COVID-19 TRAINING FOR HEALTHCARE WORKERS

Treating the Severely Dyspneic Patient – Part 2

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LEARNING OBJECTIVES

At the end of this lecture, the learner will be able to:

1. Recognize respiratory distress and need for intubation in a patient that is not improving despite other modes of oxygenation or noninvasive ventilation
2. Recognize the need for pre-oxygenation to extend the safe apnea time
3. Perform pre-intubation setup, including the gathering of equipment and integrating the viral filter into the circuit
4. Perform steps to intubation using direct laryngoscope, and utilize video laryngoscopy if available
5. Know the methods for confirming the accurate placement of the endotracheal tube
6. Recognize that rapid desaturation should be anticipated, and prepare by using the most experienced intubator and having any relevant back-up equipment readily available

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LECTURE OVERVIEW

I. Indications for Intubation

II. Pre-oxygenation

III. Preparation: Access, Equipment, Setup

IV. Positioning

V. Intubation Technique

VI. Confirming Endotracheal Tube Placement

VII. Risks During Intubation

I. INDICATIONS FOR INTUBATION

- It is important to recognize potential respiratory distress and the need for oxygenation and potential intubation in COVID patients.
- We recommend a low threshold to intubate for patients with rapidly progressive respiratory distress with hypoxia and lack of improvement
  despite other safe noninvasive oxygenation strategies such as high flow nasal cannula or noninvasive positive pressure ventilation.
- Patient conditions that should prompt consideration of intubation include:
  i. Increased work of breathing
  ii. Altered mental status
  iii. Hemodynamic instability
  iv. Multiorgan failure

II. PRE-OXYGENATION

- It is important to provide oxygen to the patient prior to intubation, or pre-oxygenate, in order to avoid hypoxia during the procedure. Pre-oxygenation aims to increase the oxygen reservoir of the lungs to extend the safe apnea time.
- Preoxygenation methods include:
  i. Nasal cannula up to 6L
  ii. Non-rebreather mask at 15L
  iii. Some institutions have approved the use of high flow nasal cannula or non-invasive ventilation strategies such as CPAP or BiPAP

III. PREPARATION

- **Access:** Ensure that the patient has adequate IV access. It is recommended to have at least two functioning forms of access prior to intubation.
- **Equipment:** Thorough preparation is the best means for success during intubation. Gathering and checking the function of all supplies including:
  i. Ambu bag
  ii. Endotracheal tube (ETT)

1. Select for the correct size of the patient (see table below)
    a. For adults 7.0-8.0 tube is often used

iii. Stylet
iv. Syringe
v. Laryngoscope
    1. Types include Mac, Miller, and Video Laryngoscope
    2. Select for the correct size of the patient (see table below)
vi. Filter
vii. End-tidal CO2 monitoring (if available)
viii. Bougie
ix. Suction
x. Ventilator
xi. If available a viral filter is recommended to be integrated into both the ventilator and Ambu bag circuit

- **Equipment set up**: It is important to ensure your equipment is ready to use.
    i. Check the function of your ETT cuff by inflating with a syringe to ensure there are no tears or air leaks
    ii. Deflate the cuff prior to intubation
    iii. Mold your ETT tube into the desired shape (curved vs. hockey stick)
    iv. Assemble your laryngoscope blade and ensure the light is functional

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IV. **POSITIONING**

- Positioning the patient prior to intubation will ensure the best first-pass success.
    i. Bed height should be raised to the intubating provider's comfort, typically between lower rib margin and mid-chest.
    ii. Place the patient in a sniffing position by flexing the neck and extending the head using a small pillow or folded blanket under the patient's head. This will align the pharyngeal and laryngeal axes.

V. **INTUBATION TECHNIQUE**

- Call out time prior to initiating the procedure. Administer rapid sequence intubation medications and wait until the patient is apneic and paralyzed prior to manipulating the airway.
    i. The blade should be in your left hand
    ii. Use the scissor technique with your right hand by placing the right thumb on the patients lower teeth and the right index or second finger on the patient's upper teeth and push the mouth open
    iii. Insert the blade to the right side of the patient's mouth
        1. If using a mac blade, sweep the tongue away from the midline
    iv. Avoid rocking back on the teeth
    v. Slowly advance blade down tongue until you visualize the epiglottis
    vi. A mac blade tip will be placed in the vallecula, a Miller blade tip will be used to lift the epiglottis
    vii. Exert force forward and away from you and lift up without rocking back
    viii. Once you see vocal cords, use your right hand to insert the endotracheal tube, introducing it from the right side of patient's mouth
    ix. Pass tube through cords to a depth of 3x tube diameter
    x. Inflate the cuff and remove the stylet
    xi. Connect the ventilator directly to the ETT to prevent the patient from hypoxia and protect yourself from droplets
    xii. Secure the ETT to ensure no dislodgement
    xiii. Verbalize post-intubation sedation plan
    xiv. Troubleshooting
        1. If you cannot see vocal cords but can see the arytenoids and or epiglottis, use your own hand & put cricoid pressure, then ask the assistant to place hand where your hand is and remove their hand
        2. You might have gone too far if you see a hole-that is the esophagus, back up your blade slowly until you see the epiglottis or until the epiglottis flops down, then follow above steps
        3. If unable to intubate, place a supraglottic airway, if available.
        4. If no supraglottic airway then can place OPA or NPA and bag with two providers to ensure adequate seal with the viral filter in place

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VI. CONFIRMING ETT PLACEMENT

- There are multiple ways to confirm proper placement of the endotracheal tube, including:
    i. Auscultate both sides of the chest and the upper abdomen to confirm bilateral breath sounds and no sounds of air insufflating the stomach
    ii. Visualize the chest rise of the patient and ensure it is equal
        1. If you hear lungs sounds on the right and not the left, pull back on the ETT until you hear breath sounds on both sides.
    iii. Check for expired carbon dioxide with an exhaled colorimetric end-tidal CO_2 or waveform capnography, if available
    iv. On chest x-ray and the tip should extend below the clavicles and approximately 2cm above the carina

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VII. RISKS DURING INTUBATION

- COVID patients have a high risk for desaturation during intubation due to hypoxia and decreased oxygen reserve. Be prepared to connect the patient directly to a ventilator.
    i. Preparation of an Ambu bag readily available prior to the administration of medications is important in the event of ventilator malfunction
    ii. An experienced intubator should be performing the procedure due to rapid desaturation
    iii. A video laryngoscope should be used if it is available and the operator is comfortable using it
    iv. If available, a supraglottic airway should be placed in the setting of failed intubation
    v. Vasopressors should be readily available in the setting of hypotension

VIII. TABLE OF ENDOTRACHEAL TUBE SIZE, DEPTH, and LARYNGOSCOPE BLADE SIZE BY AGE

Table 8-3. Suggested Uncuffed Endotracheal Tube Sizes (Pediatric Cuffed Tubes: use half size smaller)

Age	Size mm I.D.	Depth (cm)	Miller	Mac
	$\frac{\text{age in yrs}}{4} + 4$	$\frac{\text{age in yrs}}{2} + 12$		
Premature	2.5-3	8	0	0
Newborn	3-3.5	9-10	0	0
3-12 mon.	4	10.5-12	0	0
1 yr.	4	12.5-13.5	1	1
2 yrs.	4.5	13.5	2	2
4 yrs.	5	14	2	2
6 yrs.	5.5	15	2	2
8 yrs.	6 cuffed	16	2	2
10 yrs.	6.5 cuffed	17	2-3	2-3
12 yrs.	6.5-7 cuffed	18	2-3	3
Adolescent	6.5-7 cuffed	21	2, 3, 4	3
Adult	6.5-8 cuffed	21	2, 3, 4	3-4

Source: https://airwayjedi.com/2016/04/18/intubating-infant-toddler/