



Standard of Procedure for Endotracheal Intubation

Indications for Endotracheal intubation in ICU:

Respiratory failure

- Failure to ventilate
- Failure to oxygenate

Airway protection

- Tissue swelling or obstruction of the airway (eg. anaphylaxis, angioedema, tumor, or infection)
- Bleeding in the airway (eg. trauma, massive GI bleed, hemoptysis)
- Decreased consciousness and/or loss of airway reflexes; patients at risk for aspiration

Impending respiratory failure or airway compromise

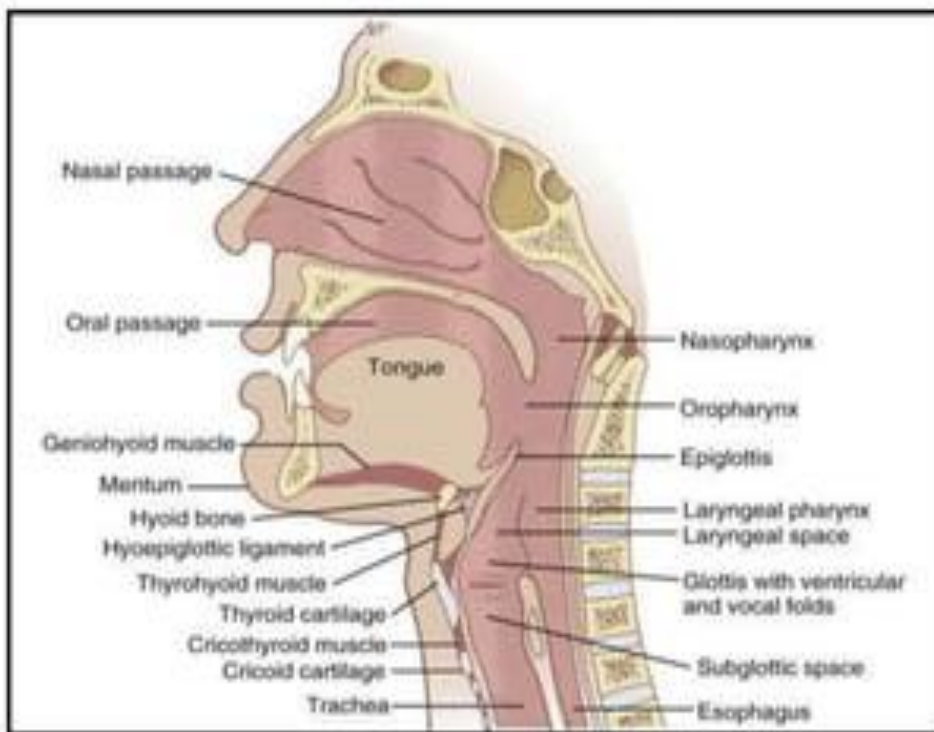
- Uncooperative (combative, agitated, etc.) patient with life-threatening injuries or requiring immediate procedures/imaging
- Progressive airway swelling or potential obstruction
- Urgent aggressive sedation required (eg. elevated ICPs requiring tight ICP and blood pressure control, refractory status epilepticus)
- Muscle/CNS/metabolic disorders (eg. Guillain Barré, amyotrophic lateral sclerosis, myasthenia gravis, botulism, hypocalcemia, brainstem infarction)
- Patients requiring aggressive fluid hydration (eg. severe burns, necrotizing pancreatitis)



Contraindications:

- Severe airway trauma or obstruction that does not permit safe way for the endotracheal tube
- Emergency cricothyrotomy is indicated in such cases
- Cervical spine injury
- Mallampati class III or IV or other determinants of difficult airway

Anatomy of airway





- **Equipment required for ET tube insertion**
- Laryngoscope (check size – the blade should reach between the lips and larynx – size 3 for most patients), turn on the light
- Cuffed endotracheal tube
- Syringe for cuff inflation
- Monitoring: end-tidal CO2 monitor, pulse oximeter, cardiac monitor, blood pressure
- Tape
- Suction
- Ventilation bag
- Face mask
- Oxygen supply
- Medications in the awake patient: hypnotic, analgesia, short-acting muscle relaxant (to aid intubation)



- **Laryngoscope technique**
- Give medications if required

- Pre-oxygenate patient with high concentration oxygen for 3-5mins

- Position patient

- Neck flexed to 15°, head extended on neck (i.e. chin anteriorly), no lateral deviation

- Stand behind the head of the patient

- Open mouth and inspect: remove any dentures/debris, suction any secretions

- Holding laryngoscope in left hand, insert it looking down its length

- Passing the tongue

- Slide down right side of mouth until the tonsils are seen

- Now move it to the left to push the tongue centrally until the uvula is seen

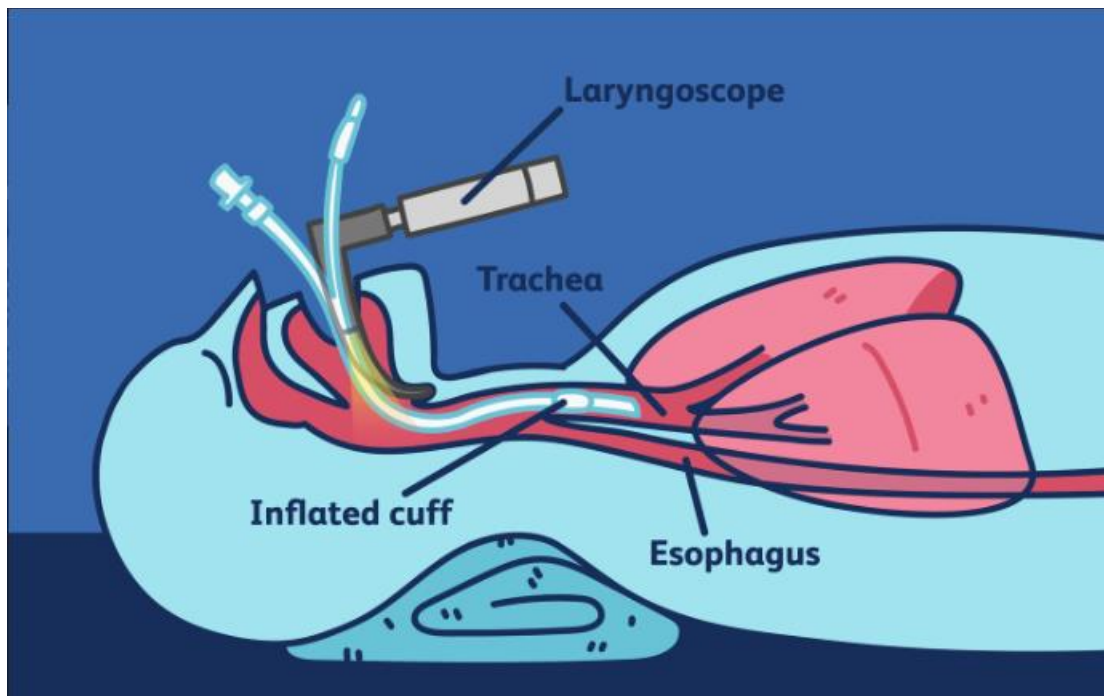
- Advance over the base of the tongue until the epiglottis is seen



- **Insertion technique**
- Apply traction to the long axis of the laryngoscope handle (this lifts the epiglottis so that the V-shaped glottis can be seen)
- Insert the tube in the groove of the laryngoscope so that the cuff passes the vocal cords
- Remove the laryngoscope and inflate the cuff of the tube with ~ 15ml air from a 20ml syringe
- Attach ventilation bag/machine and ventilate (~10 breaths/min) with high concentration oxygen and observe chest expansion and auscultate to confirm correct positioning
- Consider applying CO2 detector or end-tidal CO2 monitor to confirm placement
- Secure the endotracheal tube with tape
- if it takes more than 30 seconds, remove all equipment and ventilate patient with a bag and mask until ready to retry intubation



Intubation position and technique





INTUBATION (1 of 4)

GATHER/TEST EQUIPMENT

- | | | | |
|--|---------------------------------------|--------------------------------------|-------------------------------------|
| <input type="checkbox"/> NC | <input type="checkbox"/> ETT x2 sizes | <input type="checkbox"/> Video scope | <input type="checkbox"/> Cric kit |
| <input type="checkbox"/> BVM + PEEP Valve | <input type="checkbox"/> Blade x2 | <input type="checkbox"/> LMA | |
| <input type="checkbox"/> Free flowing IV | <input type="checkbox"/> OPA | <input type="checkbox"/> Bougie | <input type="checkbox"/> Ventilator |
| <input type="checkbox"/> EKG, SpO ₂ monitor | <input type="checkbox"/> Suction | <input type="checkbox"/> Capnograph | |

PLAN

- Assess for difficult airway (LEMON)
 - Look externally (beard, teeth, etc)
 - Evaluate with 3:3:2 finger rule
 - Mallampati score
 - Obstruction (burns,)
 - Neck Mobility
- Anticipate risks (HOP1 killers)
 - HYPOTENSION → fluid? pressors?
 - OXYGENATION → pre-ox plan?
 - pH (ACIDOSIS) → adequate vent?
 - ICP ISSUES → Premed? BP control?
- Approach: RSI / DSI / Awake
- Pre-Medication and Paralytics
 - Consider Succ contra-indications
- Primary and secondary airway plan
- Emergency plan/Cric preparations

PRE-MEDICATION

LIDOCAINE 1.5 mg/kg
FENTANYL 3 mg/kg

INDUCTION

ETOMIDATE 0.3 mg/kg
KETAMINE 1 - 2 mg/kg
PROPOFOL 2 - 3 mg/kg
MIDAZOLAM 2 - 4 mg
FENTANYL 100 mcg

PARALYTIC

SUCC 1.5 mg/kg
ROC 1.2 mg/kg
CISATRACURIUM 0.3 mg/kg

STOP TIME-OUT/VERBALIZE PLAN **STOP**

- CONSENT/EXPLAIN (if possible), verify DNR/DNI STATUS
- Verbalize the above plan and assign roles Don PPE



Version 1.0

INTUBATION

(2 of 4)

Nick Mark 2014

PREPARATION/INDUCTION

- Position patient, adjust height of bed
- De-nitrogenation
- Push medications and wait

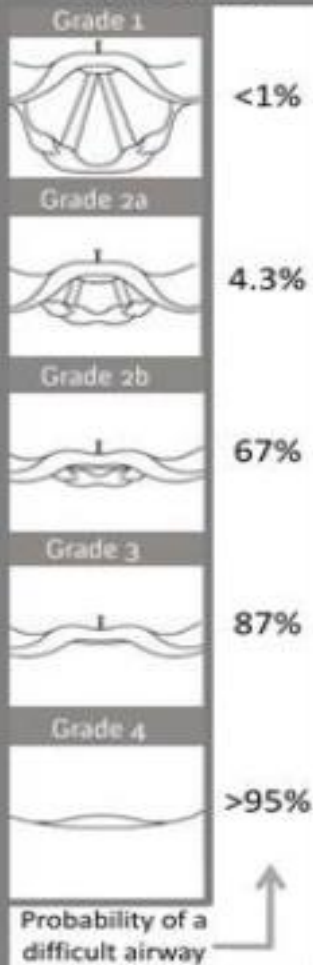
VISUALIZATION/TUBE PLACEMENT

- Insert Laryngoscope
Sweep tongue, advance blade, lift jaw
Consider placing towel under occiput
- "Call the view" and suction if needed
- Adjust view if needed
If unable to visualize → alternative blade/operator
Still unable to visualize → go to plan B
- Place tube, withdraw stylete
If unable to pass → use smaller size tube + lube
If persistent problem → **difficult airway procedure**

CONFIRMATION

- Auscultate
- Capnography
- Repeat DL/VL if uncertain

MODIFIED CORMACK-LEHANE GRADE



ETT SIZING/DEPTH

Women	7.0 - 8.0 mm ETT	21 cm
Men	7.5 - 8.5 mm	23 cm
Peds	(16 + age in yrs) / 4	



POST INTUBATION MANAGEMENT

- Secure ETT
- Reassess hemodynamics and oxygenation
 - Consider fluid bolus/pressors
 - If unstable → **hemodynamic collapse post intubation protocol**
- Analgesia/Sedation plan
 - Hypertensive: propofol gtt + fentanyl bolus
 - Hypotensive: fentanyl bolus + low dose midazolam bolus
 - address and treat cause of hypotension
- Ventilator settings
 - Oxygenation: start FiO₂ 1.0, if hypoxemic add PEEP
 - wean FiO₂/PEEP for goal SpO₂ > 90%
 - Ventilation: ensure MV is at least matching pre-intubation MV
 - use ETCO₂ or ABG to adjust
 - Document plateau pressure (before paralytics wear off) _____
 - Monitor for breath stacking as paralytics wear off
- Connect in-line suction
- Place NG/OG Tube
- ABG (ideally at least 10 min post intubation)
- Chest radiograph (ideally post NG placement)
- HOB > 30 degrees



DIFFICULT AIRWAY PROCEDURE



EMERGENCY FRONT OF NECK AIRWAY (eFONA)

1. **Position** (neutral neck) and **Prep**: sterilize skin, local analgesia (*if time*)
2. **Palpate** cricothyroid and **stabilize** trachea (non-dominant hand)
3. **Vertical incision** 2-3 cm midline
4. **Horizontal incision** 1-2 cm through cricothyroid membrane
5. **Insert scalpel** into trachea, rotate 90 degrees
6. **Place Tracheal hook** into incision, apply superior traction
7. **Insert endotracheal tube** and **confirm placement**

HEMODYNAMIC COLLAPSE POST INTUBATION

- | | |
|--|---------------------------------------|
| POSITION – esophageal, R mainstem? | → 1. verify placement |
| PEEP – Auto-PEEP from breath-stacking? | → 2. break circuit, use BVM |
| PRELOAD – loss of preload? hypovolemic? | → 3. fluid bolus |
| TONE – loss of sympathetic tone | → 5. start/increase pressors |
| TENSION – development of tension PTX? | → 4. chest US, consider needle |