

Preparation

- Consider the indication for intubation
 - Is non-invasive ventilation (CPAP/BiPAP) an option?
 - Is the patient DNI status?
 - Has patient/family consented, if applicable?
- Nasal cannula
 - 5 liters per minute to augment preoxygenation, then ≥ 15 liters per minute post-induction to facilitate apneic oxygenation
- Preoxygenate with high-flow oxygen
 - ≥ 3 min or 8 deep breaths with face mask; O₂ regulator turned all the way up
 - If inadequate saturation with NC+facemask: use NIV or BVM with PEEP valve
 - If pt too agitated for preoxygenation: ketamine induction, preox, then paralyze
- Assess for:
 - Difficult laryngoscopy
 - Difficult BVM
 - Difficult extraglottic device
 - Difficult cricothyrotomy
 - Look externally, Evaluate 3-3-2 rule, Mallampati score, Obstruction, Neck Mobility
 - B**eard, **O**bese, **N**o teeth, **E**lderly, **S**leep Apnea / Snoring
 - R**estricted mouth opening, **O**bstacle, **D**istorted airway, **S**tiff lungs or c-spine
 - S**urgery, **H**ematoma, **O**besity, **R**adiation distortion or other deformity, **T**umor*
- Determine airway management strategy
 - Plan B/C/D: Change patient position, blade, modality or operator
 - see bottom of page 2 for awake technique
 - see bottom of page 2 for cricothyrotomy technique; mark membrane prior to airway attempt if anticipated

Flowchart:

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    graph LR
    A[RSI vs. Awake] --> B[Prepare for failure of intubation and failure of ventilation]
    B --> C[Airway attempt]
    C --> D[Ventilate]
    D --> E[Supraglottic Airway]
    D --> F[Cricothyrotomy]
    E --> G[Post-intubation management]
    F --> G
    C --> H[Post-intubation management]
    
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Awake approach preferred when: Less urgent intubation, More difficult airway features, Low risk of vomiting

Discuss plan A, B, C, D with team
Equipment for plan A, B, C, D at bedside

- Check for dentures
 - Dentures in for bag mask ventilation, out for laryngoscopy
- Position patient
 - Auditory meatus to suprasternal notch (sheets under neck / occiput / shoulders)
 - Patient's head to operator's lower sternum (bed height)**
 - Torso angle of 30° recommended, especially in obesity and upper GI bleed
- Monitoring equipment
 - ECG
 - Pulse oximetry
 - Blood pressure
 - Continuous end-tidal capnography** - verify function with test breath
- IV access
 - Two lines preferable

Equipment

- Ambu bag connected to oxygen
 - Size: approximate nasal bridge, malar eminences, alveolar ridge / Err larger
- Laryngoscopy handles - verify power
 - At least two
- Suction under patient's shoulder - verify function
 - If suspected soiled airway (blood, vomitus, secretions), suction under each shoulder
- Laryngoscopy blades - verify bulbs
 - Curved and straight / One size larger, one size smaller
- Oral airways
 - Size: Angle of mouth to tragus of ear (usually 80, 90, or 100 mm in adults)
- Nasal airways
 - Size: Tip of nose to tragus of ear (usually 26 Fr/6.5 mm, 28/7, or 30/7.5 in adults)
- Colorimetric capnometer
 - To be used if continuous not available or not functioning
- Endotracheal tubes - verify cuff function
 - Variety of sizes (≥ 8.0 mm preferred in adults to facilitate ICU care)
- ETT stylet
 - Straight to cuff, 35 degrees**
- ETT securing device
 - Tape if no device available
- Gum elastic bougie
- LMA with lubricant and syringe
- Difficult airway equipment
 - Cricothyrotomy tools / video laryngoscope / optical stylet
 - fiberoptic scope / Magill forceps if suspected foreign body

(Use Broselow tape for sizes in pediatrics)

Drugs

- Pretreatment agents, if applicable
 - Pretreatment agents are always optional
 - Give as bolus 3 minutes prior to induction, except for fentanyl, which should be the final pretreatment agent, and should be given over 30-60 seconds.
- Fentanyl
 - 3 mcg/kg TBW if high BP a concern (aneurysms, dissections, high ICP, severe CAD)
- Lidocaine
 - 1.5 mg/kg TBW for reactive airways or increased ICP
- Atropine
 - .02 mg/kg IV or IM (min 0.1 mg, max 1 mg)
 - For infants, especially if receiving succinylcholine

- Induction agent
 - Etomidate 0.3 mg/kg TBW
 - Propofol 1.5 - 3 mg/kg IBW+(.4)(TBW)
 - Ketamine 2 mg/kg IV or 4 mg/kg IM IBW
 - Midazolam 0.2 - 0.3 mg/kg TBW
 - Thiopental 3- 6 mg/kg TBW
- Paralytic agent
 - Succinylcholine 2 mg/kg IV 4 mg/kg IM TBW
 - Rocuronium 1.2 mg/kg IBW
 - Vecuronium 0.3 mg/kg IBW if roc unavailable
- Normal saline flushes
- Phenylephrine
 - For peri-intubation hypotension
 - 100 mcg IV push as needed

Reduce dose if hypotensive

Contraindications to succinylcholine: History of malignant hyperthermia, Burn or crush injury > 5 days old, Stroke or spinal cord injury > 5 days old, MS, ALS, or inherited myopathy, Known hyperkalemia (absolute), Renal failure (relative), Suspected hyperkalemia (relative)

- Post-intubation settings discussed
 - A/C
 - FiO₂ 100% – titrate down over time to SpO₂ 95%
 - RR 18 [Asthma/COPD: 6-10]
 - TV 8 mL/kg – use ideal body weight [6 mL/kg if sepsis / prone to lung injury]
 - I/E 1:2 [Asthma/COPD 1:4 - 1:5]
 - Inspiratory Flow Rate 60-80 L/min [Asthma/COPD 80-100 L/min]
 - PEEP 5 cm H₂O [CHF 6-12→watch blood pressure] [PEEP 0 in Asthma/COPD]
- Personnel
 - MD / RN / RT

RSI or Awake Technique

- Verify tube placement
 - End-tidal CO₂ if using colorimetric – bright yellow with **six breaths**
 - Esophageal detection device should aspirate without resistance if ETT in trachea
 - Bougie hold-up test - see below
 - Repeat visualization using direct laryngoscopy or alternate device
 - Auscultation

Post-Intubation Care

- Secure ETT
 - Record position at lips
 - Adults: approx 21 cm (female) or 23 cm (male)
 - Pediatrics: approximately ETT size x 3
- Orogastric or nasogastric tube
- Portable chest radiograph
- Opioid then sedative boluses/drips
 - Fentanyl 2 mcg/kg bolus then 1 mcg/kg/hour
 - Morphine 0.1 mg/kg bolus then .1 mg/kg/hour
 - Propofol 0.5 mg/kg bolus then 15 mcg/kg/min
 - Midazolam 0.05 mg/kg bolus then .025 mg/kg/hour
 - Lorazepam 0.04 mg/kg bolus then .02 mg/kg/hour
 - Ketamine 1 mg/kg bolus then 1 mg/kg/hour
- Head of bed to 30-45 degrees, higher if very obese
- In-line suction
- Adjust ETT cuff pressure
 - Adjust to minimum pressure required to abolish air leak - usually 15-25 mm Hg by endotracheal tube cuff manometer
- In-line heat-moisture exchanger

These are starting doses - reassess frequently and rebolus/titrate upward as needed.

In the *just intubated* phase, especially if transport and procedures are imminent, aggressively analgesic and sedate to a RASS† score of -4 to -5. In the *stable on the vent* stage, titrate down sedation and use opioids to target a RASS score of -1 to -2. Avoid re-paralysis.

Fentanyl and ketamine are least likely to cause or worsen hypotension.

†Richmond Agitation Sedation Scale

- Watch for post-intubation complications
 - Dislodgement – check EtCO₂ waveform, repeat laryngoscopy
 - Obstruction – check for high PIP, suction secretions
 - Pneumothorax – breath sounds / lung sliding on ultrasound, repeat CXR
 - Equipment failure – disconnect from vent and bag
 - Stacking breaths / auto-PEEP - bag slowly, push on chest to assist prn
- Verify that airway equipment is ready for the next patient
 - Bougie hold-up test:** gently advance intubating stylet through ETT
 - No resistance @ 40 cm: likely esophageal
 - Resistance @ 26-40 cm (usually <30 cm): likely tracheal and patent
 - Resistance @ less than 25 cm: likely clogged tube

Awake Intubation Technique

- Glycopyrolate 0.2 mg or Atropine .01 mg/kg glyco preferred, ideally given 15 min prior to next step
- Suction then pad dry mouth with gauze
- Nebulized Lidocaine without epi @ 5 lpm ideally 4 cc of 4% lidocaine but can also use 8 cc of 2% lidocaine
- Atomized Lidocaine sprayed to oropharynx especially if unable to give full dose of nebulized lidocaine
- Viscous Lidocaine lollipop 2% viscous lido on tongue depressor
- Preoxygenate Position Restrain prn Switch to nasal cannula
- Lightly sedate with Versed 2-4 mg or Ketamine 20 mg aliquots q 2 min
- Intubate awake or place bougie, then paralyze, then pass tube

Cricothyrotomy Technique

- Vertical incision, palpate membrane
- Blind horizontal incision through membrane
- Blind finger through membrane into trachea
- Bougie along finger into trachea
- Lubricated 6.0 mm ETT or tracheostomy tube via bougie