





		Performance Standard	7301
		Effective April 1, 2018	Expires March 31, 2019
Category I Skill – Low Frequency/High Risk: Orotracheal Intubation	Approval: Medical Director Reza Vaezazizi, MD	Signed 	
Applies To: PM, MICN, BHP, EMS System	Approval: REMSA Director Bruce Barton	Signed 	

Terminal Performance Objective

Secure placement of an endotracheal tube (ETT) in the trachea to ensure a patent airway for positive pressure ventilation.

Before performing oro-tracheal intubation, paramedics must:

1. Determine BLS airway adjuncts are inadequate for effective positive pressure ventilation (PPV) and confirm the need for Endotracheal Intubation (ETI)^{1, 2}.
 - a. **NOTE: Orotracheal intubation is approved only if the patient’s weight is >36 kg and their length exceeds the Broselow tape. The Broselow tape must be used to identify patient’s height and weight. Clinical assessment should take into account anatomic and genetic conditions that may affect patient stature and weight.**
2. Recognize signs of a difficult airway, if present, and select, prepare and employ the appropriate alternative tools and techniques to secure the airway (e.g. ET Introducing Stylet, Rescue Airway).
 - a. A difficult airway is defined as the presence of anatomic conditions which preclude direct visualization of the patient’s glottic opening (e.g. airway edema, arthritis or scoliosis of the spine, significant overbite, small mandible, short neck, morbid obesity, cervical spine immobilization, face or neck trauma).
3. Correctly assemble all equipment required for ETI within 60 seconds.
4. Provide optimal ventilation and oxygenation (minute volume) to the patient while ETI equipment is prepared.
5. Test the cuff of the ET Tube by inflating it with air, and ensuring that there is not a leak in the cuff.

While performing oro-tracheal intubation, paramedics must:

1. Position the patient with their anatomy to best facilitate the intubation. Align the ear canal with the anterior shoulder, pad as clinically indicated. As a last resort. Consider having a team member apply cricoid pressure during intubation attempts.
2. Visualize anatomical structures including the glottic opening (vocal cords) during direct laryngoscopy.
 - a. Use manual percutaneous laryngeal manipulation to assist with visualization of the glottic opening as needed.
3. Minimize oral trauma during laryngoscopy by utilizing correct technique.
4. Place the clinically-indicated size ETT securely in the trachea at the correct depth within 30 seconds.
5. Inflate the cuff with enough air to seal the trachea; estimating inflation pressure by palpation of the pilot balloon.
6. Confirm placement of the ETT in the trachea by:
 - a. Direct visualization of the tube passing through the cords.
 - b. IMMEDIATELY attach
 - a. Waveform capnography and commence ventilation while confirming proper airway placement.
 - c. Confirm appropriate rectangular waveform is present **AND** capnography number is present and consistent with clinical condition.
 - d. Auscultate lung fields and epigastrium, visualize adequate chest rise and fall.

¹ 2015 AHA Guidelines for CPR and ECC, Part 8 Adult Advanced Cardiovascular Life Support, pp S730-S735

² PHTLS, Seventh Edition, Chapter 7 Airway and Ventilation pp 144-145

- e. Note Color change of ETCO₂ detector for documentation in the ePCR.
- f. Print strip of capnogram and retain for documentation. Alternatively, clinicians may mark event in cardiac monitor to import to ePCR retain for documentation. Capnogram strip is required to be attached to the ePCR.
- g. Observe for appropriate chest rise and fall.
- h. If only right lung sounds heard, carefully adjust ETT as necessary by slowly withdrawing ETT and listening for onset of left lung sounds. Once bilateral lung sounds occur, secure the tube.
- i. Colorimetric devices shall be used in the event of mechanical failure of digital waveform capnography.
- j. Remove ETT immediately if esophageal placement suspected.
 - a. The ETT MUST have a clinically relevant capnography number AND waveform to remain in place.
7. Immediately re-establish PPV at the clinically required rate and tidal volume (minute volume) and oxygen at 10-15 LPM following ETT placement.
8. Resume BLS PPV within 10 seconds following unsuccessful ETI attempts.
 - a. Employ Rescue Airway (e.g., King Airway) after two (2) failed attempts on the patient, if BLS airway adjuncts are inadequate for effective PPV.
 - b. Passing the laryngoscope past the teeth with the intent of placing an ETT is considered an intubation attempt.
 - c. A maximum of two (2) attempts per patient is permitted.
9. Secure the ETT in the trachea at the correct depth with tape or a commercial device.
10. Stabilize the patient's airway and prevent tube migration by using a device to prevent rotation, flexion, or extension of patient's head.
11. Efficiently employ post-ETI diagnostic tools to thoroughly assess overall effectiveness of ventilatory support throughout the duration of respiratory management efforts, including:
 - a. Visualize symmetrical rise and fall of the chest with PPV.
 - b. Monitor pulse oximetry – the target SpO₂ is greater than or equal to 95% if spontaneous circulation is present.
 - i. In patients with COPD/pulmonary disease, it may not be possible or desirable to attain a SpO₂ of 95%.
 - c. Monitor ETCO₂ for appropriate waveform morphology and target CO₂ levels.
 - i. The target range for ETCO₂ level is between 30 – 45 mmHg if spontaneous circulation is present.
 - ii. In cardiac arrest, metabolic derangements will significantly alter ETCO₂ values and waveform morphology. Target range for ETCO₂ level is between 15mmHg – 45mmHg during CPR.
 - iii. Recognize that in a patient with traumatic brain injury, ETCO₂ less than 35 mmHg due to hyperventilation may actually cause harm. Minute volume should be adjusted accordingly while maintaining optimal oxygenation, reserving hyperventilation for those patients showing signs of cerebral herniation only.³
 - d. Monitor ECG for dysrhythmia due to vagal stimulation or other treatable causes.
 - e. Frequent auscultation of lung fields and epigastrium, at minimum after every patient movement.
 - f. Constant evaluation of ventilatory compliance and resistance during PPV
12. Immediately identify malfunctioning equipment, ineffective techniques or changes in post-ETI PPV compliance/resistance and employ alternative measures to achieve effective ventilations.
13. Reconfirm correct ETT placement each time the patient is moved and before transfer of care to hospital staff.
 - a. Record and/or print the waveform ETCO₂ strip: after every patient movement, AND just prior to transfer of care to the hospital staff and attach the recording strip to the completed PCR.
14. Provide direction to personnel that have been delegated management of post-ETI PPV.
15. Maintain effective ventilation and oxygenation throughout the entire prehospital treatment period.
16. Maintain calm and effectively lead a team-based approach to resuscitation under all conditions.
17. Accurately document all assessment findings, therapeutic treatments and the patient's response to therapy.

Critical Success Targets for ETI

³ The Brain Trauma Foundation's Guidelines for Prehospital Management of Severe Traumatic Brain Injury, Second Edition, Sections IV and VI

1. ETT securely placed in the trachea followed by effective PPV
2. Chest rise and fall with each ventilation cycle
3. Ventilatory rate and tidal volume appropriate for patient condition and response
4. SpO₂ of greater than 95% in patients with spontaneous circulation
5. Recognition of an esophageal intubation
6. Limited interruption of PPV (30 seconds maximum)
7. Evaluation and Documentation of ETCO₂ morphology and values

System Benchmark

ETT securely placed in the trachea within 2 attempts in 90% of the indicated patients

Recognition of misplaced or dislodged ETT in 100% of the occurrences

Use of colorimetric ETCO₂ detectors with every orotracheal intubation

Appropriate clinical interpretation of digital waveform capnography with every orotracheal intubation

Applicable Protocols

The REMSA Treatment Protocol for the Universal Patient, and any other policy authorizing orotracheal intubation.

Core Competency Requirements to be covered during education/training on ETI

1. Respiratory A&P and Pathophysiology
2. Assessment of airway and breathing
3. Techniques for PPV
4. Airway pressure secondary to PPV – mean versus peak
5. Possible complications of PPV – gastric, pulmonary, cerebral, and cardiovascular complications of over-inflation and over-ventilation
6. Determination of PPV adequacy and efficacy
7. Differentiation between effective and ineffective patient response to PPV via BLS measures
8. Indications and contraindications for ETI
9. Selection of correct equipment required for ETI (e.g. ETT size)
10. Identification of the difficult airway and employment of alternative techniques and tools
11. Laryngoscopy techniques
12. ETT placement techniques
13. Stabilization of patient's head to prevent dislodgement of airway
14. Post-placement ETT monitoring
15. Complications, risks, consequences of failure to complete post-placement ETT monitoring
16. Auscultation and diagnostic differentiation of lung sounds
17. Use of diagnostic tools, i.e.: ETCO₂ detection through color change AND capnography
18. Recognition of complications (**D**islodgement, **O**bstruction, **P**neumothorax, **E**quipment Failure, or **DOPE**)
19. Team Leadership and Patient Safety
20. Documentation

Adjunctive Performance Standards

1. Positive Pressure Ventilation
2. Laryngoscopy with FBAO Removal/Magill forceps
3. BLS Airway Adjuncts
4. Post ETI Confirmation and Monitoring
5. Rescue Airway
6. Gum Elastic Bougie

Equipment Requirements

1. Personal Protective Equipment
2. NP/OP Airways
3. BVM

4. Stethoscope
5. Supplemental oxygen
6. Magill forceps
7. Laryngoscope(s)
8. Laryngoscope Blades (multiple sizes)
9. Appropriate size ET tubes
10. Stylet(s)
11. Pulse oximeter
12. Waveform capnography
13. Suction device (both rigid and flexible catheters)
14. Cardiac monitor
15. Difficult Airway Kit/Rescue Airway Kit (including just in time training aids)

Instructor Resource Materials

1. Prehospital Trauma Life Support
2. AHA CPR and BLS Provider Manual
3. AHA ACLS Provider Manual
4. AHA PALS Provider Manual
5. Current AHA Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care
6. NHTSA EMS Educational Instructor Guidelines for EMT and Paramedic

Adult Orotracheal Intubation Validation

PERFORMANCE CRITERIA: 100% accuracy required on all items with an *

Before performing orotracheal intubation, the paramedic must:

Points	Score	Performance Steps	Additional Information
1		Take or verbalize body substance isolation.	Selection: gloves, goggles, mask, gown, booties, N95 PRN
1		Determine BLS airway adjuncts are inadequate for effective positive pressure ventilation (PPV) and confirm the need for Endotracheal Intubation (ETI). *	No or inadequate rise and fall of chest, no improvement in patient's color or condition.
1		Recognize signs of a difficult airway and select, prepare, and employ the appropriate alternative tools and techniques (e.g., ET Introducing Stylet, Rescue Airway). *	<ul style="list-style-type: none"> A difficult airway is defined as the presence of anatomic conditions which preclude direct visualization of the patient's glottic opening. Signs of a difficult airway include, but are not limited to: <ol style="list-style-type: none"> Airway edema Arthritis or scoliosis of the spine Significant overbite Small mandible Short neck Morbid obesity C-spine immobilization Face or neck trauma
1		Correctly assemble all equipment required for ETI within 60 seconds. *	ETT, stylet, laryngoscope with functioning bulb, Magill forceps, suction, suction catheters (flexible and rigid), 10 mL syringe, stethoscope, Rescue Airways (King Airway), Toomey Syringe, waveform capnography, pulse oximeter, BVM with manometer
1		Provide optimal ventilation and oxygenation to the patient while ETI equipment is prepared. *	
1		Test the cuff of the ET Tube by inflating it with air, and ensuring that there is not a leak in the cuff. *	

While performing orotracheal intubation, the paramedic must:

1		Consider having a team member apply cricoid pressure during intubation attempts.	Apply gentle pressure to the patient's cricoid cartilage to occlude the esophagus and reduce the patient's chances of aspirating gastric contents.
1		Properly position the patient for intubation. *	"Sniffing" position, if not a trauma patient
1		Visualize anatomical structures including the glottic opening (vocal cords) during direct laryngoscopy. *	
1		Minimize oral trauma during laryngoscopy by utilizing correct technique. *	Do not use the patient's teeth as a fulcrum.
1		Place the appropriately-sized ETT securely in the trachea at the	<ul style="list-style-type: none"> Adult women typically will take a 7.0 – 7.5 ETT; adult men will typically take 7.5 – 8.0 ETT

		correct depth within 30 seconds. *	<ul style="list-style-type: none"> • Appropriate depth is ½ -- 1 inch beyond the vocal cords, usually 22 – 23 cm marking at the teeth
1		Inflate the cuff with enough air to seal the trachea; estimating inflation pressure by palpation of the pilot balloon.*	
1		Immediately re-establish PPV with the appropriate rate, tidal volume and oxygen at 10 – 15 LPM following ETT placement. *	
1		Confirm ETT is in the trachea *	<ul style="list-style-type: none"> • Direct visualization of the tube passing through the vocal cords • IMMEDIATELY attach waveform capnography and commence gentle bagging while confirming proper airway placement. <ul style="list-style-type: none"> ○ Confirm appropriate rectangular waveform is present or that the colorimetric detector shows yellow on exhalation • Auscultate over lung fields for confirmation of airflow with PPV <ul style="list-style-type: none"> ○ If only right lung sounds heard, carefully adjust ETT as necessary by slowly withdrawing ETT and listening for onset of left lung sounds. • Auscultate over the epigastrium for the lack of airflow with PPV. • Print strip of capnogram and retain for documentation. • Observe for appropriate chest rise and fall. • Remove ETT immediately if esophageal placement is suspected.
1		Immediately re-establish PPV at the clinically required rate and tidal volume (minute volume) and oxygen at 10 – 15 LPM following ETT placement. *	<ul style="list-style-type: none"> • Employ Rescue Airway after 2 failed attempts on the patient • Passing the laryngoscope past the teeth with the intent of placing an ETT is considered an intubation attempt.
1		Secure the ETT in the trachea at the correct depth with tape or a commercial device. *	
1		Re-implement effective PPV within 10 seconds following unsuccessful ETI attempts.	<ul style="list-style-type: none"> • Employ Rescue Airway after 2 failed attempts on the patient • Passing the laryngoscope past the teeth with the intent of placing an ETT is considered an intubation attempt.
1		Stabilize the patient’s airway and prevent tube migration by using a device to prevent rotation, flexion, or extension of patient’s head.	

1		Efficiently employ post-ETI diagnostic tools to thoroughly assess overall effectiveness of ventilatory support throughout the duration of respiratory management efforts. *	<ul style="list-style-type: none"> • Symmetrical rise and fall of the chest with PPV • Monitor pulse oximetry – the target SpO₂ is greater than or equal to 95% if spontaneous circulation is present <ul style="list-style-type: none"> ○ In patients with COPD/pulmonary disease, it may not be possible or desirable to attain a SpO₂ of 95%. • Monitor ETCO₂ for appropriate waveform morphology and target CO₂ levels. <ul style="list-style-type: none"> ○ The target range for ETCO₂ level is between 30 – 45 mmHg if spontaneous circulation is present. ○ In cardiac arrest, metabolic derangement will significantly alter ETCO₂ values and waveform morphology. Target range for ETCO₂ levels is between 15 mmHg – 45 mmHg during CPR. ○ Recognize that in a patient with traumatic brain injury, ETCO₂ less than 35 mmHg due to hyperventilation may actually cause harm. Minute volume should be adjusted accordingly while maintaining optimal oxygenation, reserving hyperventilation for those patients showing signs of cerebral herniation only. • Monitor ECG for dysrhythmia due to vagal stimulation or other treatable causes. • Frequent auscultation of lung fields and epigastrium. • Constant evaluation of ventilator compliance and resistance during PPV.
1		Immediately identify malfunctioning equipment, ineffective techniques, or changes in post-ETI PPV compliance/resistance and employ alternative measures to achieve effective ventilations. *	
1		Reconfirm correct ETT placement each time the patient is moved and before transfer of care to hospital staff. *	Record and print the waveform ETCO ₂ strip prior to transfer of care to the hospital staff and attach the recording strip to the completed PCR.
1		Provide direction to personnel that have been delegated management of post-ETI PPV. *	
1		Maintain effective ventilation and oxygenation throughout the entire pre-hospital treatment period. *	Target SpO ₂ is greater than 95%; target ETCO ₂ is 30 – 45 mmHg in a patient with spontaneous circulation.
1		Maintain calm and effectively lead a team-based approach to resuscitation under all conditions. *	
1		Accurately document all assessment findings, therapeutic	

		treatments, and the patient's response to therapy.	
--	--	--	--

Critical Failure Criteria

- ___ Failure to take or verbalize BSI appropriate to the skill prior to performing the skill
- ___ Failure to initiate ventilations within 30 seconds after applying gloves or interrupts ventilations for greater than 30 seconds
- ___ Failure to ventilate patient at a rate appropriate to patient age
- ___ Failure to provide adequate tidal volume per breath
- ___ Failure to pre-oxygenate patient prior to intubation attempt
- ___ Failure to successfully intubate within 2 attempts
- ___ Failure to disconnect syringe immediately after inflating cuff of ET tube
- ___ Uses teeth as a fulcrum
- ___ Failure to assure proper tube placement by auscultation over lung fields and epigastrium
- ___ Failure to use either a colorimetric end tidal CO2 cap or waveform capnography
- ___ If used, stylet extends beyond end of tube
- ___ Failure to recognize an esophageal intubation
- ___ Failure to re-check tube placement after each patient movement and before transfer of care to hospital staff
- ___ Any procedure that would have harmed the patient