


PILOT PROGRAM
RAPID SEQUENCE INTUBATION PROTOCOL PACKAGE
Paramedic only

M. ADULT RAPID SEQUENCE INTUBATION PROTOCOL PACKAGE

1. Rapid Sequence Intubation (RSI) Pilot Program

a) Indications

- (1) Inability to tolerate laryngoscopy, and:
 - (a) GCS less than or equal to 8 with respiratory rate less than or equal to 8 or greater than or equal to 35 or
 - (b) GCS less than or equal to 8 with oxygen saturation less than or equal to 90% on non-rebreather face mask
- (2)  On-line medical direction for RSI may be requested in the following situations:
 - (a) GCS less than or equal to 8 with clenched jaw, inability to adequately suction airway, and without above respiratory parameters
 - (b) Respiratory extremis with contraindications to nasotracheal intubation (respiratory rate greater than or equal to 35 with air hunger, use of accessory muscles, and oxygen saturation less than or equal to 90% on non-rebreather face mask)

b) Contraindications

- (1) Conditions that may cause hyperkalemia:
 - (a) Burns greater than 24 hours old
 - (b) Spinal cord injury greater than 24 hours old
 - (c) Known neuromuscular disease (Guillain-Barré Syndrome, myasthenia gravis, amyotrophic lateral sclerosis, muscular dystrophy)
 - (d) Chronic renal failure on hemodialysis/ Presence of hemodialysis access
- (2) Age less than 12
- (3) History of malignant hyperthermia

c) Preparation

- (1) Pre-oxygenate with 90-100% oxygen.
- (2) Monitor oxygen saturation with pulse oximetry and ECG.
- (3) Ensure functioning IV and fluid therapy as per protocol.
- (4) Evaluate for difficult airway.
- (5) Perform focused RSI neurologic exam.
- (6) Prepare equipment
 - (a) Intubation kit
 - (b) Bag Valve Mask (BVM)
 - (c) Suction
 - (d) RSI kit
 - (i) Prepare medications
 - (ii) Alternative airway device, Cricothyroidotomy equipment
 - (e) Capnograph

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d) RSI Procedure

(1) Sedation

Adequate sedation must be provided to prevent awareness during paralysis from neuromuscular blockade.

Etomidate, if available, will be the preferred agent for patients who are aware of their surroundings and do not have hypotension or possible hypovolemia.

Dose: Administer 0.3 mg/kg IVP over 30-60 seconds May repeat 0.15 mg/kg IVP in 2-3 minutes if inadequate sedation

OR

Ketamine may be used if etomidate is unavailable, and may be preferred for patients who have hypotension or possible hypovolemia.

Dose: Administer 2 mg/kg IVP over 60 seconds

OR

Midazolam should be considered for patients with isolated head injury and elevated blood pressure, especially with possible seizure activity. Midazolam should not be used for patients with hypotension, and should be avoided with possible hypovolemia.

Dose: Administer 0.05 mg/kg (2-5 mg) IVP over 1-2 minutes

Only one sedative agent should be administered prior to succinylcholine unless otherwise directed by medical consultation.

- (2) For patients with head injury or suspected increased intracranial pressure, administer Lidocaine 1 mg/kg (40-100 mg) IVP over 1-2 minutes
- (3) In-line cervical spine stabilization by second caregiver (in trauma setting)
- (4) Apply cricoid pressure (by third caregiver).
- (5) Succinylcholine: Administer 1.5 mg/kg (60-150 mg) rapid IVP
- (6) Intubate trachea and verify ET placement.
- (7) If inadequate relaxation after 2-3 minutes, administer Atropine 1 mg to avoid bradycardic response and repeat succinylcholine 0.5 mg/kg IVP (20-50 mg).

e) Successful Endotracheal Tube Placement

- (1) Release cricoid pressure and secure ET.
- (2) Ventilate to end tidal carbon dioxide of 30-32 mmHg.
- (3) If significant resistance to ventilation occurs as succinylcholine wears off (4-5 minutes), refer to Ventilatory Difficulty Secondary to Bucking Protocol.

f) Unsuccessful Endotracheal Tube Placement

- (1) Maintain cricoid pressure and resume BVM ventilation for 30 seconds.
- (2) If unable to ventilate, see "Unable to Ventilate" below.
- (3) Re-attempt oral ET intubation.
- (4) If unsuccessful, resume BVM ventilation for 30 seconds.
- (5) Insert an approved alternative airway device (refer to alternative airway device protocol).

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- (6) Attach capnograph and ventilate to desired end tidal carbon dioxide level.
- (7) If significant resistance to ventilation occurs as succinylcholine wears off (4-5 minutes), or if patient exhibits difficulty in tolerating an approved alternative airway device as succinylcholine wears off, refer to Ventilatory Difficulty Secondary to Bucking Protocol.

g) If Unable to Ventilate

Insert an approved alternative airway device (refer to alternative airway device protocol).

- h)** If still unable to ventilate using an approved alternative airway device, remove and perform cricothyroidotomy (refer to Cricothyroidotomy Protocol).

2. Ventilatory Difficulty Secondary to Bucking or Combativeness in Intubated Patients

a) Indication

Patients successfully intubated with an endotracheal tube, an approved alternative airway device, or Cricothyroidotomy, for whom the ability to provide manual or mechanical ventilation is impaired secondary to bucking or combativeness

b) Contraindication

Unsecured airway

c) Procedure

- (1) **Etomidate**, if available, will be the preferred agent for patients who are aware of their surroundings and do not have hypotension or possible hypovolemia.

Dose: Administer 0.3 mg/kg IVP over 30-60 seconds.

May repeat 0.15 mg/kg IVP every 15 minutes to a total of three doses.

OR

Ketamine may be used if etomidate is unavailable, and may be preferred for patients who have hypotension or possible hypovolemia, or if ventilatory difficulty is thought to be the result of pain response.

Dose: Ketamine: 2 mg/kg IVP over 60 seconds. May repeat 1 mg/kg for IVP every 10-15 minutes to a total of three doses as necessary. Additional doses require Medical Consultation.

OR

Midazolam should be considered for patients with isolated head injury and elevated blood pressure, especially with possible seizure activity. Midazolam should not be used for patients with hypotension, and should be avoided with possible hypovolemia.

Dose: Administer 0.05 mg/kg (2-5 mg) IVP over 1-2 minutes titrated to abate bucking and relax ventilation while maintaining systolic BP greater than 90 mmHg

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- (2) If ventilatory difficulty is thought to be the result of pain response,
Ketamine: Dose 2 mg/kg IVP over 60 seconds. May repeat 1 mg/kg IVP every 10-15 minutes as necessary to a total of three doses as necessary. Additional doses require medical consultation.

OR


Morphine may be used in addition to, or instead of, midazolam, ketamine, or etomidate:

Morphine: Dose: 0.1 mg/kg IV/IO at a rate of 2 mg/min to a maximum single dose of 20 mg. May repeat as necessary in 5-10 minutes after reassessment with 0.05 mg/kg at a rate of 2 mg/min to a maximum single dose of 10 mg. Titrate to abate bucking and relax ventilation while maintaining systolic BP greater than 90 mmHg.

- (3) If significant resistance to ventilation continues, the EMT-P may administer
(a) Vecuronium 0.05 mg/kg (2-5 mg) IVP



PRE-SEDATION MUST BE PROVIDED WHEN VECURONIUM IS ADMINISTERED TO A PATIENT WHO IS EITHER RESPONSIVE TO STIMULUS, OR WHO MAY BECOME RESPONSIVE TO STIMULUS DURING NEUROMUSCULAR BLOCKADE. USE OF VEDURONIUM REQUIRES FUNCTIONING END TIDAL CO₂ MONITORING. VECURONIUM MAY ONLY BE USED IF CONTINUOUS, BREATH TO BREATH, ETCO₂ MONITORING CAN BE PROVIDED.

- (b) Dose may be repeated in 4-6 minutes if necessary.
(c) **Maintenance of Amnesia**
Follow above dosing of either **etomidate** or **ketamine** with required repeat dosing every 10-15 minutes.
- (4) Continue to monitor oxygen saturation and ventilate to desired end tidal carbon dioxide.
- (5)  Obtain on-line medical direction if further problems present.

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4. RSI Quality Assurance Process

a) Individual Paramedic Approval for RSI Pilot Participation

- (1) Successful completion of small group training includes all five of the following:
 - (a) Classroom lecture
 - (b) Mannequin instruction
 - (c) Cadaver lab, including cricothyroidotomy
 - (d) Anesthesia computerized mannequin simulator
 - (e) Must demonstrate proficiency through skills testing and written test
- (2) Successful completion of individualized Operating Room Training
 - (a) Individual Operating Room training with Attending Anesthesiologist, and
 - (b) Must demonstrate proficiency to Attending Anesthesiologist's satisfaction

b) Ongoing Demonstration of Proficiency

A verification of all RSI skills and review of RSI principles of safety will be performed on a quarterly basis. In two of the quarters, this will be accomplished via direct observation in the Operating Room. In a third quarter, the medical director during a full Paramedic skills evaluation will perform this. A fourth quarter verification will be accomplished via an anesthesia mannequin simulator, an RSI skills module, or a documentation and review of a field utilization.

c) Review of Each Call

- (1) Mechanism for follow-up of each call will be in accordance with the Quality Review Procedure for Pilot Programs (formerly "Class B" Additional Procedure Algorithm) of the Maryland Medical Protocols, with the following additions:
- (2) Immediate notification of your jurisdictional RSI supervisor for all RSI attempts
- (3) Medical Director evaluation of all RSI attempts within 12 hours

d) Maintenance of detailed RSI database

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**N. PEDIATRIC RAPID SEQUENCE INTUBATION PROTOCOL PACKAGE
(For children less than 12 years of age)**



1. Rapid Sequence Intubation (RSI) Pilot Program

a) Indications


- (1) Inability to tolerate laryngoscopy and have the following:
 - (a) GCS less than or equal to 8, indicated by a patient that will not: open eyes, cry, say words, or show purposeful movement in response to painful stimulus.

AND

- (b) Respiratory insufficiency, demonstrated by oxygen saturation less than or equal to 90% on non-rebreather face mask, respiratory rate less than or equal to 8, or respiratory rate greater than or equal to 45 (age less than 1 yr), greater than or equal to 40 (age 1-5 yrs), greater than or equal to 35 (age 6-9 yrs) with signs of air hunger and accessory muscle use.



PATIENTS WITH AN IDENTIFIED DIFFICULT AIRWAY WHO CAN BE BAGGED TO AN OXYGEN SATURATION GREATER THAN 90% REQUIRE ON-LINE MEDICAL DIRECTION FOR RSI, PREFERABLY FROM A PEDIATRIC BASE STATION.

- (2)  On-line medical direction for RSI may be requested (preferably from a pediatric Base Station), in the following situations:
 - (a) GCS less than or equal to 8 with clenched jaw, inability to adequately suction airway, and without above respiratory parameters
 - (b) Respiratory extremis with contraindications to nasotracheal intubation (respiratory rate greater than or equal to 35 with air hunger, use of accessory muscles, and oxygen saturation less than or equal to 90% on non-rebreather face mask)
 - (c) Identified difficult airway patient with a GCS less than or equal to 8 and signs of respiratory insufficiency who cannot tolerate laryngoscopy but is able to be bagged to an oxygen saturation greater than 90%.

b) Contraindications

- (1) Conditions that may cause hyperkalemia:
 - (a) Burns greater than 24 hours old
 - (b) Spinal cord injury greater than 24 hours old
 - (c) Known neuromuscular disease (Guillain-Barré Syndrome, myasthenia gravis, amyotrophic lateral sclerosis, muscular dystrophy)
 - (d) Chronic renal failure on hemodialysis/ Presence of hemodialysis access
- (2) History of malignant hyperthermia

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c) Preparation

- (1) Pre-oxygenate with 90-100% oxygen.
- (2) Monitor oxygen saturation with pulse oximetry and ECG.
- (3) Ensure functioning IV and fluid therapy as per protocol.
- (4) Evaluate for difficult airway.
- (5) Perform focused RSI neurologic exam.
- (6) Prepare equipment
 - (a) Intubation kit: Recommended to carry both cuffed and uncuffed ET tubes for patients less than 8 years of age or 25 kg.
 - (b) Bag Valve Mask (BVM) with manometer. (Manometer may be part of the BVM or separate.)
 - (c) Suction
 - (d) RSI kit
 - (i) Prepare medications
 - (ii) Alternative airway device, Cricothyroidotomy equipment
 - (e) Capnograph

d) RSI Procedure

- (1) Adequate sedation must be provided to prevent awareness during paralysis from neuromuscular blockade.

Etomidate, if available, will be the preferred agent for patients who are aware of their surroundings and do not have hypotension or possible hypovolemia.

Dose: Administer 0.3 mg/kg IVP over 30-60 seconds May repeat 0.15 mg/kg IVP in 2-3 minutes if inadequate sedation

Ketamine may be used if etomidate is unavailable, and may be preferred for patients who have hypotension or possible hypovolemia.

Dose: Administer 2 mg/kg IVP over 60 seconds

Midazolam should be considered for patients with isolated head injury and elevated blood pressure, especially with possible seizure activity. Midazolam should not be used for patients with hypotension, and should be avoided with possible hypovolemia

Dose: Administer 0.05 mg/kg (2-5 mg) IVP over 1-2 minutes

- (a) Hold for BP less than 60 in neonates (patients less than 28 days old), less than 70 in infants (patients less than 1 year of age), less than $[70 + (2 \times \text{years}) = \text{systolic BP}]$ for patients greater than 1 year of age.
- (2) For patients with head injury or suspected increased intracranial pressure, administer Lidocaine 1 mg/kg IVP over 1-2 minutes.
- (3) If patient is less than 8 years of age (or if age unknown and using ET tube smaller than 6.0), pretreat patient with Atropine 0.02 mg/kg IVP (minimum dose of 0.1 mg).
- (4) In-line cervical spine stabilization by second caregiver (in trauma setting)

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- (5) Apply cricoid pressure (by third caregiver).
- (6) Succinylcholine: Administer 1.5 mg/kg rapid IVP
- (7) Intubate trachea and verify ET placement.
- (8) If inadequate relaxation after 2-3 minutes, repeat succinylcholine 0.5 mg/kg IVP.

e) Successful Endotracheal Tube Placement

- (1) Release cricoid pressure and secure ET.
- (2) Ventilate to end tidal carbon dioxide of 30-32 mmHg.
- (3) If significant resistance to ventilation occurs as succinylcholine wears off (4-5 minutes), refer to Ventilatory Difficulty Secondary to Bucking Protocol.

f) Unsuccessful Endotracheal Tube Placement

- (1) Maintain cricoid pressure and resume BVM ventilation for 30 seconds.
- (2) If unable to ventilate, see "Unable to Ventilate" below.
- (3) Re-attempt oral ET intubation.
- (4) If unsuccessful, resume BVM ventilation.

g) If Unable to Ventilate

If unable to ventilate, verify appropriate oropharyngeal airway placement and reposition BVM for optimal mask seal. If still unable to ventilate, refer to needle cricothyroidotomy protocol.

2. Ventilatory Difficulty Secondary to Bucking or Combativeness in Intubated Patients

a) Indication

Patients successfully intubated with an endotracheal tube, or needle Cricothyroidotomy, for whom the ability to provide manual or mechanical ventilation is impaired secondary to bucking or combativeness

b) Contraindication

Unsecured airway

c) Procedure

- (1) **Etomidate**, if available, will be the preferred agent for patients who are aware of their surroundings and do not have hypotension or possible hypovolemia.

Dose: Administer 0.3 mg/kg IVP over 30-60 seconds. May repeat 0.15 mg/kg IVP every 15 minutes to a total of three doses.

OR

Ketamine may be used if etomidate is unavailable, and may be preferred for patients who have hypotension or possible hypovolemia, or if ventilatory difficulty if thought to be the result of pain response.

Dose: Ketamine: 2 mg/kg IVP over 60 seconds. May repeat 1 mg/kg for IVP every 10-15 minutes to a total of three doses as necessary. Additional doses require Medical Consultation.

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Midazolam should be considered for patients with isolated head injury and elevated blood pressure, especially with possible seizure activity. Midazolam should not be used for patients with hypotension, and should be avoided with possible hypovolemia.

Dose: Administer 0.05 mg/kg (2-5 mg) IVP over 1-2 minutes, titrated to abate bucking and relax ventilation while maintaining systolic BP: greater than 60 in neonates, 70 in infants, [70 + (2 x years) = systolic BP] for patients greater than 1 year of age.

- (2) If ventilatory difficulty is thought to be the result of pain response, **Ketamine**: Dose: 2 mg/kg IVP over 60 seconds. May repeat 1 mg/kg IVP every 10-15 minutes as necessary to a total of three doses as necessary. Additional doses require Medical Consultation.

OR

Morphine may be used in addition to, or instead of, Midazolam, Ketamine, or Etomidate:

Morphine: Dose: 0.1 mg/kg IV/IO at a rate of 2 mg/min to a maximum single dose of 20 mg. May repeat as necessary in 5-10 minutes after reassessment with 0.05 mg/kg at a rate of 2 mg/min to a maximum single dose of 10 mg. Titrate to abate bucking and relax ventilation while maintaining systolic BP greater than 60 in neonates, 70 in infants, [70 + (2 x years) = systolic BP] for patients greater than 1 year of age.

- (3) If significant resistance to ventilation continues, the Paramedic may administer
- (a) Vecuronium 0.05 mg/kg (2-5 mg) IVP (May not be used for patients with needle cricothyroidotomy because of inability to monitor breath to breath $ETCO_2$).




PRE-SEDATION MUST BE PROVIDED WHEN VECURONIUM IS ADMINISTERED TO A PATIENT WHO IS EITHER RESPONSIVE TO STIMULUS, OR WHO MAY BECOME RESPONSIVE TO STIMULUS DURING NEUROMUSCULAR BLOCKADE. VECURONIUM MAY ONLY BE USED IF CONTINUOUS, BREATH TO BREATH, $ETCO_2$ MONITORING CAN BE PROVIDED.

- (b) Dose may be repeated in 4-6 minutes if necessary.

- (c) **Maintenance of Amnesia**

Follow above dosing of either **etomidate** or **ketamine** with required repeat dosing every 10-15 minutes.

- (4) Continue to monitor oxygen saturation and ventilate to desired end tidal carbon dioxide.
- (5)  Obtain on-line medical direction (preferably from a pediatric Base Station), if further problems present.

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3. Protocol for Cricothyroidotomy
(Surgical for 8 years old or greater and Needle)

a) Indications

- (1) Inability to ventilate despite having tried BVM with oropharyngeal/nasopharyngeal airway, ET placement, and alternative airway device (if not contraindicated)
- (2) Inability to place ET in the setting of life-threatening upper airway hemorrhage
- (3) Completely obstructing upper airway foreign body that cannot be removed via BLS maneuvers or Magill forceps with direct visualization

b) Preparation

- (1) Prepare suction and cricothyroidotomy kit.
- (2) Begin at sternal notch and locate cricoid cartilage.
- (3) Palpate cricothyroid membrane anteriorly between cricoid cartilage and thyroid cartilage.
- (4) Prepare skin with betadine or alcohol swabs.

c) Surgical Cricothyroidotomy for 8 years old or greater

- (1) Stabilize thyroid cartilage and make vertical incision (1-1 1/2 inches) over cricothyroid membrane. Alternatively, a needle puncture dilator device may be utilized.
- (2) Palpate cricothyroid membrane with gloved finger and carefully make transverse incision through membrane. Insert scalpel handle and rotate 90 degrees.
- (3) Insert a 5 to 6.0 mm cuffed ET tube, using the natural curve of tube.
- (4) Insert ET tube to just beyond cuff.
- (5) Inflate cuff and ventilate patient.
- (6) Monitor oxygen saturation and end tidal carbon dioxide level.
- (7) Secure ET tube. (Do not cut or trim ET tube.)
- (8) If significant resistance to ventilation develops, or if patient develops difficulty in tolerating successful cricothyroidotomy, refer to Ventilatory Difficulty Secondary to Bucking or Combativeness Protocol.



ONLY NEEDLE CRICOTHYROIDOTOMY SHOULD BE PERFORMED FOR PATIENTS LESS THAN AGE 8 WHO MAY REQUIRE CRICOTHYROIDOTOMY.

d) Needle Cricothyroidotomy

- (1) Insert 12- or 14-gauge over-the-needle catheter through the cricothyroid membrane at a 45-degree angle toward the feet. Aspiration of air with a syringe indicates tracheal entry.
- (2) Hold needle in place and advance catheter, then remove needle.
- (3) Attach catheter hub to intermittent jet oxygen insufflator valve.
- (4) Manually secure catheter at hub at all times to prevent kinking or displacement.

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- (5) Monitor oxygen saturation.
- (6) If significant resistance to ventilation develops, or if patient develops difficulty in tolerating cricothyroidotomy, refer to Ventilatory Difficulty Secondary to Bucking or Combativeness Protocol.

4. Pediatric RSI Quality Assurance Process

a) Individual Paramedic Approval for Pediatric RSI Pilot Participation

- (1) Successful completion of small group training includes all of the following:
 - (a) Classroom lecture
 - (b) Mannequin instruction
 - (c) Must demonstrate proficiency through skills testing and written test
- (2) Successful completion of individualized Operating Room Training
 - (a) Individual Operating Room training with Pediatric/Critical Care/Anesthesiology Attending approved by the Associate State EMS Medical Director for Pediatrics
 - (b) Must demonstrate proficiency to Attending Pediatric/Critical Care/Anesthesiologist's satisfaction

b) Ongoing Demonstration of Proficiency

A verification of all pediatric and adult RSI skills and review of pediatric and adult RSI principles of safety will be performed on a quarterly basis.

c) Review of Each Call

- (1) Mechanism for follow-up of each call will be in accordance with the Quality Review Procedure for Pilot Programs (formerly "Class B" Additional Procedure Algorithm) of the Maryland Medical Protocols, with the following additions:
- (2) Immediate notification to jurisdictional RSI supervisor for all RSI attempts
- (3) Medical Director evaluation of all RSI attempts within 12 hours

d) Maintenance of detailed RSI database

ETOMIDATE (AMIDATE)

a) Pharmacology

Hypnotic

b) Pharmacokinetics

A short-acting nonbarbiturate hypnotic agent without analgesic properties

c) Indications

Pre-sedation of responsive patients prior to administration of neuromuscular blocking agents

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d) Contraindications

Known hypersensitivity to etomidate

e) Adverse Effects

- (1) Respiratory depression, or apnea
- (2) Hypotension (infrequent)
- (3) Involuntary myoclonus
- (4) Adrenal suppression (possible with repeated dosing)

f) Precautions

- (1) The effects of etomidate can be accentuated by CNS depressants, such as narcotics and alcohol.
- (2) Myoclonic movements are common and should not be confused for fasciculations due to a depolarizing neuromuscular blocking agent or seizure activity.

g) Dosage

(1) Adult:

Administer 0.3 mg/kg IVP over 30 to 60 seconds.

If the provider suspects hypovolemia, the initial dose will be 0.15 mg/kg IVP over 30-60 seconds. May repeat 10 mg for adult IVP after succinylcholine effects resolve and patient is bucking or combative. May repeat 10 mg for adult IVP every 15 minutes to a total of three doses. Additional doses require medical consultation.

(2) Pediatric:

Administer 0.3 mg/kg IVP over 30 to 60 seconds.

If the provider suspects hypovolemia, the initial dose will be 0.15 mg/kg IVP over 30-60 seconds. May repeat 0.15 mg/kg IVP after succinylcholine effects resolve and patient is bucking or combative. May repeat 0.15 mg/kg IVP every 15 minutes to a total of three doses. Additional doses require medical consultation.

KETAMINE (KENTANEST, KETASET, KETALAR)

a) Pharmacology

Hypnotic Analgesic

b) Pharmacokinetics

A rapid-acting nonbarbiturate hypnotic analgesic agent characterized by normal pharyngeal-laryngeal reflexes, normal or enhanced skeletal muscle tone, and possible cardiovascular and respiratory stimulation.

c) Indications

- (1) Pre-sedation of responsive patients prior to administration of neuromuscular blocking agents
- (2) Sedation of intubated patients with ventilatory difficulty secondary to bucking or combativeness

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d) Contraindications

Known hypersensitivity to ketamine

e) Adverse Effects

- (1) Although respiration is frequently stimulated, respiratory depression may occur with rapid IV administration. Laryngospasm has been known to occur.
- (2) Although hypotension may occur, blood pressure and heart rate are frequently stimulated.
- (3) Involuntary myoclonus that may mimic seizure activity
- (4) Possible enhanced secretions
- (5) Possible unpleasant dreams and delirium upon emergence from sedation

f) Precautions

- (1) The likelihood of respiratory depression and undesired pressor effects is increased by too rapid IV administration.
- (2) Myoclonic movements are possible and should not be confused for fasciculations due to a depolarizing neuromuscular blocking agent, seizure activity, or emergence from sedation

g) Dosage

(1) Adult:

Administer 2 mg/kg IVP over 60 seconds.

May repeat 2 mg/kg IVP after succinylcholine effects resolve if patient is bucking or combative.

May repeat 1 mg/kg for IVP every 10-15 minutes to a total of three doses as necessary. Additional doses require medical consultation.

(2) Pediatric:

Administer 2 mg/kg IVP over 60 seconds.

May repeat 2 mg/kg IVP after succinylcholine effects resolve if patient is bucking or combative.

May repeat 1 mg/kg for IVP every 10-15 minutes to a total of three doses as necessary. Additional doses require medical consultation.

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MIDAZOLAM (VERSED)

a) Pharmacology

- (1) Sedative
- (2) Hypnotic

b) Pharmacokinetics

A short-acting benzodiazepine with strong hypnotic and amnestic properties

c) Indications

- (1) Pre-sedation of responsive patients prior to administration of neuro-muscular blocking agents
- (2) Sedation of intubated patients with ventilatory difficulty secondary to bucking or combativeness

d) Contraindications

- (1) Hypotension
- (2) Acute narrow-angle glaucoma
- (3) Known hypersensitivity to midazolam

e) Adverse Effects

- (1) Respiratory depression or apnea
- (2) Hypotension
- (3) Amnesia

f) Precautions

The effects of midazolam can be accentuated by CNS depressants, such as narcotics and alcohol

g) Dosage

- (1) Adult:
Administer 0.05 mg/kg (2-5 mg) slow IVP over 1-2 minutes, while maintaining systolic BP greater than 90 mmHg.
- (2) Pediatric:
Administer 0.05 mg/kg slow IVP over 1-2 minutes, while maintaining systolic BP greater than 60 in neonates, 70 in infants, $[70 + (2 \times \text{years}) = \text{systolic BP}]$ for patients greater than 1 year of age.



ADMINISTER UP TO 0.05 MG/KG IV WHEN TREATING ENDOTRACHEAL TUBE BUCKING, STOPPING ONCE BUCKING HAS RESOLVED AND VENTILATION IS RELAXED.

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SUCCINYLCHOLINE (ANECTINE)

a) Pharmacology

Neuromuscular blocking agent (depolarizing)

b) Pharmacokinetics

Paralyzes skeletal muscles, including respiratory muscles, and removes gag reflex

c) Indications

To achieve paralysis to facilitate endotracheal intubation in patients as per Rapid Sequence Intubation Protocol

d) Contraindications

(1) Conditions that may cause hyperkalemia:

- (a) Burns greater than 24 hours old
- (b) Spinal cord injury greater than 24 hours old
- (c) Known neuromuscular disease (Guillain-Barré Syndrome, myasthenia gravis, amyotrophic lateral sclerosis, muscular dystrophy)
- (d) Chronic renal failure on hemodialysis or presence of hemodialysis access

(2) History of malignant hyperthermia

(3) Patients with known hypersensitivity to the drug

e) Adverse Effects

(1) Bradycardia

(2) Prolonged paralysis

f) Precautions

Paralysis occurs in 1-2 minutes and generally lasts 4-6 minutes.

g) Dosage/Route

(1) Adult:

Administer 1.5 mg/kg (60-150 mg) rapid IVP.

If relaxation is inadequate after 2-3 minutes, a repeat dose of 0.5 mg/kg (20-50 mg) rapid IVP may be given.

(2) Pediatric:

Administer 1.5 mg/kg rapid IVP.

If relaxation is inadequate after 2-3 minutes, a repeat dose of 0.5 mg/kg rapid IVP may be given.

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VECURONIUM (NORCURON)

a) Pharmacology

Neuromuscular blocking agent (non-depolarizing)

b) Pharmacokinetics

- (1) Skeletal muscle relaxant
- (2) Paralyzes skeletal muscles, including respiratory muscles

c) Indications

For treatment of ventilatory difficulty secondary to bucking or combativeness in intubated patients

d) Contraindications

- (1) Non-intubated patients
- (2) Patients with known hypersensitivity to the drug

e) Adverse Effects

- (1) Bradycardia
- (2) Prolonged paralysis

f) Precautions

- (1) Pre-sedation must be provided when vecuronium is administered to a patient who is either responsive to stimulus or who may become responsive to stimulus during neuromuscular blockade.
- (2) Paralysis occurs within 2-4 minutes and generally lasts 25-40 minutes.

g) Dosage/Route

- (1) Adult:
Administer 0.05 mg/kg (2-5 mg) IVP.
- (2) Pediatric:
Administer 0.05 mg/kg IVP.
- (3) If bucking or combativeness persists 4-6 minutes after initial vecuronium administration, a second dose of 0.05 mg/kg IV may be administered for an adult or pediatric patient.