

**APPENDIX: 03**

**TITLE: INTUBATION PROCEDURES**

**REVISED: November 01, 2023**

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**I. BACKGROUND**

Advanced Airway Procedures and competency are the cornerstones of Paramedicine. True competency involves knowing not only how to control the airway, but when to control the airway, and selecting the best method to do so. While oral-tracheal intubation is the gold standard of securing the airway, it is not the only means available to ACCESS paramedics, nor may it even be the best option for a specific patient.

The window of opportunity in controlling the airway is often brief indeed. Good clinical judgment is paramount, coupled with critical decisiveness, and is essential to obtain the best outcomes possible for the patient.

**II. INDICATIONS AND CONTRAINDICATIONS**

**ABSOLUTE INDICATIONS:**

- Inadequate ventilation by BVM or other airway device.

**STRONGLY CONSIDER WITH:**

- Failure to oxygenate
- Failure to ventilate
- Failure to maintain the airway
- And based on anticipated clinical course (anticipated failure of any of the above)
- Cardiopulmonary arrest
- Respiratory arrest
- Other Respiratory failure/distress with diminished respiratory drive
- Comatose with non-maintainable airway
- Pronounced hypoxia
- Airway burns or edema
- CHF with diminished respiratory drive
- Acute asthma / COPD with diminished respiratory drive
- Suspected intracranial bleed/closed head injury
- Those patients who fail to respond to positive pressure ventilation
- GCS <8 without reversible causes

**CONTRAINDICATIONS:**

None

**II. COMPLICATIONS:**

The Paramedics must be prepared to deal with and prevent complications while placing an Endotracheal tube. These include:

- Unsuccessful intubation attempt
- airway trauma
- laryngospasm
- hypoxia
- aspiration

The worst-case scenario being a **“Can’t Intubate, Can’t Ventilate”** (CICV) situation.

**INTUBATION**

### III. PROCEDURE

#### PREPARATION:

Have the following ready:

- Bag-valve-mask connected to functioning oxygen delivery system
- Working suction with tubing and suction tip attached
- Full Intubation set to include:
  - Endotracheal tube(s) with stylet, syringe and intact cuff
  - Laryngoscope with blades and bright light source
  - Scalpel
  - Alternative airway (example: EOA, EGTA, SGA, LMA, etc.)
  - Endotracheal tube introducer (AKA the “bougie”, Flexiguide)
  - Anticipated pharmacological agents (See Appendix 3)
  - Manpower
- Check to be sure that a functioning, secure vascular access device (IV or IO) is in place. Note: If unable to establish IV or IO access certain drugs may be given IM instead
- In non-spinal trauma patients (especially those who are obese), elevate the head of the bed to 30 degrees

**Cardiac monitor. Be alert for the possibility of bradycardia or other dysrhythmias.**

#### PRE-OXYGENATION AND MEDICATION:

**Pre-medicate as appropriate and feasible:**

- See Appendix 2: Advanced Airway Management.

**Oxygenate:**

- Assist ventilations/oxygenate 2-3 minutes prior to *intubation attempt* unless patient’s situation precludes this (inability to ventilate with BVM and inability to protect airway). Oxygenate as best as possible based on patient’s condition using a BVM
- Place patient on high flow Nasal cannula
- Good pre-oxygenation is a vital component to successful airway management in all patients. This ensures sustained oxygenation during the intubation attempt and prevents bad outcomes.

**ORAL INTUBATION:** listed below is a general guide to the procedure. It may be modified as needed due to patient’s position, anatomical features, or other conditions as needed

Endotracheal intubation is comprised of 3 steps: Epiglottoscopy, Laryngoscopy, and Intubation. Below is the suggested procedure for optimizing airway success while minimizing risk to the pt, when utilizing a MAC or standard geometry laryngoscope. Using other laryngoscope styles may require modification.

**Epiglotoscopy:**

- Proceed slowly and methodically down the posterior aspect of the tongue, while identifying the epiglottis.
- Distract the tongue and jaw forward and lift the epiglottis edge off of the posterior pharynx.
- If the epiglottis cannot be identified, the provider may consider advancing the laryngoscope blade down the midline until the epiglottis is visible.
- Once the epiglottis is visualized, the provider should maneuver the blade to engage the hypoepiglottic ligament.

**Laryngoscopy:**

- Steps to laryngoscopy are largely in place to improve 3 axis alignment and to improve airway visualization.
- Providers shall consider performing a head lift when appropriate (barring C-spine precautions).
- The intubating provider may perform external laryngeal manipulation. An assistant should be available to continue the maneuver as the intubating provider proceeds with laryngoscopy.

**Intubation:**

- The provider should select and appropriately sized ETT and the providers choice of of bougie or stylet.
- Bougie used during the first airway attempt is strongly recommended.
- Insert the bougie or ETT and stylet from the R corner of the patient's mouth, to allow for optimized view of the ETT/Bougies passing the airway structures.
- The ETT should pass easily through the pt's airway structures without force. If utilizing an ETT+ bougie/stylet, the provider may consider rotating the ETT 30-40\* to the left.
- If initial intubation attempts fail, follow *difficult airway procedures* (Appendix 2).  
Actions to remedy this situation may include:
  - Alternating blade size and type
  - Changing patient position
  - Changing Provider
  - Placing an alternative airway (EOA, EGTA, SGA, LMA, etc.)
  - Ventilating the patient with the bag-mask
  - Cricothyrotomy
- Treat bradycardia occurring during intubation by temporarily halting intubation attempts, and oxygenating/ventilating the patient with the bag mask and 100% oxygen
- Once intubation is complete, inflate the cuff and confirm endotracheal tube placement by standard methods, **including ETCO2**.
- Secure endotracheal tube with commercial device if available
- Reconfirm placement every 5 minutes or after any patient movement

**NASAL INTUBATION:** listed below is a general guide to the procedure. It may be modified as needed due to patient's position, anatomical features, or other conditions as needed

- Oxygenate and Ventilate with high-flow oxygen for 2-3 minutes with a BVM/CPAP while preparing the equipment
- Bend the tube to the approximate airway curvature to heighten the degree of success.
- Lubricate the endotracheal tube with Lidocaine gel. Spray Neosynephrine in the nare to prevent bleeding
- Insert the endotracheal tube into the nostril on a flat plane. Use of the right nostril may be easier
- Turn the tube so as to avoid the nasal turbinates. Use no more than gentle pressure to advance the tube; *NEVER FORCE THE TUBE*
- Continue advancing the tube judging position in the throat by the amount of air you can feel coming out of the tube
- If there is suddenly less air flow than noted previously, the tube is likely past the area of the epiglottis and vocal cords
- Pull back on the tube until a large amount of airflow returns
- If using a standard ETT, turning the tube to the left and then advancing the tube will assist with good placement.
- Using cricoid pressure and the BURP procedure may also facilitate passage through the cords
- When you are certain your tube is in the trachea, inflate the cuff with 5-10ml air.
- Follow confirmation procedures
- Secure the ETT. Note the centimeter markings on the tube at the nare.
- Reconfirm placement frequently

**DIGITAL INTUBATION:** listed below is a general guide to the procedure. It may be modified as needed due to patient's position, anatomical features, or other conditions as needed

- Hyperventilate with high-flow oxygen for 2-3 minutes with a BVM and oral/nasal airway in place while you are preparing your equipment
- Insert a stylet into the ETT and curve it to form a "J"
- Lubricate the tube with Lidocaine gel
- With a GLOVED hand, stand or kneel facing the patient opposite shoulder.
- Place the index and middle fingers into the patient's mouth until you palpate the epiglottis, usually in the midline
- Lift the epiglottis with your middle finger and slide the ETT along the palmar surface of your index finger, guiding the tube under the epiglottis and between the vocal cords
- Withdraw the stylet and confirm proper ETT placement
- Secure the ETT. Note the centimeter markings on the tube.
- Reconfirm placement frequently

**Video Laryngoscopy:** The use of Video Laryngoscopy has been shown to improve first pass success and result in an overall decrease in adverse events. Considering that there are many different types of VL as an adjunct and/or replacement to direct laryngoscopy; the manufactures recommendations should be adopted as practical.

- See *Appendix 3.1: Video Laryngoscopy* if the McGrath Video Laryngoscope is used.
- Otherwise use manufacturers guidelines.

**Use of the endotracheal tube introducer (AKA the “Bougie”, Flexiguide):** The tracheal tube introducer is used to facilitate difficult intubation. It should not be confused with the more rigid stylet, which is inserted into the ETT and used to alter its shape prior to intubation. Unlike the stylet A bougie may be inserted independently of the ETT and is used as a guide. The bougie may also be “preloaded” onto the ETT. Since the bougie is considerably softer, more malleable, and blunter than a stylet this technique is considered to be a relatively atraumatic procedure. Bougie use is strongly recommended on every airway attempt. It should be utilized on difficult/perceived difficult intubations.

- Prepare the endotracheal tube introducer for use: Curve the bougie and ensure the distal tip is formed into a J (coudé) shape
- Perform a laryngoscopy, obtaining the best possible view of the glottic opening. You should always be able to view the tip of the epiglottis and, ideally, the arytenoid cartilages
- Advance the bougie, continually observing its distal tip, with the concavity facing anteriorly
- Visualize the tip of the bougie passing posteriorly to the epiglottis and (where possible) anterior to the arytenoid cartilages
- Once the tip of the bougie has passed the epiglottis, continue to advance it in the mid-line so that it passes behind the epiglottis but in an anterior direction
- As the tip of the bougie enters the glottic opening you may feel ‘clicks’ as it passes over the tracheal rings or the tip may stop against the wall of the airways. This suggests correct insertion, although cannot be relied upon to indicate correct positioning with 100% accuracy. If hold-up is felt, the bougie may then be withdrawn up to 5cm to avoid the ETT impacting against the carina
- Hold the bougie firmly in place and pass the endotracheal tube over the proximal end of the bougie
- As the proximal tip of the bougie is re-exposed, carefully grasp it, assuming control of the bougie
- The ETT should then be carefully advanced along the bougie and hence through the glottic opening, taking care to avoid movement of the bougie
- SUCCESSFUL INTUBATION MAY BE CONSIDERABLY ENHANCED BY ROTATING THE ET TUBE 90° COUNTERCLOCKWISE, SO THAT THE BEVEL FACES POSTERIORLY. In so doing the bougie may also rotate along the same plane but should not be allowed to move up or down the trachea.
- Once the ETT tube is fully in place hold it securely as you slowly withdraw the bougie
- Inflate the cuff
- Follow normal confirmation procedures
- Secure the tube

**POST INTUBATION:**

This shall apply not only to patients intubated by ACCESS personnel, but any patient that has an advanced airway (i.e., Hospital/F.D. placed ETT, Combi-tube, LMA, PTLA) in place (with good control of the airway) who comes under the care of EMS personnel.

Advanced airways should be reassessed for placement frequently and after any major decrease in patient's status.

**After any change in patient position or condition, reconfirm ET placement.**

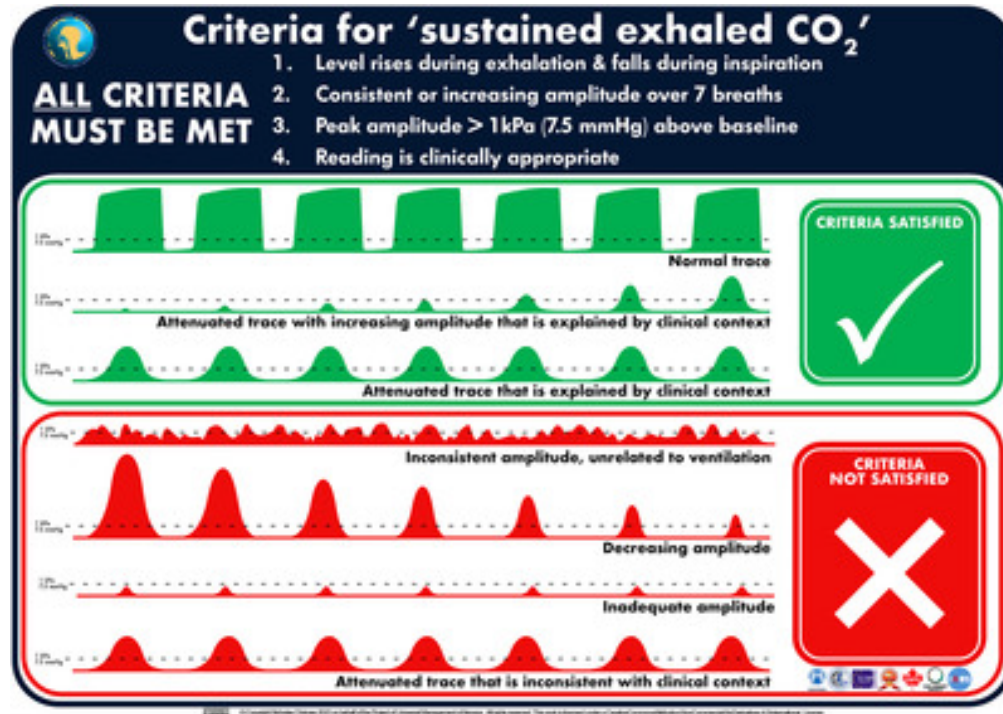
- **Secure the Tube:** Using a commercial Tube Holder when available
- **Sedation:** continued sedation is mandatory and humane. The need for continued sedation is based on physiologic signs (biting the tube, attempts at respirations, and combativeness.) Inadequate sedation results in increased ICP, barotrauma, and poor compliance to ventilation. See *Appendix 2: Advanced Airway Support Supplement*
- **Restraints:** Restraints should be considered for the patient to prevent any dislodgement of the tube caused by any breakthrough combativeness
- **C-Collar:** Patient's head should be immobilized with a collar (or similar method) after intubation to prevent ETT displacement secondary to flexion, extension, or rotation of neck. Even in non-traumatic patients, the use of a C-Collar has been shown to reduce tube dislodgement. Therefore, the C-Collar is strongly encouraged
- **ETCO<sub>2</sub>:** ETCO<sub>2</sub> monitoring is mandatory (when available). Ventilate at rate/volume to maintain ETCO<sub>2</sub> at 35-45 mm/hg. Ventilate as needed to ETCO<sub>2</sub> of 30-35 mm/hg for obvious head injury with increased ICP
- **Removing the BVM:** Remove the BVM from the tube during patient transfer from cot to bed (and similar activities) to prevent the BVM from pulling the tube out
- **Troubleshooting:** Frequent reassessments for complications and dislodgements. **"Don't be D.O.P.E.S."**
  - D: Displacement (Extubation, right main stem intubation or false passage)
  - O: Obstruction (kinked ETT, vomitus, blood, mucus, etc.)
  - P: Pneumothorax
  - E: Equipment Failure (Ventilator, BVM, O<sub>2</sub> supply, etc.)
  - S: Stacked Breaths (Baro trauma, etc.)

#### IV. CONFIRMATION AND DOCUMENTATION

Endotracheal tube placement shall be confirmed (and documented) by **at least 3 methods**, including:

- **(MANDATORY)** End Tidal CO<sub>2</sub> (ETCO<sub>2</sub>) Monitoring
  - **Waveform ETCO<sub>2</sub>:** As esophageal intubation is not necessarily always associated with a completely flat or absent ETCO<sub>2</sub>, the standard of a “sustained” ETCO<sub>2</sub> immediately after placement of the advanced airway and throughout patient care until transfer of care is required.
    - “Sustained” ETCO<sub>2</sub> is defined as a minimum of 7 consecutive breaths. The ETCO<sub>2</sub> is consistent or increasing amplitude of the capnogram over 7 breaths.
    - The level of CO<sub>2</sub> rises and falls appropriately with exhalation and inhalation.
    - The peak amplitude/change of CO<sub>2</sub> is a minimum of 7.5 mm Hg above the baseline.
    - The capnogram is clinically appropriate for the patient.
  - **Colormetric ETCO<sub>2</sub>:**
    - Colorimetric ETCO<sub>2</sub> (i.e., EZCAP) is inherently inferior to waveform capnography and is intended only as a bridge or backup if waveform ETCO<sub>2</sub> is delayed.
    - Colormetric ETCO<sub>2</sub> are usually only accurate for initial 2-4 breaths, and therefore not suitable to confirm “sustained” ETCO<sub>2</sub> or for continuous ETCO<sub>2</sub> monitoring.
    - Adult colormetric ETCO<sub>2</sub> may not be suitable or sensitive enough for small children or infants.

**INTUBATION**



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- Clinical Indicators of placement: Clinical indicators of correct placement are considered inferior to “Sustained ETCO<sub>2</sub>”. Clinical indicators, while required and important, do not exclude esophageal intubation or a misplaced airway with the same reliability that “sustained ETCO<sub>2</sub>” does.
  - Direct visualization of tube passing through the vocal cords. Independent assessment by second provider **OR** second provider witnessing via video is idea if practical.
  - Auscultation for equal breath sounds **and** the absence of epigastric sounds (counts as one method)
  - Observing for fogging/misting of tube
  - Perceived improvement in patient’s clinical status
- Use of an endotracheal esophageal detector if available.



**V. DOCUMENTATION:** Documentation shall include:

- Provider(s)
- Method
- Number of attempts and time of successful intubation. An intubation attempt is defined as anytime:
  - Orotracheal Methods: Insertion of laryngoscope blade into mouth (irrespective of whether an endotracheal tube is placed with the intent of performing endotracheal intubation). This includes simultaneous airway decontamination methods (i.e., SALAD airway management)
  - Digital Methods: The digits of the hand (or any other device) are passed into the hypopharynx in an effort to pass an ETT tube.
  - 
  - Nasotracheal Methods: Insertion of tube through nares of nose
  - Laryngeal Mask/Tube and Other Methods: Insertion of laryngeal mask/tube into mouth (for Combitube, King, LMA, iGel, and other oral non airway devices)
  - Surgical Methods: Insertion of needle/surgical airway device through neck (for cricothyroidotomy, needle jet ventilation, retrograde ETI, and other "surgical" methods of airway management)
  - The removal of a foreign body using a laryngoscope and Magill forceps does not constitute an intubation attempt.
- Depth of ETT at the Teeth (or gums), nares, or external opening of the neck.
- Complications encountered, reasons for unsuccessful attempt if known.
- Methods of confirmation.
- Tube position and confirmation just prior to turning over care to ER or D/C efforts in the field. A "snapshot" of the ETCO2 waveform is preferred.

**VI. SPECIAL SITUATIONS:**

**Suspected C-Spine Injury:**

Consider the endotracheal tube introducer (AKA the "Bougie", Flexiguide). If unable to place endotracheal tube, remove front of C-collar and hold in-line stabilization while attempting intubation. If still unsuccessful, consider alternate airway access techniques (nasal, digital, crich, etc.).

**Laryngeal edema**

Rarely, laryngeal edema due to burns or anaphylaxis will be severe as to result in swelling which obliterates the glottic opening. When nothing but inflamed swollen tissue is visible on laryngoscopy, instruct an assistant to push down slowly on the chest **AND MAINTAIN THE COMPRESSION**. This may result in a "bubble of air" becoming visible over the (hidden) glottis. Pass a bougie through the bubble and it should enter the larynx. Passage of a ETT over the bougie should now be possible. A smaller than normal ETT should be considered due to the swelling.

Maintaining the insertion of a bougie will facilitate trying various sizes of ETT in the event of difficulty as the bougie can remain in position until success is achieved. If the use of this procedure is not feasible, or is unsuccessful, consider ventilating with a BVM, use of an alternative airway or use of a surgical or needle airway.

### Pediatric Intubation

Providers should consider making adjustments to the above procedures for intubation of pediatric patient populations. Examples include: Alternative blade type/size, altering flow rate of “No Desat” nasal canula, alternative positioning strategies for pediatric patients, etc.

When selecting the appropriate ETT tube size, the use of a length based pediatric tape (AKA “Braslow Tape” or “ACCESS Pediatric Tape”) or similar device may help guide the provider.

Weight (kg) /Zone	Cuffed (mm)*	Length at teeth (cm)
<1 kg	2.5 mm	5.5-6 cm
< 3 kg	2.5 – 3mm	6-8.5 cm
3 kg	3.0 mm	9-9.5 cm
4 kg	3.0 mm	9.5-10 cm
5 kg	3.0 mm	10-10.5 cm
Pink/Red	3.0 mm	10.5-11cm
Purple	3.5 mm	11-12 cm
Yellow	4.0 mm	12.5 – 13.5 cm
White	4.5 mm	cm
Blue	5.0 mm	15.5-16.5 cm

\*NOTE: ACP no longer routinely carries uncuffed ETT. When available, use ACCESS Pediatric Tape for guidance with pediatric ET tube sizes.

### Physician PEARLS

**Sustained ETCO<sub>2</sub> remains the gold standard for confirmation.**

**“No trace, No tube”.**

**SEDATION OR USE OF PARALYTIC MAY BE REQUIRED TO CONTROL PATIENT FOR INTUBATION/POST-INTUBATION MANAGEMENT (CONSCIOUS PATIENT, TRISMUS, ETC.). SEE APPENDIX 2: Advanced Airway Supplement**

A key to good airway management is moving promptly through unsuccessful ETT attempts to successful airway management. Delays caused by repeated attempts trying to get traditional intubation (oral) may result in hypoxia, and poor patient outcomes. Use good clinical judgment when determining when to continue with a traditional ETT, and when to rapidly proceed to other methods (including surgical cricothyrotomy).

First pass success can be improved with preparation and proper patient positioning which aligns the “triple airway axis”.