

**AIRWAY/OXYGENATION
PROCEDURE**

Purpose: To provide the procedure to be followed to establish and maintain a patient's airway, provide oxygenation and ventilation.

- M B S P**
- I. Evaluate adequacy of airway**
 - A. Use universal precautions.
 - B. Protect cervical spine from movement in all trauma patients.
 - C. Evaluate presence of adequate ventilation.
 - D. Note abnormal noises, indicating obstruction (ie: crowing, stridor, wheezing, cough)
 - II. Maintain patent airway**
 - A. **Medical patient:** use Head Tilt-Chin Lift, or Head tilt-Jaw Thrust
 - B. **Trauma patient:** use Modified Jaw Thrust (jaw thrust with neutral neck alignment)
 - C. **If unable to establish open airway, proceed to Obstructed Airway Procedure.**
 - D. **In patient without a gag response:**
 1. Insert oropharyngeal airway, or
 2. Nasopharyngeal airway: can be very effective in patients with facial injuries, post-seizure states, and when slight gag response is present.
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- E. **To secure a definitive airway:**
 1. **Establish endotracheal tube placement**
 - a. Maximum of 2 attempts per provider, maximum 30 seconds each attempt, maximum time 5 minutes.
 - 1) Hyperventilation should occur between attempts.*
 - b. **Orotracheal Intubation Procedure**
 - 1) Indications
 - a) Preferred method of intubation unless contraindicated.
 - 2) Contraindications
 - a) Unable to open mouth
 - b) Conscious, semi-conscious with an intact gag
 - c) Inability to visualize cords while C-spine immobilized
 - d) Inability to access patient to visualize cords
 - 3) Assemble and check-out equipment needed for ET intubation.
 - 4) Ensure patient is well oxygenated through hyperventilation*.
 - 5) Use assistant as appropriate.
 - 6) Position medical patient's head in slight hyperextended position.
 - 7) Maintain trauma patient's head in neutral position with manual immobilization during procedure.
 - 8) Suction may be necessary before tube can be inserted into larynx.
 - 9) Use Selleck's maneuver to limit vomiting and facilitate cord visualization.

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- 10) Use of stylet recommended.
- 11) Perform direct laryngoscopy.
- 12) Gently insert tube down through oropharynx into trachea; visualize tip of tube passing in between cords.
- 13) Without letting go of tube, inflate cuff to seal airway.
- 14) If available, aspirate using esophageal detection device to confirm tube placement.
- 15) Auscultate breath sounds during ventilation at four lung points (apices & lateral) and epigastrium to assure location of tube.
- 16) Reposition tube if breath sounds are unequal, or if breath sounds are not heard, remove tube.
- 17) When adequate breath sounds are heard, insert oropharyngeal airway or other bite block and secure.
- 18) Assure that ET tube is well secured prior to any patient movement.
- 19) Consider immobilization of patient's head to maintain tube position.
- 20) Attach bag-valve-mask and assure adequate ventilation.
- 21) Re-evaluate breath sounds for tube location following any patient movement.
- 22) End Tidal CO₂ Indicator may be used to confirm and monitor tube placement.

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c. **Nasotracheal Intubation Procedure**

- 1) Indications for use in the breathing patient
 - a) Unable to open the mouth
 - b) Semi-responsive patient
 - c) Inability to visualize cords when C-spine immobilized or due to limited patient access.
 - d) Facial Burn
- 2) Contraindications
 - a) Apneic patient
 - b) Patient with mid-face facial injuries or suspected basilar skull fracture
- 3) Assemble and check out equipment needed for intubation.
- 4) Use assistant as appropriate.
- 5) Ensure patient is well oxygenated by hyperventilation.*
- 6) Position medical patient with head slightly hyperextended.
- 7) Immobilize head of trauma patient in neutral position with manual stabilization throughout procedure.
- 8) Instill topical vasoconstrictor nose spray in nares.
- 9) Lubricate nare by inserting anesthetic jelly (that has been applied to nasopharyngeal airway) and lubricate end of ET tube with anesthetic jelly as needed.
- 10) Use Sellick's maneuver to limit vomiting and

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- facilitate cord stabilization.
- 11) Insert tube into nare with bevel against septum, or nasal floor without a stylet.
 - 12) Advance tube along floor of nose.
 - 13) If resistance is met, rotate tube to slightly left or right.
 - 14) If no risk of c-spine trauma, head may be flexed, depress trachea or lift jaw to assist in tube placement; BE GENTLE.
 - 15) Listen for breathing, advance tube during inspiration. No sound means tube is not in the trachea.
 - 16) If available, aspirate using esophageal detection device to confirm tube placement.
 - 17) Inflate cuff, attach bag-valve-mask and assure adequate ventilation.
 - 18) Auscultate for bilateral breath sounds at four lung points (apices and lateral) during ventilation and over epigastrium to assure location of tube.
 - 19) If breath sounds not present, remove tube.
 - 20) Hyperventilate patient before another attempt is made.*
 - 21) Ensure that ET tube is well secured prior to any patient movement.
 - 22) Consider immobilization of patient's head to maintain tube position.
 - 23) Re-evaluate breath sounds for tube location following any patient movement.
 - 24) End Tidal CO₂ Indicator may be used to confirm and monitor tube placement.

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d. **Digital Intubation Procedure**

- 1) Indication
 - a) Unable to orally or nasally intubate.
- 2) Contraindications
 - a) Responsive patient.
 - b) Patient with intact gag or clenched jaw.
- 3) Assemble and check out equipment needed.
- 4) Ensure patient is well oxygenated by hyperventilation.*
- 5) Maintain trauma patient in neutral position with manual stabilization throughout procedure.
- 6) Have suction ready.
- 7) Consider use of bite block.
- 8) Use Sellick's maneuver to limit vomiting and facilitate cord stabilization.
- 9) Insert index and middle finger to palpate and elevate epiglottis.
- 10) Pass distal end of ET tube (without stylet) between index and middle finger and advance tube.
- 11) If available, aspirate using esophageal detection device to confirm tube placement.

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- 12) Inflate cuff and auscultate breath sounds during ventilation at four lung points and epigastrium to assure location of tube.
- 13) When adequate breath sounds are heard, insert oropharyngeal airway or other bite block and secure.
- 14) Ensure ET tube is well secured prior to any patient movement. Attach BVM and assure adequate ventilation.
- 15) Consider immobilization of patient's head to maintain tube position.
- 16) Re-evaluate breath sounds for tube location following any patient movement.
- 17) End Tidal CO₂ Indicator may be used to confirm and monitor tube placement.

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2. If ET intubation cannot be achieved;

a. Insert an Esophageal Tracheal Double Lumen Airway

- 1) Contraindicated when:
 - gag reflex present
 - patient under 5 feet tall.
 - patient less than 16 yrs.
 - history of corrosive ingestion.
 - history of esophageal disease.

b. Procedure for ETDLA Insertion

- 1) Assemble and check-out equipment.
- 2) Ensure patient is well oxygenated through hyperventilation.*
- 3) Use assistant as appropriate.
- 4) Have suction ready.
- 5) Place head of medical or trauma patient in neutral alignment, with manual stabilization throughout procedure for trauma patient.
- 6) Lift tongue and lower jaw upward with one hand.
- 7) With other hand, hold ETDLA so that it curves in the same direction as curve of pharynx. Insert the tip into the mouth and advance gently until the printed ring is aligned with the teeth.
- 8) Inflate line 1, blue pilot balloon leading to the pharyngeal cuff.
- 9) Inflate line 2, white pilot balloon leading to the distal cuff.
- 10) If available, aspirate using esophageal detection device to confirm tube placement.
- 11) Begin ventilation through the longer blue connecting tube. If auscultation of breath sounds is positive and auscultation of gastric insufflation is negative, continue ventilation. (Also confirm by watching for chest rise.)
- 12) IF NECESSARY, if auscultation of breath sounds is negative, and gastric insufflation is positive,

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immediately begin ventilation through the shorter clear connecting tube. Confirm tracheal ventilation by auscultation of breath sounds and absence of gastric insufflation.

- 13) Remove syringe and monitor that cuffs remain inflated.

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F. To clear airway of secretions, or emesis:

1. Turn patient to side if possible, maintaining spinal immobilization in trauma patient.
2. **Suction** the oropharynx with a large bore rigid or flexible catheter.
 - a. Hyperventilate patient prior to and in between procedure if possible.*
 - b. Suction the oropharynx less than 15 seconds.
3. If lower airway needs to be suctioned:
 - a. Sterile technique must be used.
 - b. Use flexible catheter down an ET tube for less than 10 sec.

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G. When all previous methods of opening the airway have failed:

1. **Needle Cricothyroidotomy**
 - a. Indications
 - 1) Only used when absolutely all methods of opening and maintaining an airway have failed, and ventilation with pocket mask or BVM are inadequate.
 - b. Precautions
 - 1) Bleeding is common.
 - 2) Do not stray from the midline due to the proximity of large vessels.
 - 3) Attempt on a child < 8 years old should be done only with the direction of Medical Control.
 - c. Procedure
 - 1) Prepare equipment:
 - 10 or 12 gauge IV catheter
 - 10-12 cc syringe
 - High flow oxygen tubing adapted to fit IV catheter, or jet insufflation device.
 - 2) Expose neck, identify trachea, palpate prominent thyroid notch anteriorly. Palpate cricoid cartilage inferiorly. The space between the cricoid and thyroid cartilages is the cricothyroid membrane.
 - 3) Stabilize the trachea by holding the thyroid cartilage between thumb and fingers of one hand.
 - 4) Insert the largest available IV catheter attached to a syringe through the skin just above the cricoid cartilage, and pierce the cricothyroid membrane.
 - 5) As soon as the trachea is entered as demonstrated by aspiration of air, angle to 45 degrees inferiorly and slide needle out as you advance IV catheter. Re-aspirate to re-check position.
 - 6) Ventilate with a positive pressure source to achieve chest rise with a one to two ratio of ventilation to

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exhalation.

7) Dress wound, stabilize catheter.

8) A second catheter can be inserted in the same location to assist with passive exhalation.

III. When airway is patent, support oxygenation and ventilation.

A. If patient's breathing is inadequate (ie: too fast, too slow, too shallow, retractions, cyanosis, or decreased LOC):

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1. Ventilate patient at appropriate rate for age. (see special notes)

a. Pocket mask** with one-way valve with 15 lpm oxygen attached (preferred method).

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b. Bag-Valve-Mask (BVM) with 15 lpm attached.

c. If neither is available, mouth-to-mouth with barrier shield may be used.

d. The use of manually triggered positive pressure breathing devices (Demand Valve) is prohibited.

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B. If patient is breathing adequately and oxygen is indicated:

1. A low concentration (20-40%) may be administered by nasal cannula at 2-6 lpm (COPD patients should receive 1-2 liters of oxygen when in mild to moderate distress. When in severe distress, administer high concentration of oxygen but be prepared to assist with ventilations).

2. A moderate concentration (40-60%) may be administered by:

a. Simple face mask at 6-10 lpm

b. Partial re-breathing mask at 6-10 lpm.

3. A high concentration (60-90%) may be administered by:

a. Non-rebreathing mask at 15 lpm

4. Peds: a pediatric simple face mask at 5 lpm delivers 60-80% oxygen concentration when held firmly in place on infants and small children (Held 2 inches from face it delivers 40%).

C. In cases of CNS injury or illness with decreasing level of consciousness, the adult patient should be hyperventilated at the rate of 20.

IV. Special Considerations

A. With Use of the ETDLA

1. When facial trauma has resulted in sharp, broken teeth or dentures, remove dentures and exercise extreme caution when passing the ETDLA into the mouth to prevent the cuff from tearing.

2. DO NOT FORCE THE ETDLA; if it does not advance easily, redirect it or withdraw and reinsert.

B. Pulse Oximetry

1. Use pulse oximetry to evaluate patient oxygenation before and after management as possible.

V. Special Notes:

	Respiratory Rate	Ventilation Rate	Hyperventilation Rate
Infant	30-50/min.	30/min.	40/min.
Small Child	20-30/min.	20-24/min.	24/min.

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Older Child	12-20/min.	16-20/min.	20/min.
Adult	12-20/min.	16-20/min.	20/min.

- * Hyperventilation before a procedure can be done with high flow O₂ attached to BVM or pocket mask. Ventilate patient every 3 seconds for 30 seconds.
- ** Use of pocket mask with one-way valve and supplemental oxygen is preferable to the use of Bag-Valve-Mask.

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