The Fundamentals of Assisting and Performing Intubation

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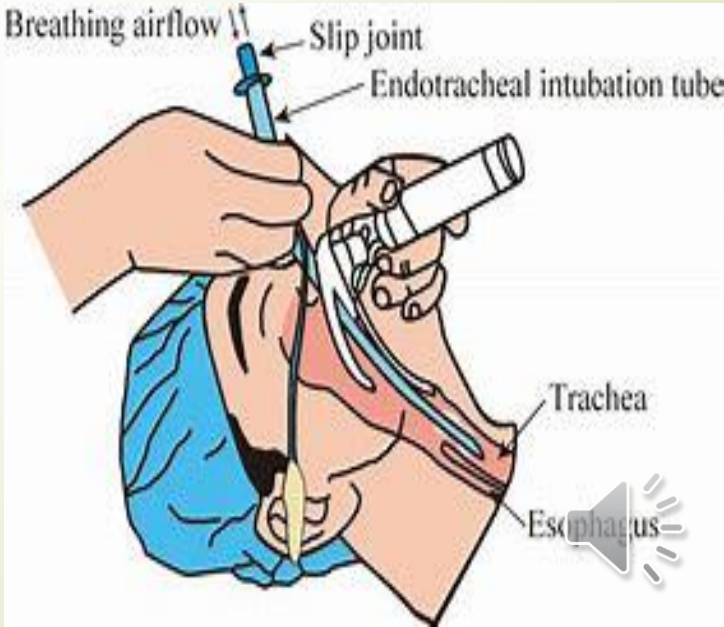


Learning Objectives

- Review of Guidelines
- Indications & Contradictions
- Special Considerations for Managing a Difficult Airway
- Related Equipment
  - Laryngoscopes
  - Intubation Box Contents
  - Sizing ET Tubes & LMA's
- Key Steps in the Procedures
- Confirming Placement
- Documentation
- References

Review of Guidelines

- Who should intubate:
  - Generally the most experienced "intubater".
- Where:
  - In some Hospitals, the RT is primary "intubater": Most units and floors
  - Others such as (Anesthesiologists, Intensivist) are primary in OR, ER/ED
- How much medication?
  - If upward titration of sedation is not effective, strongly consider calling anesthesia.
    - Example: If more than 10 mg of Versed is needed, especially in hypotensive patients.

Common Indications & Contradictions

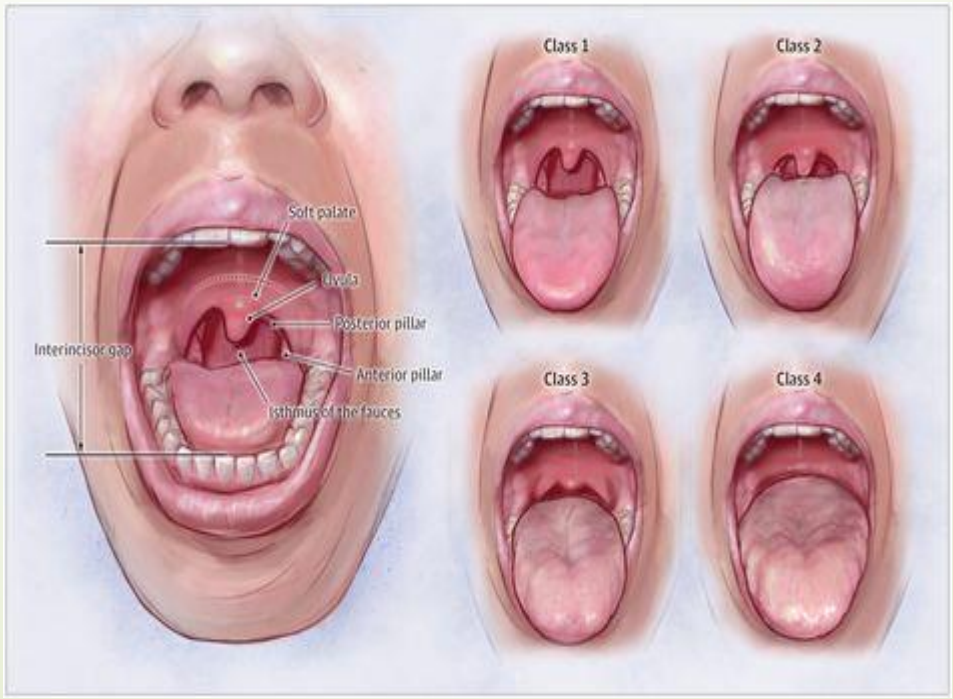
- Indications:
  - Hypoxemic and/or hypercapneic respiratory failure.
  - Prohibitive breathing pattern/prolonged tachypnea.
  - Inability to protect airway.
  - Severe and worsening respiratory muscle weakness.
- Contraindications:
  - Presence of a DNI order.
  - Laryngectomy
  - Epiglottitis (should be done by anesthesiologist)
  - Tachypnea due to anxiety or pain.

Recognizing a Difficult Airway

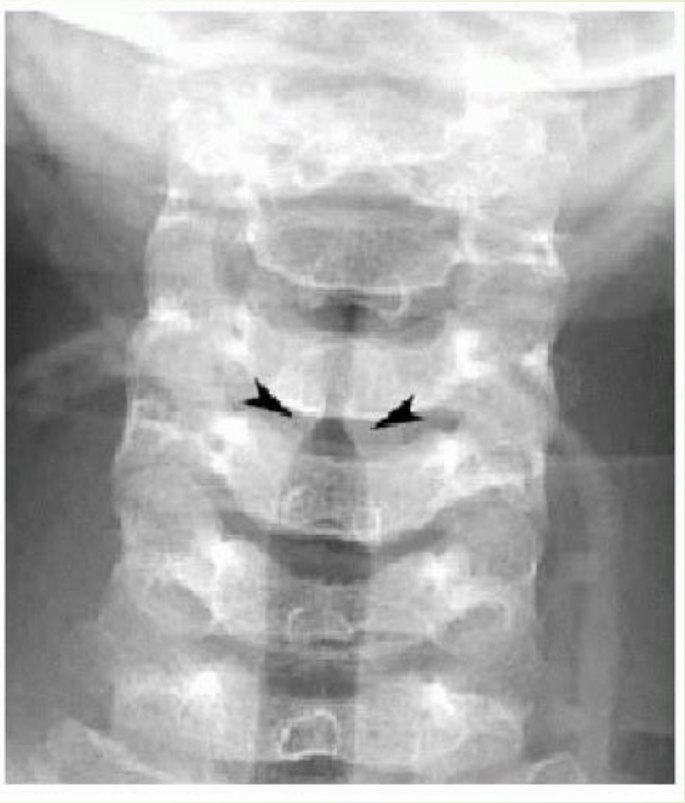
- High Mallampati Score
- Reported history of difficult intubation
- History of multiple Intubations and/or Tracheostomies
- CXR Examination
  - Torturous trachea
  - Narrow upper A/W or trachea
- Ability to Adequately Sedate
  - ETOH or other substance abuse
- Upper Airway Trauma or Surgery

Mallampati Score

- Ranges from 1 – 4 with four being the most difficult airway.



X-Rays Suggestive of a Difficult Intubation



One of the Scales for Assessing Airway Difficulty: El Ganzouri Risk Index

Lower is associated with easier airway with > 2 being more difficult.

Variable	Finding	Points
Mouth opening	⩾ 4 cm	0
	< 4 cm	1
Thyromental distance	> 6.5 cm	0
	6.0–6.5 cm	1
	< 6.0 cm	2
Mallampati score	I	0
	II	1
	III	2
Neck movement	> 90°	0
	80–90°	1
	< 80°	2
Ability to prognath	Yes	0
	No	1
Body weight	< 90 kg	0
	90–110 kg	1
	> 110 kg	2
History of difficult intubation	None	0
	Questionable	1
	Definite	2

Special Considerations for a Difficult Airway

- Consider calling anesthesia
- Use a video laryngoscope-if available
- Specialized equipment/supplies
  - Bougie
  - Smaller sized ET tubes
- Use cricoid pressure & optimize patient position
  - In-bed, Head at top of bed, sniffing position
- If possible, leave oxygenation cannula in place
- If available, Use:
  - Difficult airway box, to be kept in adult units
  - Fiberoptic equipment

When to Call Anesthesia—If RTs Intubate at Your Hospital

- Patient remains awake or agitated despite sedation
- Failed attempt(s) by RT(s)-Maximum of 2 attempts
- Face/neck trauma or abnormality
  - Kyphotic neck
- Difficult A/W (see preceding slides).
  - Down's Syndrome (Big tongue and cheeks)
  - High Mallampati Score
  - Reported history of difficult intubation
  - History of multiple intubations and/or tracheostomies
- Severe Bleeding Disorder
- Covid-19 (or highly infectious) Patient

Related Equipment- Larynoscopes

- Traditional (Non-Video) Larynoscopes
- Found in Intubation Boxes
  - Either disposable or Non-Disposable
  - Adult
    - #3 and 4 blades
    - Macintosh - Curved
    - Miller- Straight
  - Pediatric
    - # 1 and 2 blades
    - Macintosh and Miller

Related Equipment- Larynoscopes

- Video- Must be turned off and disinfected after each use!!!
  - McGrath
    - Screen attached to handle
    - Disposable battery – Last 250 minutes.
    - Blade slides over distal end and clicks in place
    - Has # 3 and 4 blades
    - **Blades not interchangeable with other video scopes**
    - Extra batteries are generally in the case
  - GlideScope
    - Screen is detached
    - Special stylette
    - Disposable blade/handle combo (expensive).
  - C-Mac-Generally used in the ER and by anesthesia.

A Word About Video Laryngoscopes

- Check remaining battery life for McGrath and periodically and before and change battery if needed.
- If distal end with video lens becomes soiled, you won't be able to see.
  - Use surgi-lube very sparingly
  - Distal end may need to be cleaned with excessive mucous or vomit.
- ET tube tip will not initially be visible until advanced.
- May require more of a curve to the ET tube.
- May result in more soft tissue injuries

Video Laryngoscopy - Screen Attached to Scope

GlideScope Core - Screen Separate from Scope

Related Equipment– What you Need in the Room

- PPE
- Manual Resuscitator/Mask (AMBU Bag)-Age Specific
- Oxygen flow meter(s)
- Suction source, tubing and Yankauer
- ETCO2 Cable and Adaptor
- Difficult Airway Box ???
  - If available

Related Equipment-- Intubation Box Contents

- Upper Portion of Intubation Box
  - Age-specific disposable laryngoscope and handles
  - Multiple age-specific ET tubes
  - Stylette
  - 10 ml Syringe
  - ET Tube Tamer
  - Subglottic suction stickers
- Lower Portion of Intubation Box
  - Extra Age-specific ET Tubes
  - Color Sensing ETCO2 detector
  - Bag with surgi-lube, saline, nipple adaptor
  - Extra Stylette and 10 ml syringe
  - Suction kits

Related Equipment-- Sizing ET Tubes & LMA's

TABLE 4-1 Tube Sizes

AGE	INTERNAL DIAMETER (mm)
Children	
Newborn	2.5
6 mo	3.5
1 yr	4.5
2 yr	5.0
4 yr	5.5
6 yr	6.0
8 yr	6.5
10 yr	7.0
12 yr	7.5
14 yr	8.0
Adults	
Female	7.0–8.0
Male	7.5–9.0
Special cases	

LMA Sizing

LMA Size	Patient Size
1	Neonate / Infants < 5 kg
1 ½	Infants 5-10 kg
2	Infants / Children 10-20 kg
2 ½	Children 20-30 kg
3	Children/Small adults 30-50 kg
4	Adults 50-70 kg
5	Large adult >70 kg

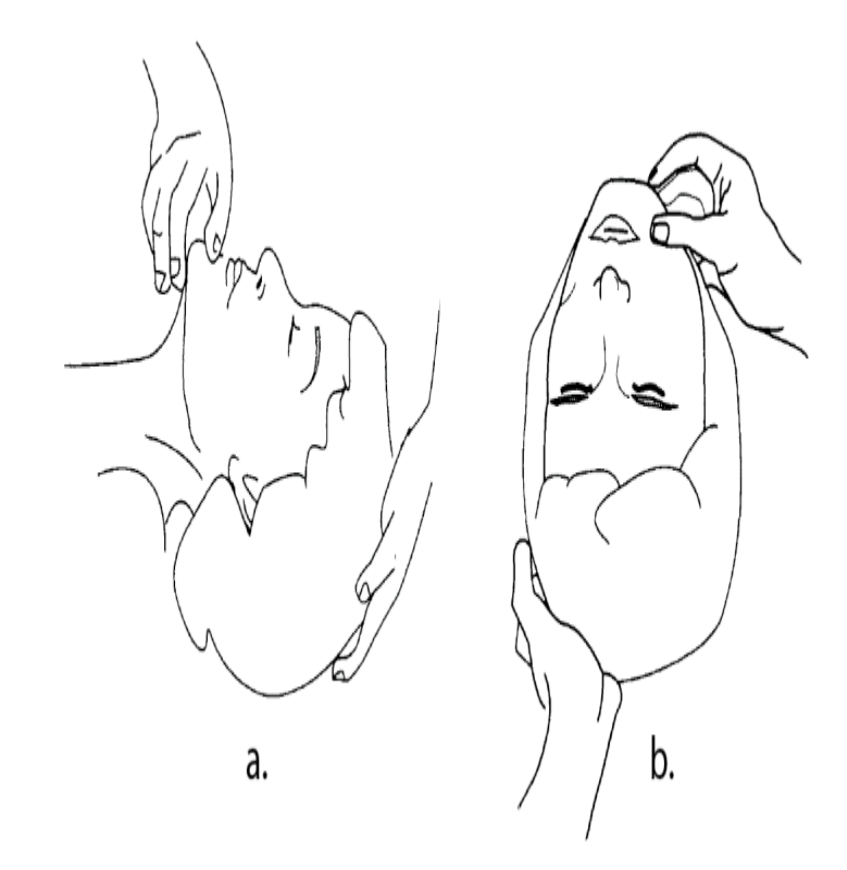
Key Steps in the Procedure

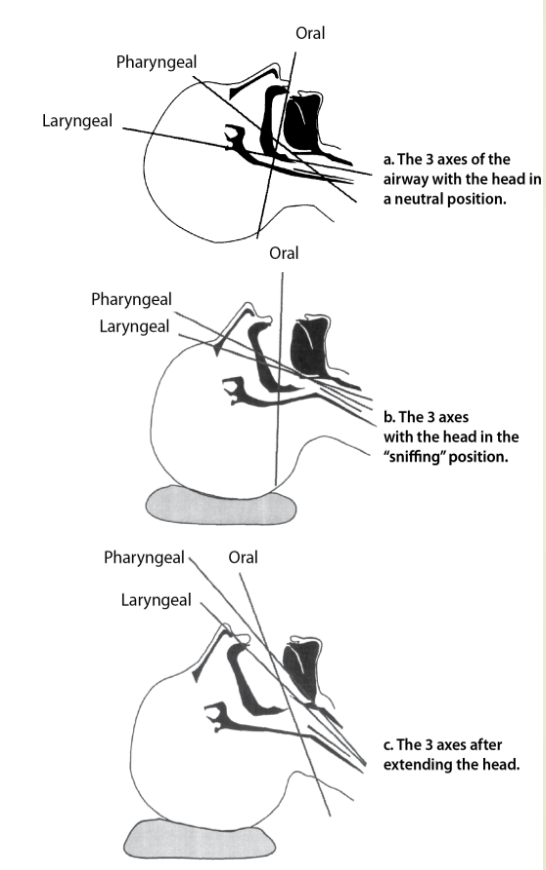
- Confirm indication and obtain physician order (initially may be verbal)
- Gather & set-up equipment (see equip. slides)
- Position patient, preoxygenate and medicate, if needed.
- Check/remove dentures, excessive secretions.
- Insert laryngoscope, sweep tongue to the left, lift epiglottis to visualize glottis.
- Advance ET tube though oral pharynx under epiglottis and through glottis.
- Inflate ET tube cuff, connect manual resuscitator, ventilate.
- Confirm initial placement via ETCO2, BBS, CXR.

Key Points-When Assisting Intubation

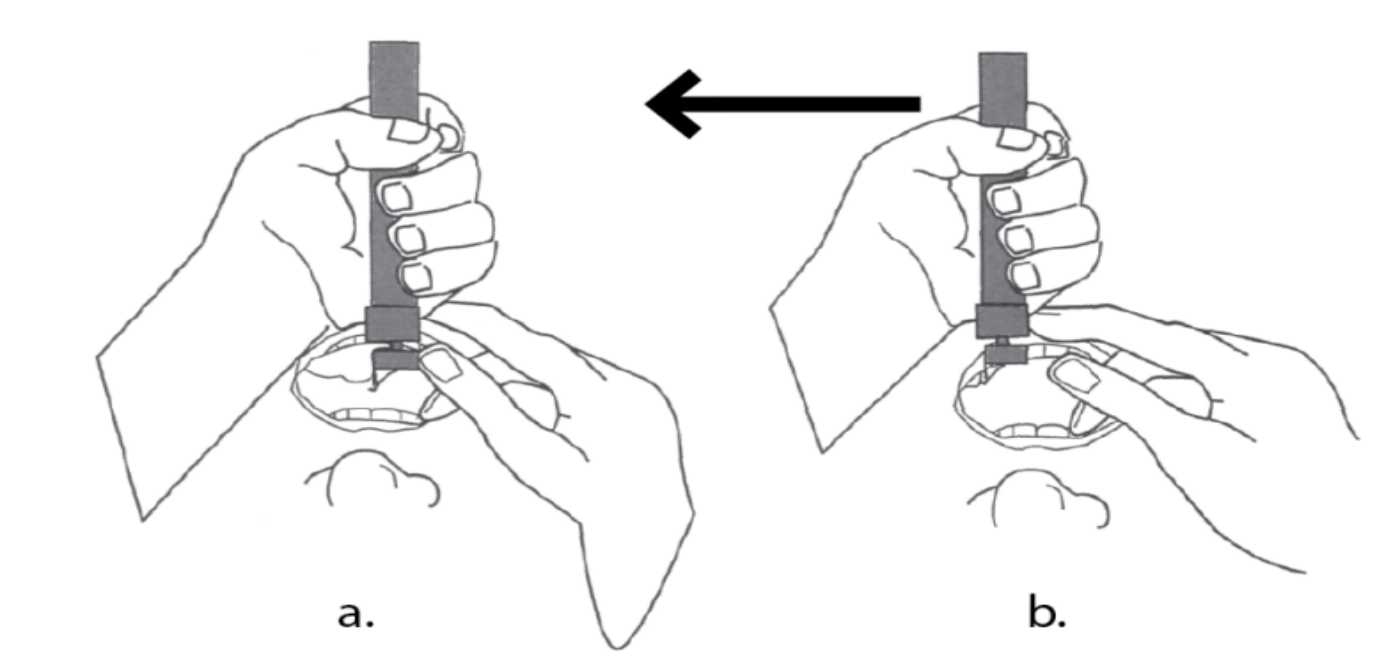
- Help ensure all supplies and equipment are in the room (see preceding slides)
- Help prepare equipment
  - Insert stylette, connect syringe and test cuff
  - Have available, one size smaller ET tube and alternate laryngoscopes/blades.
  - Set up ETCO2 cable and adaptor for waveform confirmation
  - Suction/Yankaur
- Help position the patient (pulled up in bed, sniffing position)
- Manually ventilate/oxygenate & Monitor SPO2
- Help ensure all supplies/equipment are situated near intubater and functional
  - ET tubes, syringe, laryngoscope, suction, AMBU bag
- Apply cricoid pressure or prepare smaller ET tube if requested
- Once patient is intubated
  - Inflate cuff
  - Help confirm placement (BBS, ETCO2)
- Once placement is confirmed
  - Secure ET tube
  - Manually ventilate patient
  - Set up ventilator

Key Steps in the Procedure-Sniffing Position

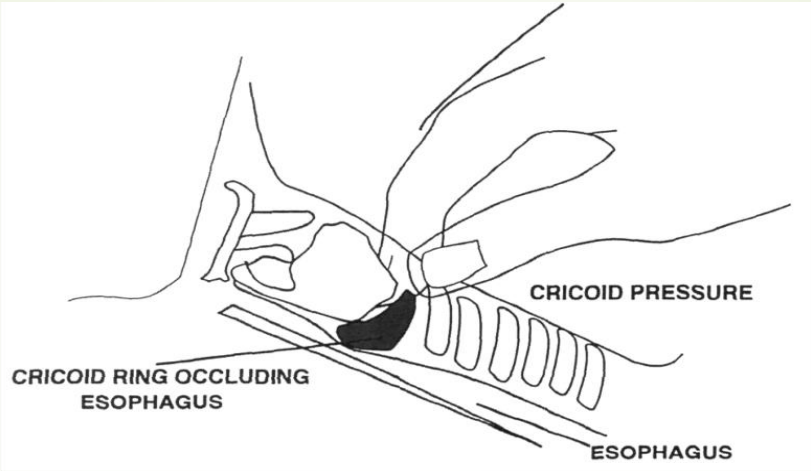




Inserting the Laryngoscope-
Insert Carefully Avoiding the Teeth (A) and Sweep the Tongue to the Left (B)



Cricoid Pressure



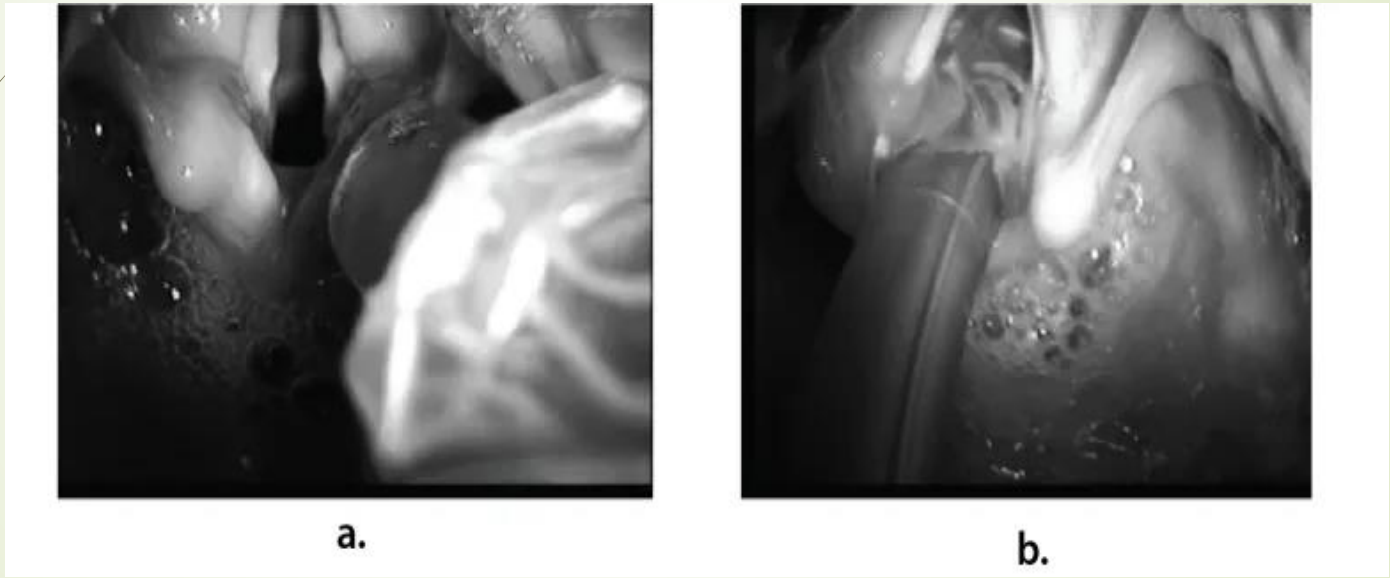
a.

b.

Before cricoid pressure

With cricoid pressure

Passing the ET Tube Through the Glottis



Confirming Placement

- Preliminary verification
  - Auscultation of lungs (+) and abdomen (-)
  - Fogging in the ETT is generally **Not** a good means of verification.
- Confirmation
  - **Gold Standard:** ETCO2 with waveform capnography, if available.
  - Color-Change indicator, if waveform is not available
  - Chest X-Ray

Documentation

- EHR Documentation
  - Adding LDA
    - Hi-Lo Vs Standard ET
    - Size ET tube
    - Who intubated/their clincial discipline
  - Progress Note
    - What was done, how it was tolerated.
  - Charge
- Non-EHR Documentation
  - Intubation Form

Take Home Points

- Intubation is a high risk-procedure.
  - Accounts for a disproportionate number of med/mal cases in which RT's are named as defendants.
- Proficiency takes time and experience.
  - When given the opportunity, assist when the opportunity presents itself.
  - Practice on the mannequin.
  - Familiarize yourself with equipment.
  - Practice with simulations, if you have access.
- Use discretion when deciding who will intubate:
  - Experienced RT or New RT
  - Anesthesia
- When in doubt, call anesthesia!

Key References

- Kacmarek, RM, Stoller, J & Heuer AJ, ***Egan's Fundamentals of Respiratory Care***, ed 12th ed, 2021.
- Heuer, AJ. Clinical Assessment in Respiratory Care, ed 9, 2021.
- US Nat'l Library of Medicine: https://medlineplus.gov/ency/article/003449.htm .
- Oxford Medical Education : https://www.oxfordmedicaleducation.com/clinical-skills/procedures/endotracheal-tube/
- Glidescope Information: https://www.verathon.com/glidescope-core/