform capnography

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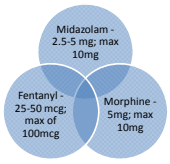
Monitor

- Continuously monitor capnography
  - Achieve $EtCO_2$ 38-42 mmHg
- Treat and manage other conditions per protocols
- Provide sedation as clinically indicated per protocol 2.30 – Sedation



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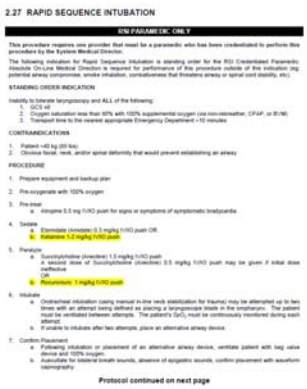

2.27 RAPID SEQUENCE INTUBATION

Protocol continued on next page

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RSI Dosing Scheme

Medication		40 kg	50 kg	60 kg	70 kg	80 kg	90 kg	100 kg	110 kg	120 kg	130 kg	140 kg	150 kg
		88 lb	110 lb	132 lb	154 lb	176 lb	198 lb	220 lb	242 lb	264 lb	286 lb	308 lb	330 lb
Etomidate	0.3 mg/kg	12 mg	15 mg	18 mg	21 mg	24 mg	27 mg	30 mg	33 mg	36 mg	39 mg	42 mg	45 mg
	2 mg/ml	6 ml	7.5 ml	9 ml	10.5 ml	12 ml	13.5 ml	15 ml	17 ml	18 ml	19.5 ml	21.0 ml	22.5 ml
Ketamine	1 mg/kg	40 mg	50 mg	60 mg	70 mg	80 mg	90 mg	100 mg	110 mg	120 mg	130 mg	140 mg	150 mg
	50 mg/ml	0.8 ml	1 ml	1.2 ml	1.4 ml	1.6 ml	1.8 ml	2 ml	2.2 ml	2.4 ml	2.6 ml	2.8 ml	3.0 ml
Succinylcholine	1.5 mg/kg	60 mg	75 mg	90 mg	105 mg	120 mg	135 mg	150 mg	165 mg	180 mg	195 mg	210 mg	225 mg
	20 mg/ml	3 ml	3.8 ml	4.5 ml	5.3 ml	6 ml	6.8 ml	7.5 ml	8 ml	9 ml	9.8 ml	10.5 ml	11.3 ml
Rocuronium	1 mg/kg	40 mg	50 mg	60 mg	70 mg	80 mg	90 mg	100 mg	110 mg	120 mg	130 mg	140 mg	150 mg
	10 mg/ml	4 ml	5 ml	6 ml	7 ml	8 ml	9 ml	10 ml	11 ml	12 ml	13 ml	14 ml	15 ml

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Facilitated Extrication

Protocol 2.40

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Facilitated Extrication

- Appropriate use of pharmacologic agents to assist with pain control and anxiolysis during the process of victim extrication
  - More than just "pain control" during extrication
- Indicated for any entrapped patient who cannot otherwise be extricated due to extreme pain:
  - Limb entrapped in/under heavy machinery
  - Extrication process itself anticipated to inflict more pain
  - Inherent muscle tone prohibits simple extrication

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Facilitated Extrication

- Decision based upon clinical and situational information
  - Routine pain management has failed (Protocol 2.24)
  - Sedation has failed or not safe/practical to perform (Protocol 2.30)
  - Current attempts at releasing the entrapment have failed
- Preparation is essential
  - Continue routine medical care
    - IV access or IO access
  - Continuous cardiac monitoring feasible
  - Pulse oximetry and capnography
  - Airway management equipment
- Medical and rescue teams need to be communicating and planning together

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Facilitated Extrication – Pain Control

- Morphine:
  - Causes hypotension and respiratory depression
  - Onset of action: peak effect around 15 minutes
  - Analgesic effects last 1-2 hours
  - IM route has unpredictable effects in hypotensive state
  - Causes histamine release and itching
- Fentanyl:
  - Less hypotension
  - Onset of action: peak around 5 minutes
  - Analgesic effect with repeated doses can last 3-4 hours
  - No histamine release

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Facilitated Extrication - Sedation

- Midazolam:
  - Benzodiazepine
  - Onset: 3-5 minutes IV/IO/IN; 5-7 minutes IM
  - Duration of effects: 3 – 5 minutes IV/IO; 10 minutes IM
  - Adverse effects:
    - Hypotension
    - Respiratory depression

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Facilitated Extrication - Sedation

- Etomidate:
  - Hypnotic
  - Onset: < 30 seconds IV/IO; <60 seconds IM
  - Duration of effects: 5 – 7 minutes IV/IO/IM
  - Adverse effects:
    - Respiratory depression/apnea
    - Myoclonus
    - Adrenal suppression with multiple doses

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Facilitated Extrication - Sedation

- Ketamine:
  - Dissociative anesthetic
  - Onset: <30 seconds IV/IO; 30 – 60 seconds IM; ?? IN
  - Duration of effects: 3 – 5 minutes IV/IO; 10 minutes IM
  - Adverse effects:
    - Tachycardia
    - Hypertension
    - Increased ICP
    - Hypersalivation/drooling

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Facilitated Extrication

- Determine Indication
- Determine Risk/Benefit ratio
- Discuss with Rescue Leader
- Prepare and Plan
  - Vascular access
  - Monitoring equipment
  - Airway equipment
  - Extrication plan and evac plan
- Analgesic Administration
- Sedative Administration
- Removal
- Even CLOSER monitoring of patient once removal has occurred!

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Dosing

- Ketamine for 'Facilitated Extrication'
  - 1-2 mg/kg IV/IO
  - 2-5 mg/kg IM1
    - Additional Doses of 2mg/kg IM

      or
    - 0.5-1 mg/kg IV/IO every 10 minutes

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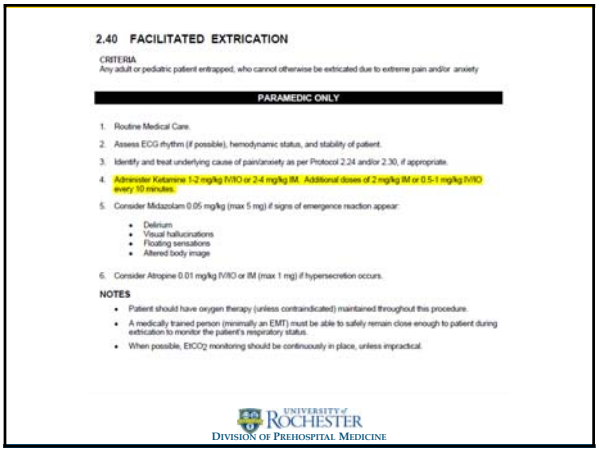

2.40 FACILITATED EXTRICATION

CRITERIA
Any adult or pediatric patient entrapped, who cannot otherwise be extricated due to extreme pain and/or anxiety

PARAMEDIC ONLY

1. Routine Medical Care.
2. Assess ECG rhythm (if possible), hemodynamic status, and stability of patient.
3. Identify and treat underlying cause of pain/anxiety as per Protocol 2.24 and/or 2.30, if appropriate.
4. Administer Ketamine 1-2 mg/kg IV/IO or 2-4 mg/kg IM. Additional doses of 2 mg/kg IM or 0.5-1 mg/kg IV/IO every 10 minutes.
5. Consider Midazolam 0.05 mg/kg (max 5 mg) if signs of emergence reaction appear:
   - Delirium
   - Visual hallucinations
   - Floating sensations
   - Altered body image
6. Consider Atropine 0.01 mg/kg IV/IO or IM (max 1 mg) if hypersecretion occurs.

NOTES

- Patient should have oxygen therapy (unless contraindicated) maintained throughout this procedure.
- A medically trained person (minimally an EMT) must be able to safely remain close enough to patient during extrication to monitor the patient's respiratory status.
- When possible, $EtCO_2$ monitoring should be continuously in place, unless impractical.

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Case Studies

Putting it to practice

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Case 1

- 28 yo asthmatic
  - Tripoding, in profound distress
  - Hx of multiple intubations and ICU admissions
  - RR 42
  - HR 130
  - BP 142/80
  - SpO_2 76 on 100%
  - $EtCO_2$ 10 mmHg and shark-fin

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- No response to Epi 0.3 mg IM x2
- Increasingly confused, combative

- RSI?
  - Choice of induction medications
  - Choice of continued sedation
  - Ventilation settings

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Case 2

- Middle aged male wandering naked, smashing windows
  - Diaphoretic
  - Inappropriately dressed
  - Guttural noises
  - No response to verbal re-direction
  - Two TASER deployments by LE without effect
  - LE discusses with EMS various swarm options

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- What medical conditions might this patient have?
- Treatment priorities?
- Sedation considerations?
- Physical restraint and monitoring considerations?

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Case 3

- 35 yo healthy male laborer with right arm caught in machinery
  - HR 92
  - BP 128/84
  - RR 16
  - SpO_2 99%

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- Treatment priorities?
- Sedation considerations?
- Monitoring considerations?
- Extraction considerations?

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Conclusion

- Several recent changes have occurred within the protocols that RSI Paramedics must be aware of
- Ketamine has been introduced in the region for management of patients of the following populations:
  - Excited Delirium – 2.8B
  - Rapid Sequence Intubation – 2.27
  - Facilitated Extrication – 2.40

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Conclusion

- Ketamine will only be available to RSI Credentialed Paramedics at this time.
- Because of availability may be requested for alternate procedures beside airway control
  - Facilitated Extrication
  - Excited Delirium

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Conclusion

- Excited Delirium
  - Increased max dose for use of midazolam
    - 10 mg max prior to Medical Control consultation
  - Ketamine is beneficial in management of these patients
    - May be preferred medication if available due to decreased respiratory depression in comparison to midazolam

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Conclusion

- Rapid Sequence Intubation:
  - Pre-treatment of lidocaine has been removed from the protocol
  - Rocuronium has been added as alternate paralytic
  - Ketamine is available as option for induction and may be beneficial in specific patient populations
    - 1-2 mg/kg IV/IO

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Conclusion

- Facilitated Extrication
  - New protocol for 2014 edition
  - Decision based upon clinical and situational information
    - All other efforts have been exhausted and/or failed

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Dosing Scheme

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