



**ORANGE COUNTY EMERGENCY MEDICAL SERVICES**  
**ADVANCED LIFE SUPPORT PROCEDURES**  
**ENDOTRACHEAL INTUBATION (INCLUDING ETCO2)**

#: PR- 030  
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Original Date: 01/2004  
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**INDICATIONS:**

- Apneic patient weighing greater than 80 lbs (36 Kg)
- Respiratory arrest
- Respiratory depression with weak or no gag reflex
- Unresponsive patient with respiratory depression

**CONTRAINDICATIONS:**

- Obvious signs of death
- Do-Not-Resuscitate

**EQUIPMENT:**

- Laryngoscope with assorted straight and curved blades.
- Endotracheal tubes (cuffed), sizes 6.5 to 8.0) and 10 mL syringe to inflate cuff
- Flexible stylet
- Magill forceps
- Suction device with tonsil tip and French-type suction catheters, source of water to clear catheter
- Bag-valve-mask or 40 L/min resuscitator with oxygen tubing
- Oxygen source with tubing, including nasal cannula (not required for fire line settings)
- End-tidal carbon dioxide detector device, quantitative with waveform (ETCO2)
- Endotracheal tube water-soluble lubricant
- Flexible intubation guide (Boogie device)
- Endotracheal tube holder or non-allergenic tape to secure tube when placed

**PREPARATION:**

- Assemble equipment, check endotracheal tube cuff for potential leaks
- Use of stylet recommended for all intubations, insert stylet so that end of stylet does not extend beyond tip of endotracheal tube
- Position patient for optimal view of vocal cords or with in-line stabilization of cervical spine for trauma

**PROCEDURE:**

- Assure oral pharynx is clear of secretions or blood by suctioning
- Hyperventilate patient with bag-valve-mask (5 – 10 times rapid ventilation) with high flow oxygen when available. Use bag-valve-mask ventilatory support at all times except during insertion of endotracheal tube. If time allows, place on high flow nasal cannula during intubation attempt
- Insert laryngoscope blade, positioning for optimal visualization of glottic opening between vocal cords
- Remove any solid foreign bodies visualized with Magill forceps
- Insert endotracheal tube through glottic opening such that cuff is positioned ½ to 1 cm below vocal cords
- When glottic opening not well visualized, use flexible intubation guide by inserting in expected location of glottic opening and threading endotracheal tube with stylet removed over the guide. If

Approved:

*Carl Schultz MD*

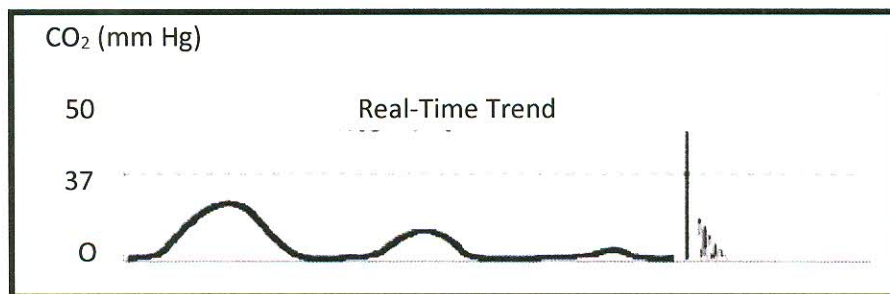
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- flexible guide is properly placed; a feeling of the guide passing over the tracheal rings is expected
- When tube is positioned (usually with the tube markings at the 21 cm mark on upper teeth), secure across face using a pincer grasp and remove stylet if used
- Inflate endotracheal tube cuff until test bulb of tube is firm or 10 ml, has been injected
- Ventilate patient with bag-valve-mask (attached to 100% oxygen) if available
- Listen over epigastrium for abnormal gurgling or air rushing sounds (immediate extubate if sounds noted in epigastrium (stomach) and attempt reintubation up to 3 attempts
- Observe for rise and fall of chest with ventilation
- Listen over both lung fields, if right sided breath sounds only are noted, carefully pull back on tube Being careful not to extubate until bilateral breath sounds are heard or the tube is at the 20 cm mark of the upper teeth (in a normal sized adult)
- Confirm placement of endotracheal tube with ETCO<sub>2</sub> device
- Secure the endotracheal tube and reassess for bilateral breath sounds and good ETCO<sub>2</sub> wave-form and reading (see below)
- Document size of endotracheal tube, location relative to top teeth (gums) in cm of tube length, time of insertion, presence of breath sounds, and ETCO<sub>2</sub> reading. Note also any problems, difficulties, or complications

#### QUANTITATIVE ETCO<sub>2</sub>:

- Use for any patient whose airway is managed with an endotracheal tube [ETT], King Airway, or supraglottic airway.
- Normal ETCO<sub>2</sub> readings for a healthy adult range between 30 to 45 mmHg. In cardiac arrest, blood flow to the lungs is decreased and ETCO<sub>2</sub> readings between 10 to 30 mmHg are not unexpected. If ETCO<sub>2</sub> reading is less than 10 mmHg, suspect tube is dislodged and check for breath sounds and abnormal epigastric sounds to assure proper position of endotracheal tube.
- An expected waveform when the endotracheal tube is in position is a rhythmic elevation of line from the baseline concurrent with ventilation efforts. The following illustrates a wave-form for a dislodged endotracheal tube:



Waveform typical of a missed or dislodged intubation

- ETCO<sub>2</sub> may not indicate right mainstem intubation; may not indicate oropharyngeal location of tube.

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## **EXTUBATION:**

### **Indications:**

- Failure to ventilate through endotracheal tube (consider suctioning tube for partial ventilation)
- Patient awakens and cannot tolerate endotracheal tube
- Leak of cuff such that ventilation is not efficient or other equipment malfunction that interferes with ability to adequately ventilate

### **Procedure:**

- Suction oropharynx
- Turn patient to side or turn head to side if not trauma victim (to avoid potential aspiration)
- Deflate cuff of endotracheal tube
- Withdraw endotracheal tube while patient exhaling, prepare to suction
- Provide supplemental oxygen

## **SPECIAL CIRCUMSTANCES:**

### **BREATH SOUNDS NOTED ONLY ON ONE SIDE OF CHEST:**

- If right side, consider main stem intubation (tube down too low) and deflate cuff and carefully withdraw tube 1 cm and reassess breath sounds, may repeat withdrawal of tube, but do not withdraw more than the 20 cm tube marking at the top teeth (gum).
- If left side, consider pneumothorax or other thoracic abnormality and leave endotracheal tube in place if able to ventilate adequately.

### **PATIENT COUGHING OR NOT TOLERATING ENDOTRACHEAL TUBE THAT IS REQUIRED TO MAINTAIN VENTILATION:**

- Consider sedation with up to 5 mg midazolam if blood pressure 90 systolic or above and perfusing (see SO-M-80).

### **UNABLE TO INTUBATE AFTER THREE ATTEMPTS:**

- If unable to intubate after three total attempts, or if intubation not feasible due to location or physical characteristics of patient, consider alternate airway such as King Airway or supraglottic airway.
- For short transport distances, maintenance of ventilation with bag-valve-mask ventilation is appropriate.

Approved:

*Carl Scholtz M.D.*

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