Response to Encountered Difficult Airway

AIME for 1st Attempt Success

**Post Intubation options:**

- **Fentanyl:** 1-2 mcg/kg bolus start/titrate 1 mcg/kg/hour (use in combination with sedation)
- **Propofol:** 0.5 mg/kg bolus; start/titrate 15-25 mcg/kg/min (ave: 70 kg ~10-40 ml/hr, hypotension may require pressor support after volume correction, with analgesia prn)
- **Midazolam:** 0.02 mg/kg bolus; start/titrate 0.02 mg/kg/hour (in combination with analgesia)
- **Ketamine:** 0.5-1 mg/kg bolus; start/titrate 0.5-1 mg/kg/hour (analgesia and sedation, may consider ketafol [ketamine 0.5 mg/kg with propofol 0.5 mg/kg total 1mg/kg=50:50 mix])
- **Rocuronium:** 0.6 mg/kg bolus; 0.1-0.2 mg/kg q 20-30 min (ensure adequate sedation/analgesia)

**Ventilation options/settings**

<table>
<thead>
<tr>
<th>Tidal Volume</th>
<th>Rate</th>
<th>Initial FiO₂</th>
<th>PEEP</th>
<th>E/I ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal patient</td>
<td>8 mL/kg</td>
<td>9-12</td>
<td>1.0</td>
<td>5</td>
</tr>
<tr>
<td>Asthma/COPD</td>
<td>6 mL/kg</td>
<td>6-8</td>
<td>1.0</td>
<td>5</td>
</tr>
<tr>
<td>ARDS</td>
<td>6 mL/kg</td>
<td>10-12</td>
<td>1.0</td>
<td>5-15</td>
</tr>
<tr>
<td>Hypoventilation</td>
<td>8 mL/kg</td>
<td>10-12</td>
<td>1.0</td>
<td>0-5</td>
</tr>
<tr>
<td>Increased ICP</td>
<td>8 mL/kg</td>
<td>10-12</td>
<td>1.0</td>
<td>0</td>
</tr>
<tr>
<td>Infant</td>
<td>4-6 mL/kg</td>
<td>30-35*</td>
<td>1.0</td>
<td>5</td>
</tr>
</tbody>
</table>

**Tubes Tools & Techniques**

**Airway Assessment**

Assess for predicted difficulty with mask ventilation (BOOTS), Laryngoscopy and intubation (MMAP)

- **BOOTS**
  - Beard Measure** &
  - Obese Mallampati class
  - Older Atlanto-Occipital extension
  - Toothless Pathology: Upper airway
  - $\text{Sounds}^*$
    - * Sounds: snoring, stridor, wheezing
    - ** Measure 3,3,1: Hyomental distance = 3 fingers under chin; Mouth opening = 3 fingers; Bite test = ability to bite upper lip with bottom teeth (1 = bottom teeth can move anterior to upper)

**Note:** the neck should also be assessed for pathology, which may affect surgical access

**Difficult Mask Ventilation**

1. Insert Oral +/- Nasal airway. PEEP valve
2. 2-person/2-hand mask ventilation
3. Consider alternative mask size
4. Consider foreign body
5. Consider cricoid pressure release
6. Consider extraglottic rescue device (King Laryngeal Tube, LMA)

**Note:** extraglottic device will not work if pathology exists at or below glottis

**Difficult Laryngoscopy**

- **‘Best Look Laryngoscopy’**
  1. Position yourself (raise bed) and patient (sniff)
  2. 3/2/1 (3 things to do with 2-hands on 1st attempt)
    - Lift head with Rt hand if not contraindicated
    - Perform BURP/ELM (External Laryngeal Manipulation)
    - Consider 2-handed laryngoscopy
  3. Manage the tongue and control the epiglottis ... engage hyoepiglottic ligament
  4. Bougie on the bed with every DL attempt
  5. Based on experience may consider indirect technique - Video Laryngoscopy: unchanneled (ie. Glidescope) vs channelled (ie. King Vision, Airtraq)

**VL Tips (device specific):**

- **Best View:** Not too close, blade tip in vallecula may be better;
  - **ETT Glottic Access:** ‘Too good’ of a view means you are too close with no room for ETT, understand best shape for stylet, consider channelled device;
  - **Glottic Advancement:** avoid excessive distal curve, rotate to right, pull back device, reconsider blade location, replace place stylet with bougie once past cords, alternative ETT tip (Parker).
**Preparation:**
STOP IC BARS: Suction, Tubes (predicted size & ½ size smaller), Oxygen delivery (High Flow Nasal Prong HFPN), Bag mask with PEEP valve or CPAP), Pharmacology, IV fluids, Confirm (CO2 capnography/esophageal detector), BARS (approach to unanticipated difficult airway).

B: Best look laryngoscopy, Blade change, Bougie*  
A: Alternative intubation technique**  
R: Rescue device***  
S: Surgical airway

* Bougie Tips: Place until end point met (30-50 cm), leave laryngoscope in, if holds up on cords turn tube ¼ turn to left, use half to full size smaller tube  
** Alternatives include, Video laryngoscope, Airtraq, other blade type  
*** Rescue devices include i.e.: LMA, ILMA, or King LT

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**Equipment:**

- **Age, Weight (kg)**  
  - **Laryngoscope**  
    - S=straight  
    - C=curved  
  - **ETT**  
  - **ETT depth (lps)**  
  - **LMA**  
  - **ILMA**  
  > 30kg  
  - **King LT**

- **Plan A:**
  - 1. Prepare High flow NBF throughout, BVM with PEEP valve prn
  - 2. Preoxygenation and Pre-treat with fluid bolus. consider pressor
  - 3. Plan A: Best Look DL or VL if skilled;
  - 4. Induction
  - 5. Confirm location with 2 of:
    - Positive pressure
    - Esophageal detector
  - 6. Recheck vitals

- **Plan B:**
  - 1. Prepare High flow NBF throughout, BVM with PEEP valve prn
  - 2. Preoxygenation and Pre-treat with fluid bolus. consider pressor
  - 3. Plan B: Can’t intubate CAN oxygenate: Bougie, VL or other indirect technique; ILMA: >30kg
  - 4. Induction
  - 5. Confirm location with 2 of:
    - Positive pressure
    - Esophageal detector
  - 6. Recheck vitals

- **Plan C:**
  - 1. Prepare High flow NBF throughout, BVM with PEEP valve prn
  - 2. Preoxygenation and Pre-treat with fluid bolus. consider pressor
  - 3. Plan C: Can’t intubate, CAN’T oxygenate (rescue): Extrraglottic device sized
  - 4. Induction
  - 5. Confirm location with 2 of:
    - Positive pressure
    - Esophageal detector
  - 6. Recheck vitals

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**Pharmacology**

**Rapid Sequence Intubation:** All induction drugs require dosage adjustment based on age, weight, blood pressure and level of consciousness.

- **Pre-treatment:** Preoxygenation: high flow nasal prongs (10-15 lpm) (HFPN), BVM with PEEP prn combined with (HFPN+ Floor man CPAP), fluid bolus considered in most patients. Other pre-treatment agents may be considered (e pressor).

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**Induction**

- **Propofol**
  - 1-3 mg/kg (10 mg/ml) < 30 sec 5-10 min
  - Hypotension
  - Reduce dose with low BP

- **Etomidate**
  - 2-3 mg/kg (2mg/ml) < 30 sec 5-10 min
  - Adrenal suppression
  - Minimal effect on BP

- **Ketamine**
  - 1.2 mg/kg (10 mg/ml)
  - 30-60 sec
  - Increase HR/SP 70-90%+  
  - Adrenal + if low BP & SNS not maxed

- **Midazolam**
  - 1.3 mg/kg (1.5 mg/ml)
  - 1-2 min 15-30 min
  - dose may drop BP
  - Not a true induction agent

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**Paralysis**

- ** Succinyl-choline**
  - 1.2 mg/kg (20 mg/ml) < 1 min 5-10 min
  - Increase K
  - Denervation
  - Crush/burn; MH
  - Repeat dosing

- **Rocuronium**
  - 1 mg/kg (10 mg/ml)
  - 1-1.5 min 40-60 min
  - Dose 1 not .6 mg/ml
  - Alternative for succinylcholine

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**Rescue**

- **Ephedrine**
  - 1 mg/kg (50 mg/ml)
  - 5 g/kg 5-10 min
  - BCD, increase HR
  - Dilute with 9 ml to make 5 mg/ml

- **Phenytofine**
  - 1 mg/kg (10 mg/ml)
  - 5 g/kg 50-100 mg
  - 1 min 5-10 min
  - Bradycardia
  - Dilute properly
  - 10 mg in 100 ml of NS: 100 mg/ml

- **Norepinephrine**
  - .05-1 mcg/kg/min
  - 2-4 mcg/ml
  - start 2-4 min
  - 1-5 min
  - Bradycardia, arrhythmia, extraglottic
  - 4 mg in 100ml ~4 mcg/ml
  - 40 mg/hr ~3mcg/ml

- **Atropine**
  - 0.02 mg/kg (max 1 mg)
  - 1 min 10-20 min
  - Small dose can worsen bradycardia
  - Treat brady if occurs

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**Hypotensive patients or high risk for post intubation shock:**

1. **Volume load 10-20 ml/kg**
2. Ketamine or Ketalatol with combined dose total 1mg/kg "mix anywhere from 20.80 (K:BP) ratio to 80:20 (K:BP) ratio.
3. Consider pressor bolus or beginning norepinephrine infusion after +/-
   before induction in high risk patients