

APPENDIX: 02

TITLE: INTUBATION PROCEDURES

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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. 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:**

- Cardiopulmonary arrest
- Respiratory arrest
- Comatose with non-maintainable airway
- Pronounced hypoxia
- Inadequate ventilation by BVM or other airway device.

STRONGLY CONSIDER WITH:

- Any patient with a decreased level of consciousness with compromised ability to manage their airway
- Airway burns or edema
- CHF with diminished respiratory drive
- Acute asthma / COPD with diminished respiratory drive
- Other Respiratory failure/distress 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:

- airway trauma
- laryngospasm
- hypoxia
- aspiration

The worst-case scenario being a **“Can’t Intubate, Can’t Ventilate”** (CICV) situation. While there are many procedures endorsed in the medical community, common actions include:

- Alternating blade type and length
- Changing patient position

- Consider use of endotracheal tube introducer (AKA the “Bougie”, Flexiguide)
- Attempting to ventilate with a BVM and basic airway adjuncts only.
- Attempting to place an alternative advanced airway (LMA, Combitube, King LT, SALT, or other airway etc)
- Needle cricothyrotomy
- Surgical cricothyrotomy
- Having another provider attempt intubation

III. PROCEDURE

PREPARATION:

Have the following ready:

- Bag-valve-mask connected to functioning oxygen delivery system
- Working suction with Yankauer suction tip attached
- Full Intubation set to include:
 - Endotracheal tube(s) with stylet, syringe and intact cuff and CETT Introducer
 - Laryngoscope with blades and bright light source
 - Scalpel
- Alternative airway (example: i.e. LMA, Combitube, King LT, SALT, IGEL or other airway if available and appropriate)
- Endotracheal tube introducer (AKA the “bougie”, Flexiguide)
- Anticipated pharmacological agents
- 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-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:

- Atropine Sulfate for children > one month of age
- Lidocaine for intracranial pressure control in head injured patients, patients with CNS injury (hypertensive crisis, bleed, CVA), or for dysrhythmia control in patients at risk for ventricular dysrhythmias

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 6+ liters nasal cannula during RSI procedures
- Good pre-oxygenation is a vital component to successful M.A.I. This ensures sustained oxygenation during the intubation attempt

If appropriate, administer induction agents and/or paralytic 45-60 seconds prior to intubation (See Appendix 03: *MEDICATION ASSISTED INTUBATION (MAI) SUPPLEMENT*)

ORAL INTUBATION:

Perform endotracheal intubation. If unable to intubate during the first attempt, stop and ventilate the patient with bag-mask for 30-60 seconds.

- If initial intubation attempts fail, consider
 - Alternating blade size and type
 - Changing patient position
 - Placing an alternative airway (EOA, EGTA, Combitube, LMA, etc)
 - Ventilating the patient with the bag-mask until spontaneous ventilation returns (usually six to ten minutes)
- If endotracheal intubation fails and you are unable to ventilate the patient with the bag-mask or use an alternative airway (example: i.e. LMA, Combitube, King LT, SALT, IGEL or other airway if available and appropriate) you should perform a needle or surgical cricothyrotomy
- Treat bradycardia occurring during intubation by temporarily halting intubation attempts and hyperventilating 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**.
- Release cricoid pressure, 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

- Hyperventilate with high-flow oxygen for 2-3 minutes with a BVM while preparing the equipment
- Bend the tube to the approximate airway curvature to heighten the degree of success. Use of an "Endotrol" CETT is at the discretion of the paramedic.
- Lubricate the endotracheal tube with Xylocaine 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 CETT, 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 CETT. 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 CETT and curve it to form a "J"
- Lubricate the tube with Xylocaine 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 CETT along the palmar surface of your index finger, guiding the tube under the the epiglottis and between the vocal cords
- Withdraw the stylet and confirm proper CETT placement
- Secure the CETT. Note the centimeter markings on the tube.
- Reconfirm placement frequently

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 CETT and used to alter its shape prior to intubation. Unlike the stylet a bougie is inserted independently of the CETT and is used as a guide. Since the bougie is considerably softer, more malleable, and blunter than a stylet this technique is considered to be a relatively atraumatic procedure. It is used where a difficult intubation is anticipated, or a poor view of the glottic opening has been confirmed on laryngoscopy. 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

- 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 CETT 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 CETT 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° COUNTER CLOCKWISE, 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 CETT 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. **Secure the Tube:** Using a commercial Tube Holder when available

- **Mechanical Ventilation:** Proper use of a mechanical ventilator has shown improved oxygenation, ventilation, and patient comfort compared to a BVM.
 - While not absolutely mandated, the use of a mechanical ventilator in intubated patients is strongly encouraged.
 - If not used, provider must document reason(s) for deferring mechanical ventilation in a patient with an advanced airway
- **Sedation and analgesia: continued sedation is mandatory and humane.** The need for continued sedation and analgesia 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. Sedation and analgesia should be achieved using:
 - Appendix 03: *MEDICATION ASSISTED INTUBATION (MAI) SUPPLEMENT*
 - **Other medications as ordered by medical control.**
- **Restraints:** Restraints should be considered for the patient to prevent any dislodgement of the tube caused by any breakthrough combativeness.
- **C-Collar:** 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 and considered.

- **ETCO₂:** ETCO₂ monitoring is mandatory (when available). Ventilate at rate/volume to maintain ETCO₂ at 35-45 mm/hg. Ventilate as needed to ETCO₂ 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:** After any change in patient position or condition, reconfirm ET placement. Frequent reassessments for complications and dislodgements. The phrase “**Don’t be D.O.P.E.S.**” is a useful memory aid to trouble shoot common but serious complications.
 - **D:** Displacement. Extubation or right main stem intubation
 - **O:** Obstruction: kinked CETT, vomitus, blood, mucus, etc.
 - **P:** Pneumothorax
 - **E:** Equipment Failure
 - **S:** Stacked Breaths

IV. CONFIRMATION AND DOCUMENTATION

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

- **(MANDATORY)** Use of STAT-CAP or EASY-CAP or other expired end tidal CO₂ monitor devices on all ET tubes. Titrate respirations as clinically indicated.
- Direct visualization of tube passing through the vocal chords
- Auscultation for equal breath sounds **and** the absence of epigastric sounds (counts as one method)
- Observing for fogging/misting of tube
- Use of an endotracheal esophageal detector
- Improvement in patient’s clinical status

Patient’s head should be immobilized with a collar after intubation to prevent CETT displacement secondary to flexion or extension of neck. Advanced airways should be reassessed for placement frequently and after any major decrease in patient’s status.

Documentation shall include:

- Provider
- Number of attempts and time of successful intubation. An intubation attempt is defined as anytime:
 - The Laryngoscope blade passes the teeth w/ the providers **intent** to intubate the patient
 - The tube passes into nasopharynx or the oropharynx or
 - The digits of the hand (or any other device) are passed into the hypopharynx in an effort to pass an CETT tube
- Depth of CETT at the lips or nares.
- Complications encountered, reasons for unsuccessful attempt if known.
- Methods of confirmation.
- Tube position just prior to turning over care to ER or D/C efforts in the field.

V. 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.

Initial 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.

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).

Intubation in children > one month of age

Atropine Sulfate 0.02 mg/kg IV, minimum dose 0.1 mg.

SEDATION OR USE OF PARALYTIC MAY BE REQUIRED TO CONTROL PATIENT FOR INTUBATION (CONSCIOUS PATIENT, TRISMUS, ETC.). SEE APPENDIX 03: Medication Assisted Intubation (MAI) Supplement.

VI. ENDOTRACHEAL TUBE SIZE AND CHART:

Premature	1 – 2.5 kg	2.5 mm
Neonatal	2.5 – 4.0 kg	3.0 mm
6 months	6 – 9 kg	3.0 mm
1 year	10 – 11 kg	3.5 mm
2-3 years	12 – 14 kg	4.0 mm
4-5 years	15 – 18 kg	4.5 mm
6-7 years	19 – 23 kg	5.0 mm
8-10 years	24 – 29 kg	5.5 – 6.0 mm
11 – 14 years	30 – 36 kg	6.5 mm
15 years up		7.0 – 8.0 mm

Estimating CETT Size: Age + 3 divided by 4

Use ACCESS Pediatric Tape for guidance with pediatric ET tube sizes.

(CETT tube should have a diameter of approximately the size of the patient's little finger or their external nares).

VII. References

1. Pitt, K., Woollard, M. *Should paramedics bougie on down? Pre-hospital Immediate Care.* 2000;4:68-70.
2. Nocera, A. *A flexible solution for emergency intubation difficulties. Ann Emerg Med,* 1996;27(5):665-667.
3. Woollard, M., Pitt, K. *Difficult intubation protocol: Use of the endotracheal tube introducer (gum-elastic bougie).* Internal document. Welsh Ambulance Services NHS Trust.