



**New Hampshire Department of Safety
Division of Fire Standards & Training
And
Emergency Medical Services**

Student Manual

**The Rapid Sequence Intubation
Assistant**

**The Role of the NH
EMT- Basic, Intermediate, Paramedic**

March 2011

INTRODUCTION

Securing and maintaining an airway is a paramedic's highest priority when caring for critically ill or injured patients. When required, advanced airway interventions must be performed quickly and efficiently by an experienced individual with the goal of establishing a definitive airway while minimizing any possible complications. The State of New Hampshire, Division of Fire Standards and Training and Emergency Medical Services (FST&EMS) has established a Rapid Sequence Intubation (RSI) Assistant program which offers a New Hampshire Basic, Intermediate or Paramedic advanced airway assessment and backup airway skills to best assist a paramedic performing RSI. Successfully performing these skills will require an experienced provider with a thorough understanding of the airway anatomy, basic and backup airways as well as the RSI process.

This class will discuss:

The recognition of airway compromise and management;

The proper use of RSI medications and clinical skills with the goal of developing confidence and competence to successfully and safely perform his/her role in the RSI process in the prehospital setting.

RAPID SEQUENCE INTUBATION CREDENTIALING PROCESS

In order to ensure the RSI program operates at a safe and efficient level, FST&EMS has stringent requirements for EMT-Basics, Intermediates, or Paramedics who wish to complete the credentialing process.

The first step in the process is to decide whether you as an EMS provider are ready to take on the added responsibility associated with assisting an RSI. Are you completely comfortable with your basic airway and backup airway skills or do you need more time to develop them? Are you intimately familiar with the back up airways? If not, then assisting an RSI is not for you. It is expected that anyone wishing to obtain RSI Assistant privileges be able to demonstrate mastery of basic airway assessment and management, as well as outline the RSI procedure.

Once ready, you will need to complete some competencies and meet other minimum requirements:

- Successfully complete the RSI in-service. This involves the RSI Assistant class, a final written exam, and completing an Airway Simulation Exam.

Once the requirements are met the EMS Medical Director and Unit Leader will review your packet and, if satisfied, give you final approval. Once you have been approved, it must be renewed every 2 years.

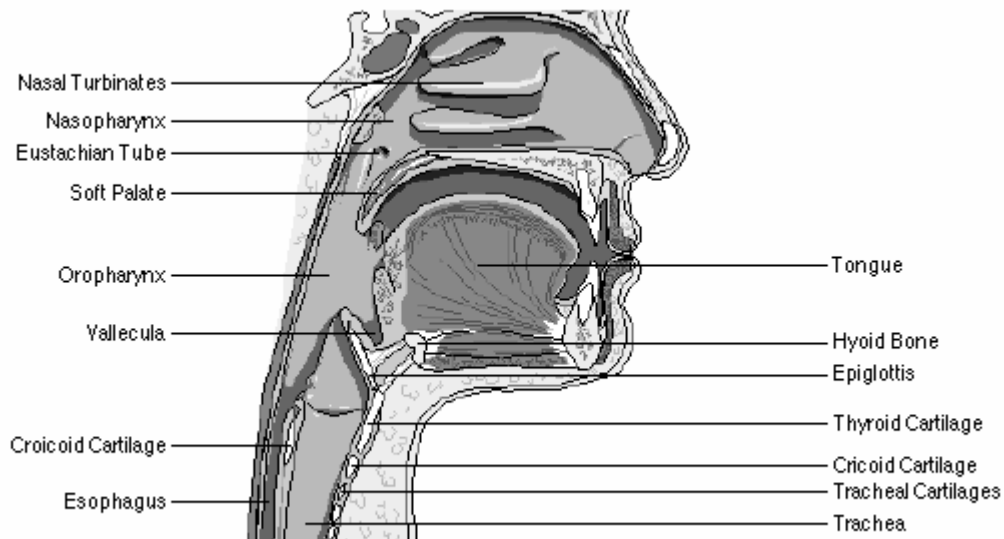
ANATOMY / TERMINOLOGY REVIEW

Airway Review

The airway is divided into 3 regions, each with separate structures:

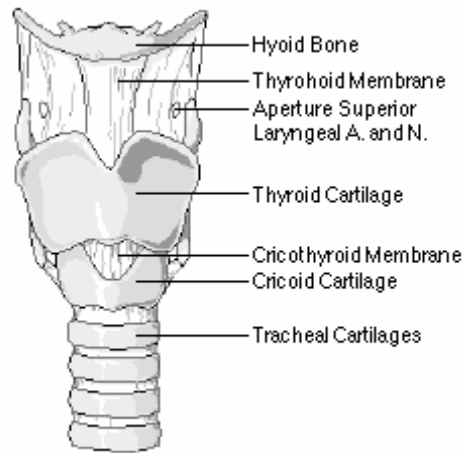
Upper Airway

The face and the facial skeleton and are considered components of upper the airway. The upper airway heats, humidifies and conducts air into the lower airways. Problems can arise from obstructions, fractures and soft tissue injuries.



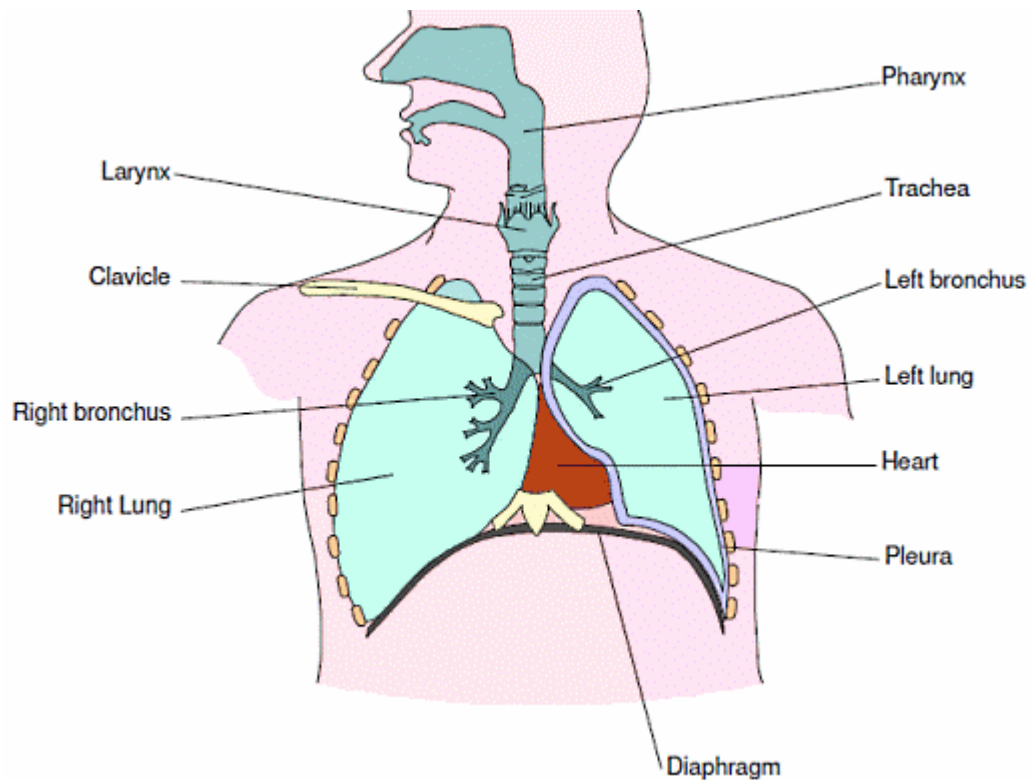
Middle Airway

The middle airway consists primarily of the larynx. It is fairly well protected but is susceptible to injury. The larynx is comprised of cartilage and contains the vocal cords. Because it is narrow, edema, secretions, or foreign bodies can quickly cause problems.



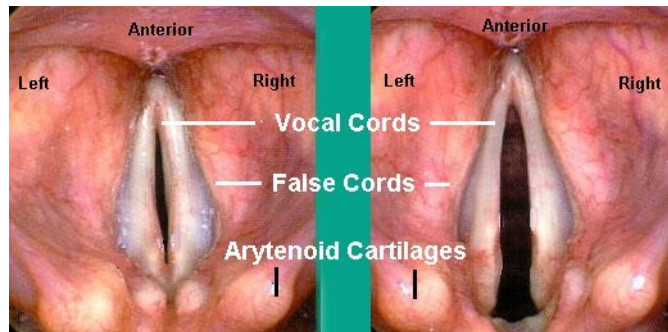
Lower Airways

The lower airway begins at the trachea as it exits the neck and enters the chest. It consists of c-shaped cartilage rings held together by elastic-muscle tissue posteriorly, divides into the right and left mainstem bronchi and continues to the lung tissue.



Laryngoscopic View

View during laryngoscopy is variable. Under ideal circumstances the epiglottis, arytenoid cartilages and nearly the entire vocal cords will be visible.



INDICATIONS

One of the basic functions of a paramedic is to ensure a patent airway. A paramedic must be able to rapidly identify patients at risk and determine the most appropriate method to manage the airway.

Immediate severe airway compromise in the context of trauma, drug overdose, status epilepticus, etc., where respiratory arrest is imminent.

When determining the best method for maintaining an airway, consider the following:

- Is the patient at risk for a positional obstruction or aspiration?
- Is there inadequate oxygenation and/or ventilation?
- Is the patient's condition expected to deteriorate?

Examples of patients requiring RSI:

- **Conditions requiring oxygenation/ventilation control or positive pressure ventilation:**
 - Traumatic brain injury with ALOC
 - Severe thoracic trauma (flail chest, pulmonary contusions with hypoxemia)
 - Clinical condition expected to deteriorate
- **Unconscious or ALOC with potential for or actual airway compromise or vomiting**
- **And patient has.....**
 - A clenched jaw
 - An active gag reflex

Contraindications

- Hyperkalemia known or suspected (Succinylcholine)
 1. Rhabdomyolysis: rapid breakdown of skeletal muscle due to injury to muscle tissue. May be caused by physical (e.g., crush injury), chemical, or biological factors.
 2. Major crush injury greater than 8 hours old
 3. Severe burns greater than 24 hours old
- Spinal cord injury greater than 3 days old
- Pseudocholinesterase deficiency
- Neuromuscular disease (patient or family)
- Malignant Hyperthermia (patient or family)
- Anticipating an undoable airway
- Penetrating eye injuries
- Narrow angle glaucoma

Pregnancy

- The medications are “Pregnancy Risk Category – C”
 - No human studies and animal studies show adverse effect
 - Transmission to breast milk uncertain – likely – but not a significant concern in an RSI situation

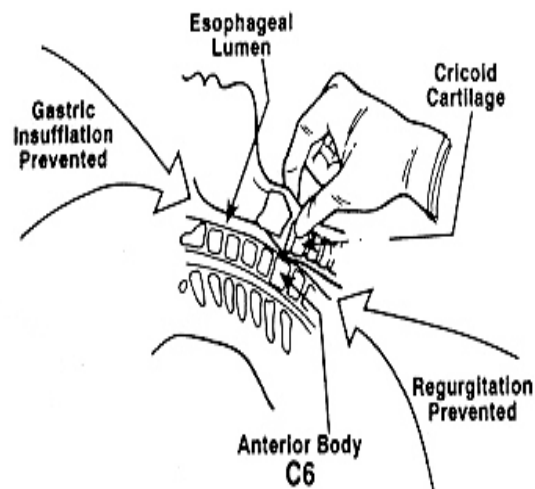
“Because of the higher incidence of difficult intubation in pregnancy (due to increases in size and weight during pregnancy), optimal positioning of the patient becomes more important.

Failure to manage the airway appropriately in a gravid patient potentially threatens not one life, but two, as maternal complications are the leading cause of fetal insult and death.¹ Understanding anatomic and physiologic changes in pregnancy paired with adequate preparation for airway management minimizes this risk.

Although limited data exist concerning drugs for rapid sequence intubation in this population, etomidate and succinylcholine are considered acceptable in the gravid patient. Succinylcholine does not cross the placental barrier, although induction agents do. Etomidate does cross the placental barrier, but has been shown to cause less respiratory depression in the newborn than thiopental.¹⁰ (acep.org 7/2007)

What is my role?

1. Basic airway maintenance while the Paramedic prepares their equipment
 - Positioning, suctioning, oral and nasal airways
2. Pre-oxygenate with 100% O₂ via non-rebreather mask for at least 3-5 minutes
 - Replaces the patient's functional residual capacity (FRC) of the lung with oxygen "Nitrogen Washout"
 - If done properly, this will permit as much as 3-4 minutes of apnea before hypoxia develops
 - In emergent cases, three mask breaths with 100% oxygen may have to suffice.
 - Resist the use of positive pressure ventilation (PPV). Use only if the patient is not ventilating adequately.
 - PPV leads to gastric distention → regurgitation → aspiration
 - If PPV is necessary, utilize cricoid pressure
3. Cricoid Pressure (Use thumb and forefinger to apply pressure directly backward/posterior over the cricoid cartilage.)
 - Also known as "Sellick's Maneuver"
 - Should be automatic just as Etomidate is administered
 - Maintained until ETT cuff is inflated, placement is confirmed and tube is secure
 - Used to occlude the esophagus and prevent passive regurgitation common with Succinylcholine
 - If patient starts to actively vomit – RELEASE! and suction oropharynx, otherwise, can lead to esophageal rupture



BURP with cricoid pressure can help the Paramedic visualize the vocal cords.

Backward
Upward
Right
Pressure

4. Ventilate the patient via the endotracheal tube. Do not push or pull on the tube. Place one hand on the patient's jaw and hold the tube tightly at the teeth as the Paramedic secures the tube. It is safest to continue to hold onto the tube even with a tube holder in place. This gives you better spatial orientation relative to the BVM and movement of the tube. Pay attention to the ease of ventilation and immediately tell the Paramedic if this changes at all. A change in ventilatory effort can mean: pneumothorax, displaced tube, equipment failure, and need for more sedation to name but a few.
5. Remove the BVM from the endotracheal tube prior to moving the patient. This is when most tubes become displaced.
6. Watch the capnography. A change in these numbers can be the result of #4's complications.
7. Should the Paramedic become incapacitated for any reason or be unable to secure the airway; be prepared to manage the airway with a King Tube or Combitube as well as with BLS maneuvers.

What are the medications and what will I see?

Lidocaine:

Lidocaine may be administered 2-3 minutes prior to paralyzation in certain cases. Asthmatics and traumatic brain injury patients may benefit from this medication. Lidocaine blunts the gag and cough reflex, acts as a smooth muscle relaxant, and may prevent transient increases in intracranial pressure associated with intubation. Dosing is 1.5mg/kg IVP.

Atropine:

Atropine is utilized in bradycardic patients and in pediatric intubations. Pediatric patients have a higher parasympathetic response to intubation. Dosing is 0.5mg IVP.

Etomidate:

Etomidate is the sedative that is given prior to paralyzing the patient. Paralyzation has no effect on sensation or mentation. There are few things crueler than paralyzing a conscious patient. This is a quick acting drug (one arm-brain cycle) and has a short half life. Etomidate can burn at the IV sight and up the extremity so warn the patient. Many are asleep though before they complain of it burning. The dose is 0.3mg/kg IVP; typically 20, 30, or 40mg and lasts 5-6 minutes.

Succinylcholine:

Succinylcholine is a short acting paralytic known as a "Depolarizing Agent". This means that all of the body's cells will fire prior to relaxing and the patient will "Fasciculate". This presents as overall twitching. The patient will then stop breathing. Remember that this medication does nothing to sensation and mentation. Hearing, sight, etc are intact dependant upon sedation. Succinylcholine has a half life of 5-6 minutes also which is why it is the preferred RSI paralytic. Once this medication is given we can not take it back. We are taking away what airway and ventilation control they had. We own this responsibility. Dosing is 1.5mg/kg IVP; typically 75 or 150mg.

Rocuronium:

Rocuronium is a "Non-depolarizing Agent" and does not cause fasciculations. It does however have a 20-40 minute half life. This medication is typically utilized after they have been intubated or in cases where Succinylcholine is contraindicated. Dosing is 1mg/kg IVP; typically 50, 100, or 150mg.

Versed (midazolam):

Versed is a benzodiazepine utilized for post intubation sedation. This medication may cause hypotension. Sedation is required immediately after intubation as the Etomidate will be wearing off. Indications for subsequent doses are; tearing, coughing against the tube, rises in heart rate and the capnography numeric. Increases in movement are late signs. Dosing is 0.05 to 0.1mg/kg IVP every 5 minutes as needed; typically 2.5 to 10mg.

Fentanyl:

Fentanyl is a man made narcotic similar to Morphine. Fentanyl has less risk of hypotension and allergic reactions than does morphine. Sedation and paralyzation have no effect on pain sensors so Fentanyl is important in patients with a pain component such as trauma or head bleeds. Fentanyl also works synergistically with versed to assist in sedation. Dosing is 50mcg every 5-10 minutes as needed to a maximum of 150mcg. Further dosing requires medical control.

AIRWAY MANAGEMENT**5.0****ASSESSMENT**

Each patient presents unique problems that cannot be fully outlined in any algorithm. As such, the provider must rely on thorough assessment techniques and consider each of the following:

1. **Airway Patency:** Assess for airway obstruction or risk of impending obstruction due to facial injuries, mass, foreign body, swelling, etc. Assess for presence/absence of gag reflex.
2. **Ventilatory Status:** Assess for adequate respiratory effort and impending fatigue/failure/apnea. Assess for accessory muscle use, tripod positioning, the ability of the patient to speak in full sentences. If available, assess end-tidal (ET) CO₂.
3. **Oxygenation:** Any oxygen saturation <90% represents relatively severe hypoxia and should be considered an important warning sign. In addition to oxygen saturation, assess for cyanosis.
4. **Airway Anatomy:** Before attempting airway maneuvers or endotracheal intubation, especially with the use of medications, assess patient anatomy to predict the probability of success and the need for backup device or technique.
 - ◆ First, assess for difficulty of mask seal. Patients with facial hair, facial fractures, obesity, extremes of age, and pathologically stiff lungs (COPD, ARDS, etc.) may require special mask techniques or alternatives.
 - ◆ Next, assess for difficulty of intubation. Patients with a short neck, the inability to open their mouth at least three finger widths (or other oral issues such as a large tongue or teeth), less than three finger-widths of thyromental distance (or a receding jaw), reduced atlanto-occipital movement (such as in suspected c-spine injury), obesity or evidence of obstruction (such as drooling or stridor) may be difficult to intubate.

DEVISE A PLAN

1. Each patient will present unique challenges to airway management. Therefore before any intervention is attempted, the provider should contemplate a plan of action that addresses the needs of the patient, and anticipates complications and how to manage them.
2. Airway management is a continuum of interventions, not an “all or none” treatment. Some patients may only need airway positioning or a nasal or oral airway to achieve adequate ventilation and oxygenation. Others will require more invasive procedures. The provider should choose the **least invasive** method that can be employed to achieve adequate ventilation and oxygenation.
3. Continually reassess the efficacy of the plan and change the plan of action as the patient’s needs dictate.
4. In children, a graded approach to airway management is recommended. Basic airway maneuvers and basic adjuncts followed by bag valve mask ventilation are usually effective.

BASIC SKILLS

Mastery of basic airway skills is paramount to the successful management of a patient with respiratory compromise.

- ▶ Ensure a patent airway with the use of:
 - ◆ Chin-lift/jaw-thrust.
 - ◆ Nasal airway.
 - ◆ Oral airway.
 - ◆ Suction.
 - ◆ Removal of foreign body.

Airway Management continued on next page ⇨

AIRWAY MANAGEMENT continued**5.0**

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- ▶ Provide ventilation with a bag valve mask. Proper use of the BVM includes appropriate mask selection and positioning to ensure a good seal. If possible, utilization of the BVM is best accomplished with two people: one person uses both hands to seal the mask and position the airway, while the other person provides ventilation. If the patient has some respiratory effort, synchronize ventilations with the patient's own inhalation effort.

ADVANCED AIRWAY SKILLS

Only after basic procedures are deemed inappropriate or have proven to be inadequate should more advanced methods be used. Procedures documenting the use of each device/technique listed below are found elsewhere in this manual.

- ▶ **ETT:** The endotracheal tube was once considered the optimal method or “Gold Standard” for airway management during cardiac arrest. It is now clear, however, that the incidence of complications is unacceptably high when intubation is performed by inexperienced providers or monitoring of tube placement is inadequate. The optimal method for managing an airway will, therefore, vary based on provider experience, Emergency Medical Services (EMS) or healthcare system characteristics, and the patient's condition.
- ▶ **Bougie:** All providers who attempt ETT placement should become intimately familiar with the use of a Bougie. It is the device used most often by anesthesiologists and emergency physicians for helping guide placement when a difficult airway is encountered.
- ▶ **Alternate Devices:** Utilize an alternate device when the clinical indications for intubation still exist but conditions prevent intubation or previous attempts at ETT placement have failed. Each device has its own set of advantages/disadvantages and requires a unique insertion technique. Providers should have access to, and intimate knowledge of, at least one alternate device. Examples include:
 - ◆ King LT.
 - ◆ Combitube/EasyTube.
 - ◆ LMA.
- ▶ **CPAP:** Continuous Positive Airway Pressure (CPAP) has been shown to be effective in eliminating the need for intubation and in decreasing mortality in properly-selected patients with acute respiratory distress.

DOCUMENTATION

All efforts toward airway management should be clearly documented and, at the minimum, should include the following:

- ▶ Pre/post intervention vital signs including oxygen saturation as well as capnography (if available).
- ▶ Procedures performed/attempted, including number of failed attempts and who performed each attempt/procedure.
- ▶ Size of device(s) placed, depth of placement (if applicable).
- ▶ Placement confirmation: methods should include auscultation, condensation in the ETT, symmetrical chest wall rise, as well as at least one of the following—colorimetric EtCO₂, capnography, esophageal tube detector.

RAPID SEQUENCE INTUBATION (RSI)—ADULT ONLY**5.4****PARAMEDIC STANDING ORDERS****PREREQUISITES REQUIRED**

This procedure is only to be used by paramedics who are trained and credentialed to perform RSI by the NH Bureau of EMS. Either 2 RSI paramedics or 1 RSI paramedic and 1 RSI assistant must be present.

▶ **INDICATION**

- ◆ Immediate, severe airway compromise in the context of trauma, drug overdose, status epilepticus, etc., where respiratory arrest is imminent.

▶ **CONTRAINDICATION**

- ◆ Extensive recent burns or crush injuries >24 hours old.
- ◆ History of malignant hyperthermia.

▶ **PROCEDURE: THE SEVEN “Ps”**

1. **PREPARATION:** The time frame is limited, but the operator must have adequate Ambu Mask/oxygen sources, two laryngoscope handles, an assortment of blades, one working IV or IO, rescue airway devices, oxymetry and capnography monitoring, bulb-style tube checker.
2. **PREOXYGENATION:** When possible, use a non-rebreather mask for at least 3 minutes to effect nitrogen washout and establish an adequate oxygen reserve. In emergent cases, administer 8 vital capacity mask breaths with 100% oxygen.
3. **PREMEDICATION**
 - ◇ Consider lidocaine (1.5mg/kg) given 2 minutes before intubation to control Intracranial Pressure (ICP) in patients with possible head injury or CNS pathology (hypertensive crisis or hemorrhage).
 - ◇ Consider atropine for bradycardia at 0.5mg IV.
4. **PARALYZE**
 - ◇ Etomidate (0.3mg/kg IV; maximum 40mg). Apply cricoid pressure and maintain until ETT is placed, confirmed, and secured.
 - ◇ Succinylcholine (1.5mg/kg IV) immediately after etomidate (maximum 150mg).
5. **PASS THE TUBE**
 - ◇ Observe for fasciculations approximately 90 seconds after succinylcholine to indicate imminent paralysis.
 - ◇ After paralysis is achieved, follow procedure outlined in [Orotracheal Intubation Protocol 5.3](#) to place the ETT.
6. **PROOF OF PLACEMENT**—Assess for adequate placement by:
 - ◇ Auscultation (equal breath sounds over the chest and a lack of sounds over the epigastrium with ventilations).
 - ◇ Condensation in the ETT.
 - ◇ Symmetrical chest-wall rise, **AND**
 - ◇ At least one additional method: colorimetric end-tidal CO₂ detector, capnography, or esophageal tube detector (Note: to be accurate, the tube detector should be used prior to ventilation).

Reassess tube placement often, especially after movement of the patient.

Rapid Sequence Intubation continued on next page ⇨

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RAPID SEQUENCE INTUBATION (RSI)—ADULT ONLY continued**5.4**

↔ *Rapid Sequence Intubation continued from previous page*

7. POST INTUBATION CARE

◇ Sedation:

- ◆ Midazolam (0.05 – 0.10mg/kg IV), every 5 – 10 minutes as needed, **OR**
- ◆ Lorazepam 1 – 2mg IV every 15 minutes as needed for sedation (maximum: 10mg).

◇ Paralysis (via on-line Medical Control only):

- ◆ Vecuronium 0.1mg/kg IV, **OR**
- ◆ Rocuronium 1mg/kg IV.

Continuous capnography required for post intubation.

P

SUCTIONING (ADVANCED)

5.5

INDICATIONS

- ▶ Obstruction of the airway (secondary to secretions, blood, and/or any other substance) in a patient currently being assisted by an airway adjunct such as an endotracheal tube, Combitube, tracheostomy tube, or a cricothyrotomy tube.

PROCEDURE

1. Ensure the suction device is operable.
2. Pre-oxygenate the patient.
3. While maintaining aseptic technique, attach the suction catheter to the suction unit.
4. If applicable, remove ventilation device from the airway.
5. Insert the sterile end of the suction catheter into the tube without suction. Insert until resistance is met; pull back approximately 1 – 2cm.
6. Once the desired depth is met, apply suction by occluding the port of the suction catheter and slowly remove the catheter from the tube using a twisting motion.
7. Suctioning duration should not exceed 10 seconds.
8. Saline flush may be used to help loosen secretions and facilitate suctioning.
9. Re-attach the ventilation device and oxygenate the patient.

SUPRAGLOTTIC AIRWAY DEVICES**5.6**

This protocol is intended for commercially available blind airway devices. Examples are Combitube, KING-LT-D, EasyTube, and LMA (Intermediate and Paramedic only).

Whereas each device will have its own idiosyncrasies, each provider must be trained, knowledgeable, and experienced with the manufacturer's recommendations for the particular device used.

INDICATIONS**BASIC/INTERMEDIATE STANDING ORDERS**

B/I ▶ Cardiac arrest.

PARAMEDIC STANDING ORDERS

P ▶ When immediate airway control is desired in the absence of endotracheal intubation.
 ▶ Airway control in the absence of other effective methods (e.g., failed airway).
 ▶ Situations involving a difficult mask (BVM) fit.

CONTRAINDICATIONS

- ▶ The patient has an intact gag reflex or is not profoundly unconscious and may resist the insertion.
- ▶ Severe maxillofacial or oropharyngeal trauma.
- ▶ Any allergy or sensitivity to latex (the Combitube's pharyngeal balloon contains latex).
- ▶ Inappropriate sizing (follow the manufacturer's recommendations).
- ▶ The following contraindications apply to devices that are inserted into the esophagus.
 - ◆ The patient has known esophageal disease.
 - ◆ The patient has ingested a caustic substance.
 - ◆ The patient has burns involving the airway.

Note: Not all contraindications are absolute.

- ▶ PROCEDURE
 - ◆ Each device is unique; follow each manufacturer's specific recommendations for the proper procedure for insertion and use.
 - ◆ Assess for adequate placement by auscultation (equal breath sounds over the chest and a lack of sounds over the epigastrium with bagging).
 - ◆ In addition to auscultation, confirm tube placement by using either a colorimetric end-tidal CO₂ detector or capnography.
 - ◆ Secure the device.
 - ◆ Reassess tube placement frequently, especially after movement of the patient.
 - ◆ After tube placement, continuous waveform capnography is required for all paramedic level units.

**RSI Assistant
Competency Checklist**

Requirement	Date	Verifying Signature
# of years as an EMS provider _____		
Completion of Airway Assessment Module		
Completion of Backup Airway Module		
BVM		
Combitube		
King LT-D		
Airway Simulation Exam		
Signatures	Instructor	Medical Director

