Mercyhealth™

Prehospital & Emergency Services Center

July 2020 CME

Advanced Airway Team Management for All EMS

Approaching the airway as a Team:

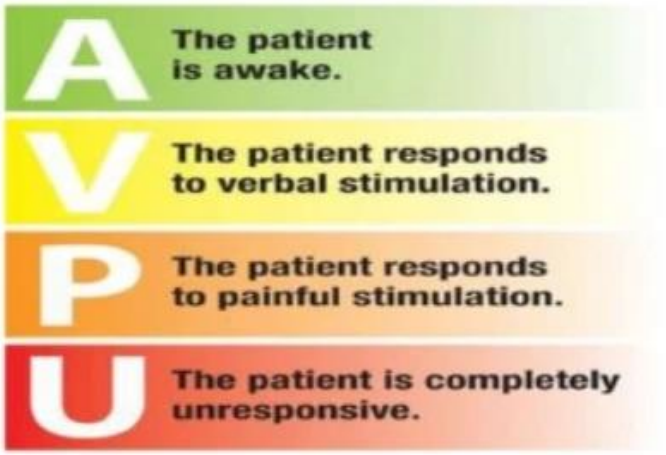
What can a BLS provider do?

- **EMRs, EMTs and Advanced EMTs play a critical role in successful airway assessment and management, particularly when resuscitating a patient prior to intubation**
- All levels of providers should strive to understand the process of intubation to help improve teamwork and optimize patient outcomes.
- *Areas were EMRs, EMTs and A-EMTs can play an especially crucial role in patient care and the assistance of an ALS provider are highlighted throughout this lecture with* **EMR🚑!** **, EMT🚑!** **, or AEMT🚑!**

Basic Airway and Breathing Assessment:

Starts with forming a general impression of the patient…

- Level of consciousness?
- Airway patency?
- Adequacy of breathing?
- May they be going into shock?
- Potential for deterioration?

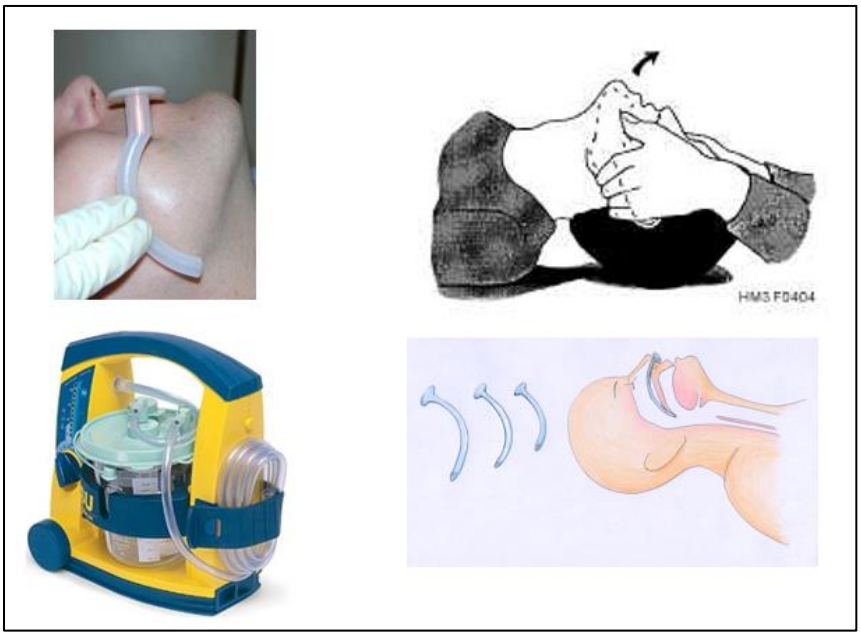


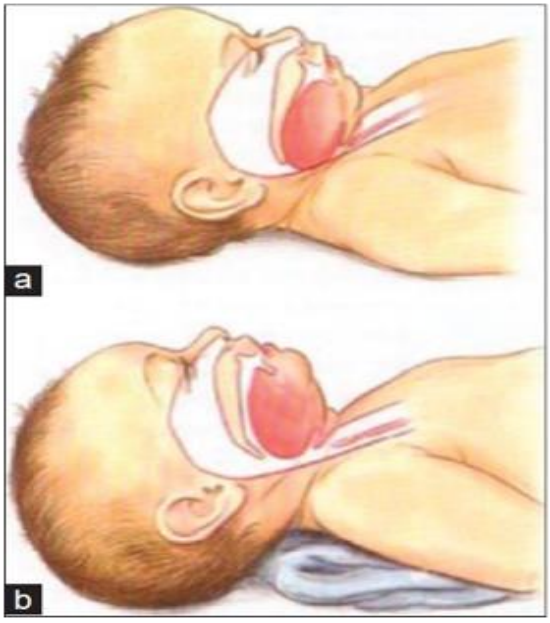
Basic Airway Maneuvers:

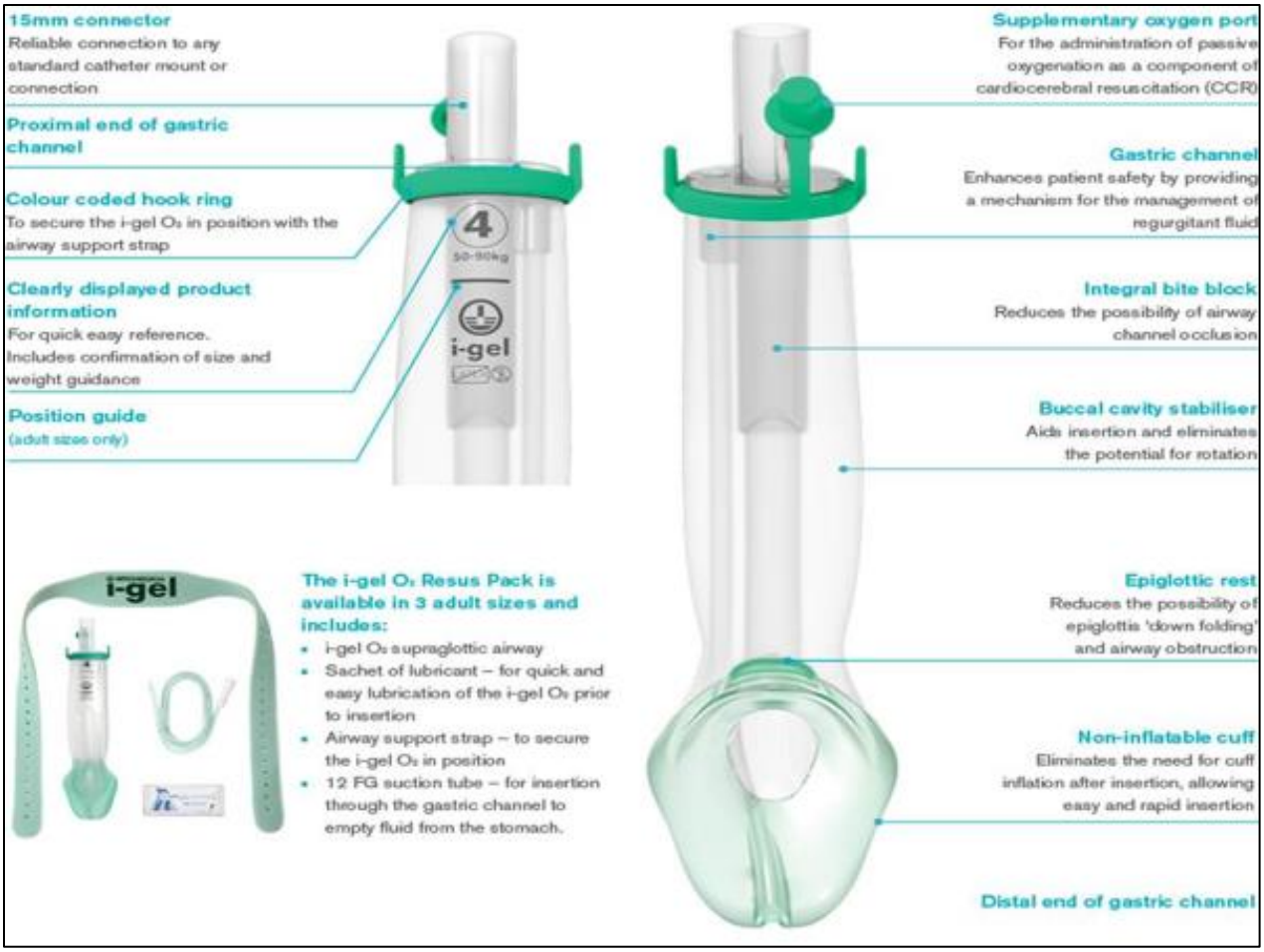
Includes positioning, suctioning, and insertion of basic airway adjuncts (OPA, NPA)… **EMR!**

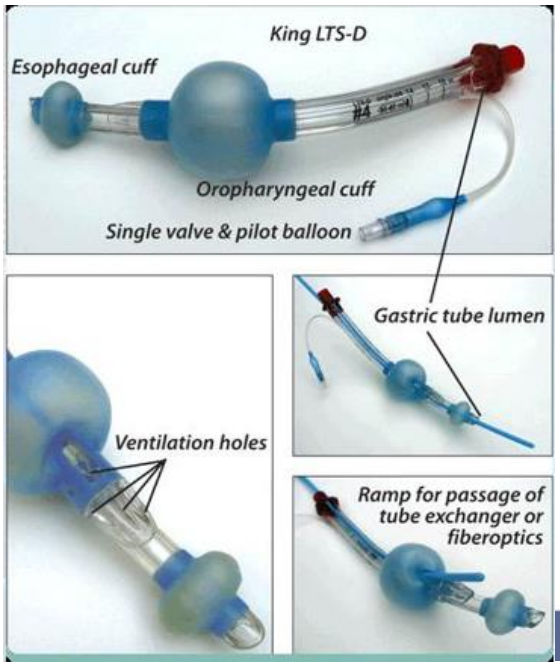
- OPA and BIADs (e.g. iGel, King) are contraindicated in patients with intact gag reflex
- NPA are contraindicated in patients suspected of possible craniofacial trauma such as a basal skull fracture
- A good review of iGel device can be viewed online at: https://www.youtube.com/watch?v=ijAeVvgh7sg and https://www.youtube.com/watch?v=ao-Sb_OulE8

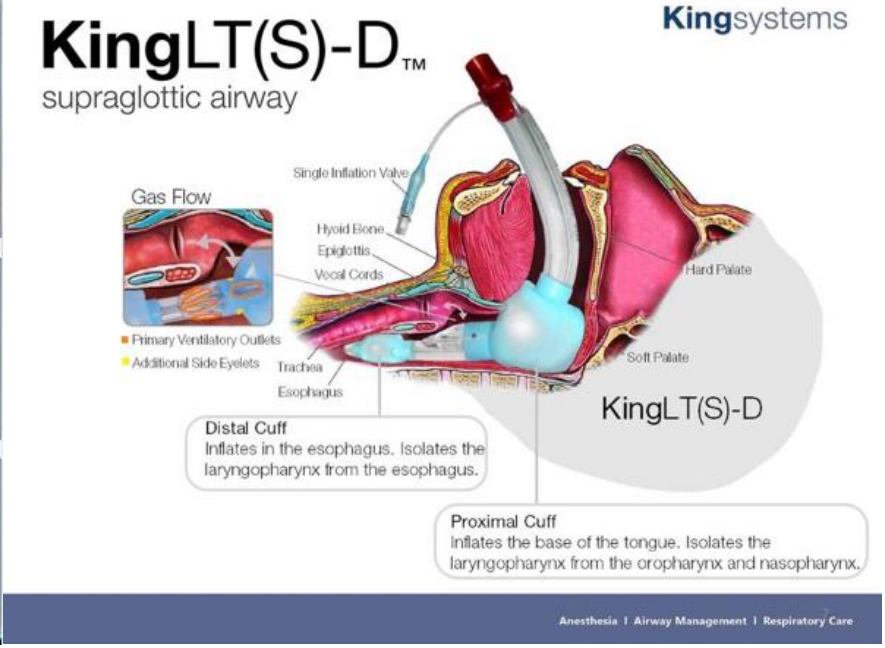
Proper sizing and positioning is very important…






15mm connector
Reliable connection to any standard catheter mount or connection
Proximal end of gastric channel
Colour coded hook ring
To secure the i-gel O2 in position with the airway support strap
Clearly displayed product information
For quick easy reference. Includes confirmation of size and weight guidance
Position guide
(adult sizes only)
Supplementary oxygen port
For the administration of passive oxygenation as a component of cardiocerebral resuscitation (CCR)
Gastric channel
Enhances patient safety by providing a mechanism for the management of regurgitant fluid
Integral bite block
Reduces the possibility of airway channel occlusion
Buccal cavity stabiliser
Aids insertion and eliminates the potential for rotation
Epiglottic rest
Reduces the possibility of epiglottis 'down folding' and airway obstruction
Non-inflatable cuff
Eliminates the need for cuff inflation after insertion, allowing easy and rapid insertion
Distal end of gastric channel
i-gel
The i-gel O2 Resus Pack is available in 3 adult sizes and includes:
i-gel O2 supraglottic airway
Sachet of lubricant – for quick and easy lubrication of the i-gel O2 prior to insertion
Airway support strap – to secure the i-gel O2 in position
12 FG suction tube – for insertion through the gastric channel to empty fluid from the stomach.


King LTS-D
Esophageal cuff
Oropharyngeal cuff
Single valve & pilot balloon
Gastric tube lumen
Ventilation holes
Ramp for passage of tube exchanger or fiberoptics


KingLT(S)-D™
supraglottic airway
Kingsystems
Gas Flow
Single Inflation Valve
Hyoid Bone
Epiglottis
Vocal Cords
Hard Palate
Primary Ventilatory Outlets
Additional Side Eyelets
Trachea
Esophagus
Soft Palate
KingLT(S)-D
Distal Cuff
Inflates in the esophagus. Isolates the laryngopharynx from the esophagus.
Proximal Cuff
Inflates the base of the tongue. Isolates the laryngopharynx from the oropharynx and nasopharynx.
Anesthesia I Airway Management I Respiratory Care

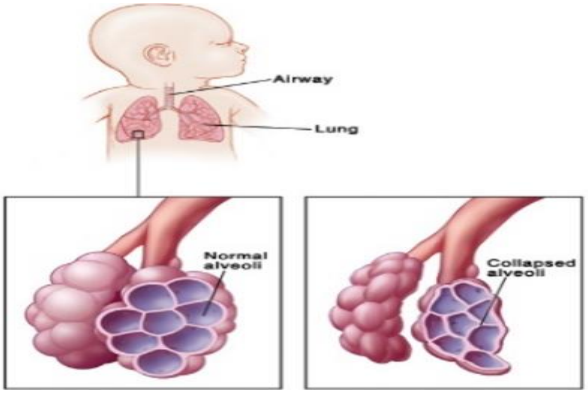
Oxygenation vs Ventilation:

Why do we breathe?

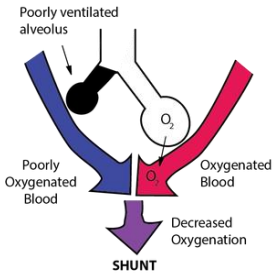
- Two functions: Oxygenation and Ventilation
- Depends on diffusion of gas molecules across a thin liquid/solid barrier from a higher to lower concentration

Oxygenation -

- Measured by appearance of pink skin demonstrating perfusion to tissues and SpO2 level (saturation of hemoglobin molecules with oxygen [*or carbon monoxide!!*])
- We can affect oxygenation through two methods – adjusting FiO2 (fraction of inspired oxygen) and PEEP (Positive End Expiratory Pressure)

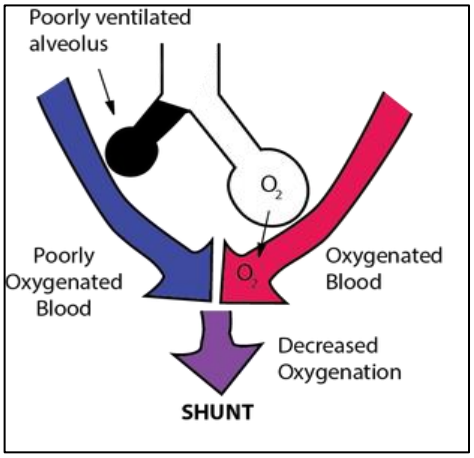


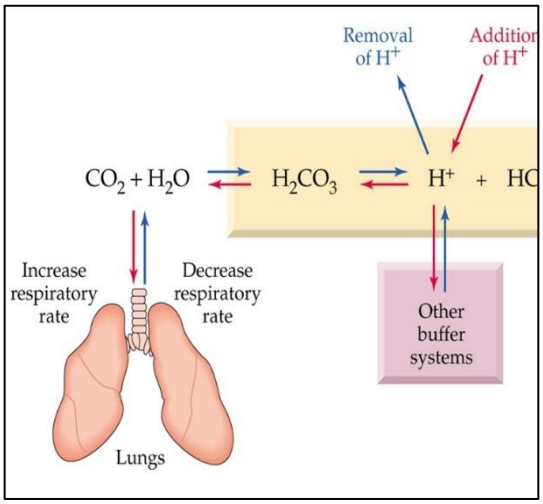
- **FiO2** EMR!
  - **Air is 21% oxygen**. FiO2 can be increased with oxygen delivery devices such as nasal cannula, non rebreather mask, and Bag Valve Mask.
  - Remember, a non-rebreather mask at 15 lpm only raises the FiO2 to 60-70%!
  - A patient being readied for RSA should receive **25lpm** by Non-Rebreather and **15lpm** by nasal cannula to maximize oxygenation and allow for apneic oxygenation through NC during intubation once NRB is removed.
- **PEEP** EMT!
  - Even if 100% FiO2 is delivered to the lungs, the lungs can't make use of it if the alveoli are *collapsed*.
  - This can happen in any patient, usually when exhaling and is called *"shunt"* physiology
  - PEEP is a (usually) small amount of pressure (typically 5-10cm of water) applied when the patient is breathing *out*
  - Can be applied by CPAP (Continuous Positive Airway Pressure), a Ventilator, or a PEEP Valve on a Bag-Valve Mask
  - There is ZERO PEEP on a regular BVM without attaching a PEEP Valve
  - This small amount of pressure can help keep the airways (bronchioles) open in people with COPD, *and* keeps the small airways
  - PEEP can have some negative effects as well
    - Can *worsen hypotension* (the extra pressure in the lungs can decrease venous blood return to the heart)
    - Can *increase Intracranial Pressure*; avoid if possible in head injured patients
    - Can *worsen a pneumothorax*
    - Myth: though it can worsen a pneumothorax, it will not *cause* one, or "blow out a lung". Overinflation from bagging too much *can* cause *barotrauma* and *volutrauma*



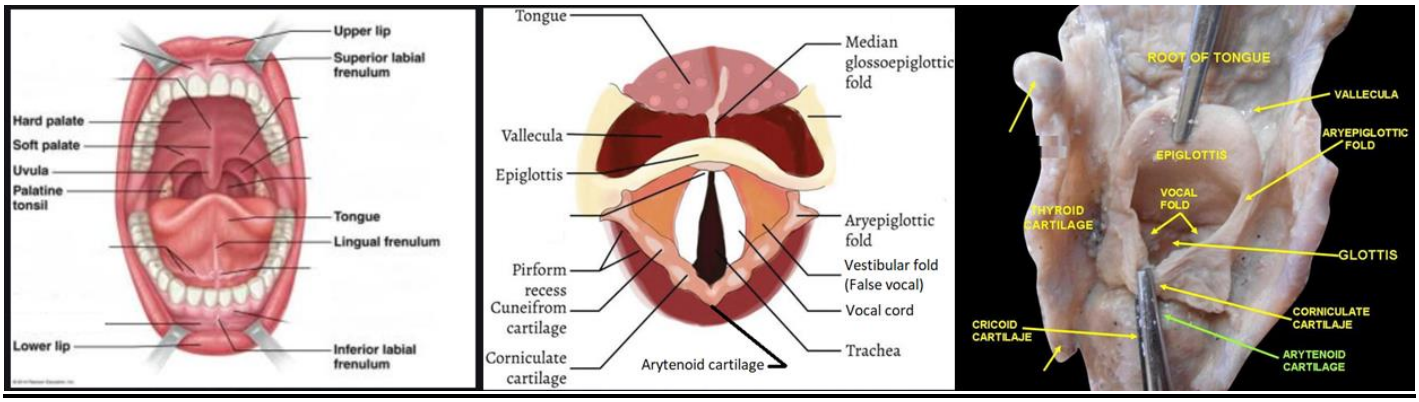
Ventilation **EMR!**

- We can affect ventilation with two variables; **Respiratory Rate** and **Tidal Volume**
- CO2 is a metabolic byproduct of our bodies as we consume oxygen and glucose. The purpose of breathing faster is to get rid of more CO2 from the body so it does not accumulate to toxic levels that cause unresponsiveness and acidosis.
- Sick patients such as *septic* patients and patients in *Diabetic Ketoacidosis* are very *acidotic* from metabolic processes and usually have a high respiratory rate to compensate for this. When these patients are paralyzed for RSA, their respiratory rate drops to *zero* **and you can kill these patients** by making them too acidotic.
- To mitigate this
    - It may be best to *delay* intubating a sick patient with DKA if possible
    - Minimize apneic time by increasing your chance of first past success
    - Match patient's previous ventilatory rate once intubated and then titrate ETCO2 to 35-45





Know your airway anatomy:

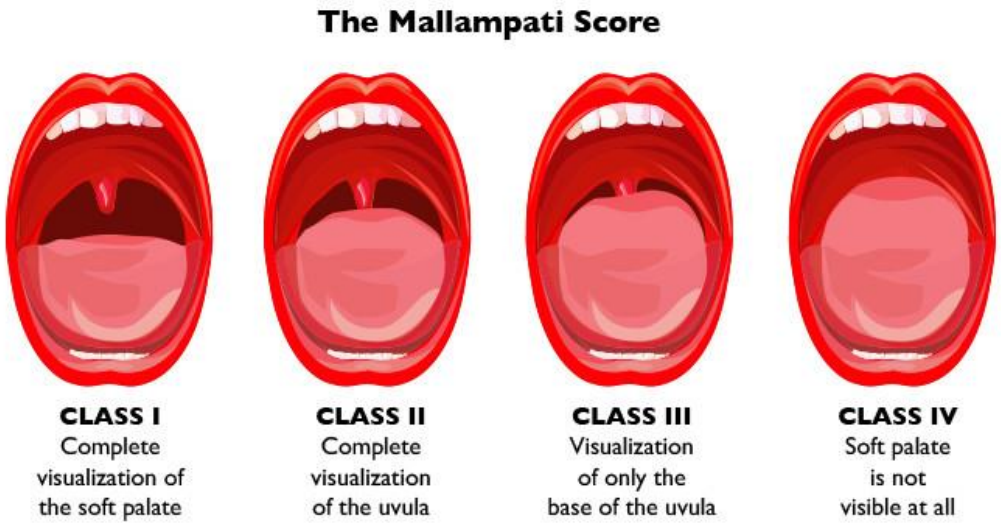


Predicting the Anatomically Difficult Airway:

- An airway assessment should be performed on all patients prior to committing to the performance of any advanced airway procedure.
- Mnemonics are helpful to remember lists but important thing is to understand the concepts of what makes certain procedures difficult to accomplish promptly and effectively
- If you suspect a particularly difficult airway, intubation in the field may be contraindicated. Call medical control and choose the closest emergency department.

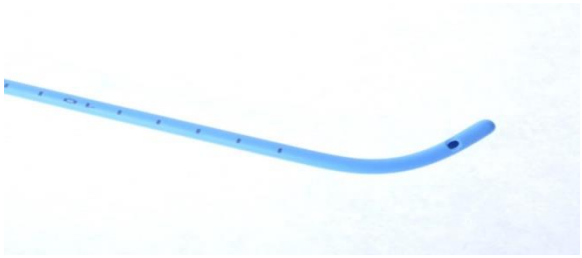
Difficult to Intubate (LEMON) **L**ook **E**valuate (3-3-2) rule **M**allampati score **O**bstruction/**o**besity **N**eck mobility	**Difficult to perform BVM Ventilation (MOANS)** **M**ask seal (facial hair, dentures, small chin) **O**bese **A**dvanced Age **N**o teeth **S**tiff lungs
Difficult to place BAID (RODS) **R**estricted mouth opening **O**bstruction/obesity (above or below larynx) **D**istorted airway **S**tiff lungs	**Difficult to perform Cricothyroidotomy (SHORT)** **S**urgery or **s**car tissue **H**ematoma or infection (note, a rapidly expanding hematoma is still an indication for a definitive airway!) **O**bese **R**adiation **T**umor

A Mallampati score greater than 1 should be considered difficult and video laryngoscopy should be considered over direct visualization method. Defer intubation until after arrival at hospital in patients with score of 3-4 unless clinically necessary due to impending respiratory failure or complete airway occlusion.



Benefits of the **Gum Bougie**:

- Smaller than anticipated airway
- Limited anterior view
- Exchanging ET tube for air leak



What airway and ventilation control challenges do you anticipate in these patients?...

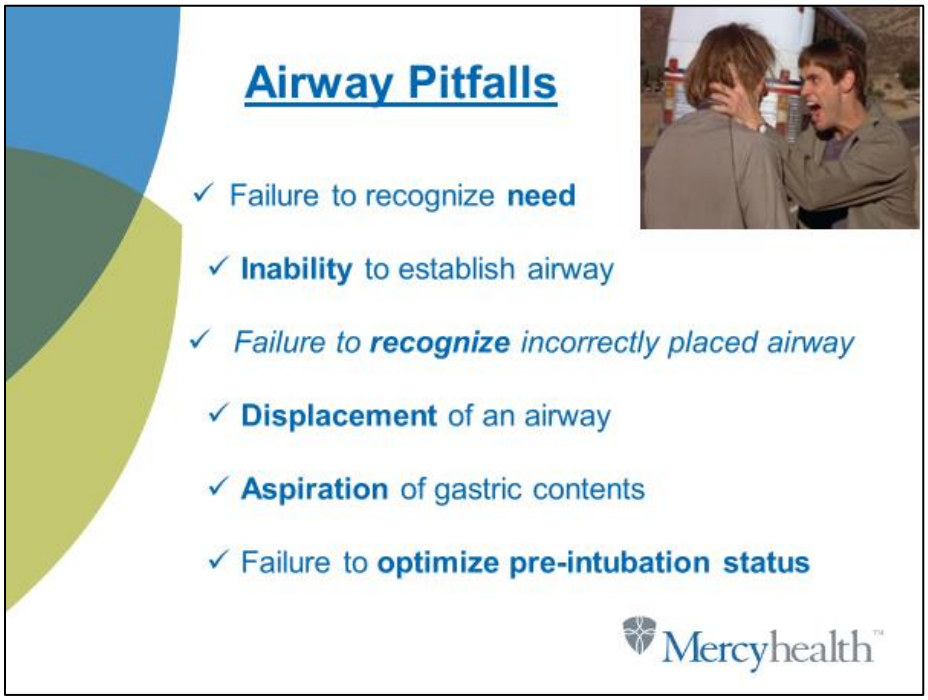
When does a patient need intubation?

Consider the clinical course of the patient (are they getting better or worse)…

- **Altered Mental Status** with need to protect airway - Classically GCS of 8 or less. Think about the cause of altered mental status. If it can be *easily* reversed, such as with glucose or narcan, then mental status may improve rapidly. If the cause is unknown, or there is another obvious cause that *cannot* easily be reversed such as severe head trauma, then the patient likely needs a definitive airway, particularly if there are snoring respirations and patient is not handling secretions.
- **Airway management in a combative patient** - Not all combative patients will need to be intubated, even if Versed or Ketamine is given for dissociation of a violent or combative patient. Chemical restraints and intubation is *never* done as a punitive measure; only for the safety of staff and the patient. If sedated, respiratory rate, and SPO2 should be monitored. If the patient is not protecting their airway, or respirations, oxygenation is inadequate with basic interventions (airway repositioning, supplemental O2) then intubation may be necessary. In a violent patient who suffered head trauma, RSA may facilitate workup (the patient may have to go to CT scan and/or surgery).
- **Persistent Hypoxia** after high-flow O2 - Intubation allows for positive pressure ventilation and delivery of 100% FIO2 as well as PEEP. If a patient is requiring 15lpm by non-rebreather mask to maintain O2 saturation >90% then intubation is likely indicated. However, the patient may benefit from CPAP if COPD or CHF is suspected and could potentially improve without intubation. Sublingual nitroglycerin may also drastically improve a patient with suspected CHF if not hypotensive. This is preferred if possible, especially in a patient with COPD as intubating does nothing to fix the underlying cause.

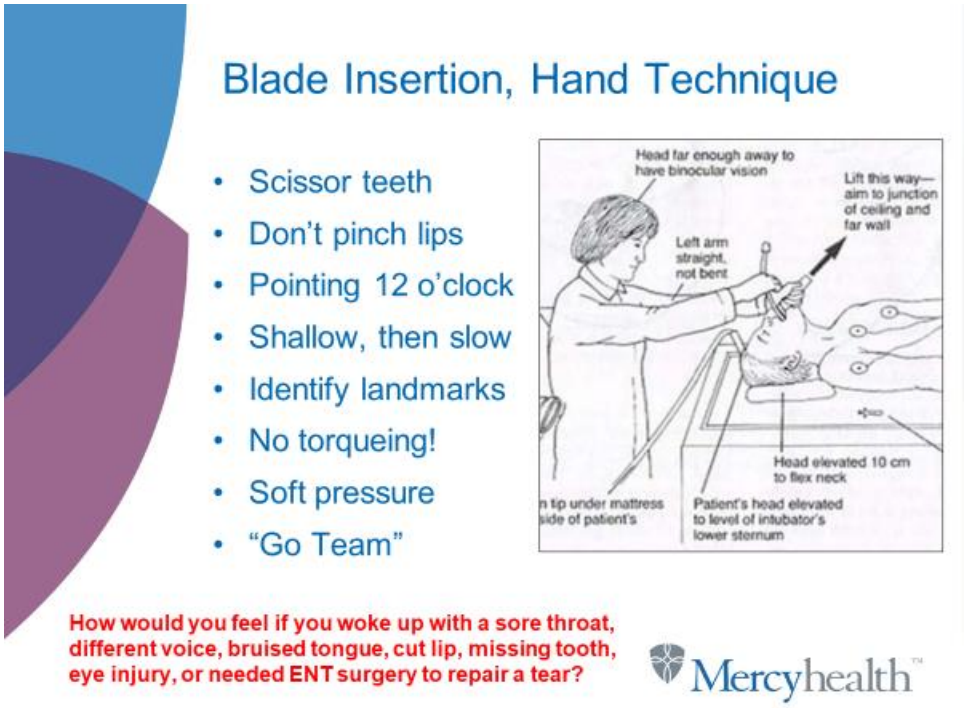
- **Inhalation injury** – superheated air inhaled from exposure to steam, smoke, fire, or chemicals that cause inflammation and/or swelling of the respiratory tract. Patients with potential EXPOSURE who demonstrate ANY MILD signs/symptoms such as sore throat, singed nose hairs, pharyngeal swelling, wheezing, or shortness of breath should be considered for elective intubation.

- **Severe Respiratory Distress or Failure** - Respiratory failure and hypoxia often go hand in hand. Use your gestalt (spidey sense) and look for signs of respiratory distress such as tripoding and retractions, air movement, respiratory rate, and depth. ETCO2 can also be used. If you notice a patient's respiratory rate or depth decrease, with worsening mental status, they are going into respiratory failure. You may also notice that their ECO2 is increasing (as CO2 builds up).
- **Multiple Trauma Patient** - A severely injured patient may require RSI for some of the same reasons mentioned above including hypoxia, inability to protect the airway from altered mental status, respiratory distress, and to expedite the patient's workup in the Emergency Department. Additionally, severe chest trauma causing a flail chest, or threat of imminent airway compromise from massive facial injuries, hemorrhaging into or around the airway, and an expanding neck hematoma are also indications.



Remember to "first do no harm":

- Follow a standard, safe, and cautious approach to insertion of laryngoscope…



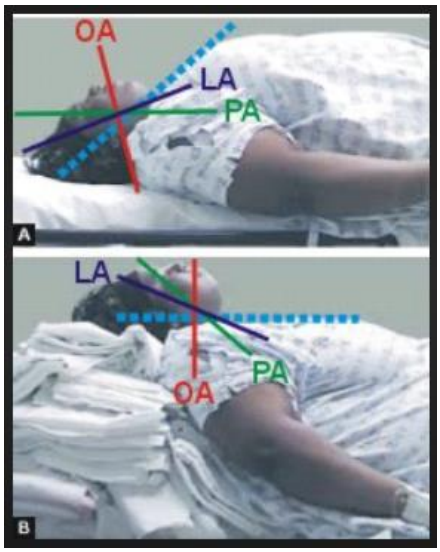
Preparing for Intubation Procedure:

Closed loop communication with personnel **EMR🚑! , EMT🚑! , and AEMT🚑!**

- Providers should be utilized to their highest level
- Leader should assign roles and these should be repeated back

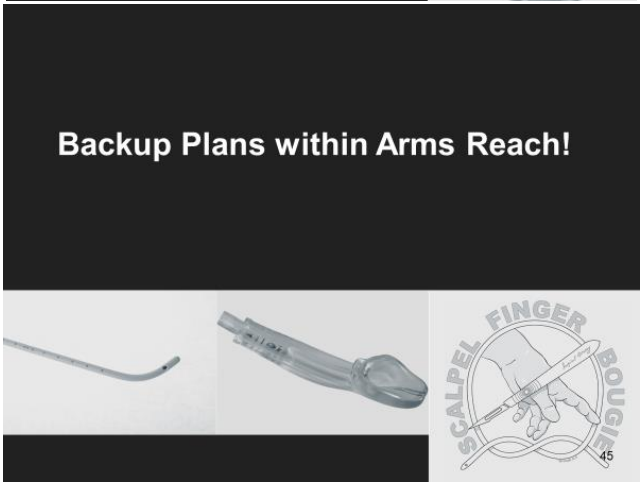
Positioning of the patient **EMR🚑!**

- Head/neck in sniffing position unless c-spine injury is suspected
- Ramping up the chest/shoulders in obese patients



Gather Intubation Equipment:

- Pt connected to monitor with BP, cardiac, Spo2, and EtCO2 in place **EMR!**
- Apply nasal Cannula and non-rebreather vs BVM (depending on adequacy of ventilation) **EMR!**
- Suction, Basic Airway Adjuncts (Oral and Nasal Airways), Supraglottic Airway (King/iGel), ETT securing device, and inline ETCO2 (for endotracheal tube) ready at the patient's head **EMT!**
- Video Laryngoscope, Direct Laryngoscopes, Backup Airways and Devices, Cric Kit, and gum bougie are gathered and checked for proper function and battery supply
- Select, draw up, and label appropriate medications



Pre-intubation Optimization, and Pre-oxygenation

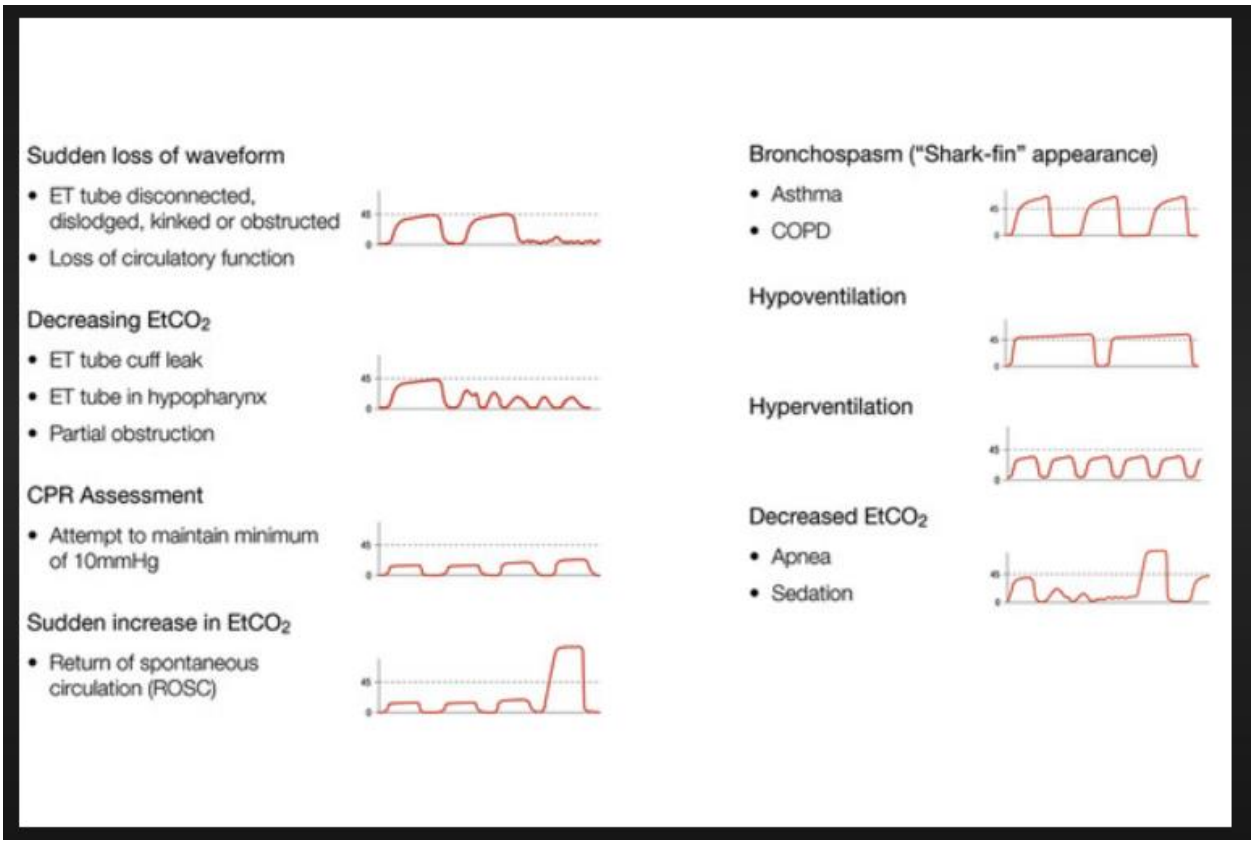
- If COPD or asthmatic, initiate albuterol and atrovent and consider early CPAP **EMT!,**
- If still hypoxic, consider using BVM connected to PEEP valve *in addition* to Nasal Cannula
- Start **two large bore (18g or larger) IVs or IO's**. If patient is hypotensive, initiate 2L NS wide-open (reassess lung sounds often for signs of fluid overload) **A-EMT!**
- If hypotension persists or requires prompt correction, administer pressor infusion or **push-dose epinephrine**

Placement and Confirmation

- Immediate confirmation with in-line ETCO2 is required for all patients with advanced airway (BAID device or intubation)
- Failure to confirm an intubation with ETCO2 will result in immediate suspension of intubation privileges and/or revocation of RSA credentials pending QA review and remediation!

ETCO2 Troubleshooting - Normal PaCO2 *35-45 mmHg*

- Dotted Line = equipment failure (check equipment)
- Solid Line = NOT IN TRACHEA! → Immediately check tube placement, w/ blade or remove, BVM, re-attempt
- "Shark Fin" = Bronchoconstriction → Treat with bronchodilators, mag, solumedrol, nebs, ketamine
- Low ETCo2 = Poor Perfusion or Hyperventilating → Bag slower (6-8 breaths/minute)
- High ETCo2 = Acidosis, CO2 retention → Increase RR (asthma/COPD may require permissive hypercapnia)



Post-intubation Management

- Ensure ET tube is secured immediately! **EMR🚑!**
- Consider C-collar to limit patient head/neck movement which could displace ETT **EMR🚑!**
- Analgosedation - *Think **analgesia** as the first priority of good sedation. Ketamine has analgesic properties but midazolam* does not. *Consider adding fentanyl if midazolam was used. You can be generous with the fentanyl as it does not significantly affect hemodynamics and respirations are controlled.*
- Placement of gastric decompression tube – only performed in unconscious intubated patients by paramedics who have received formal training

- Goals of ventilation management: **EMR🚌!**
    - FiO2 100% O2 initially
    - 5-10 of PEEP or PEEP Valve if bagging and O2 Sat <90%; **follow to >92%**
    - **SpO2 goal 95-99%**
    - Volume **6ml/kg** (adequate chest rise if using BVM)
    - **Normal acid/base: ETCo2 35-45**
    - Match pt's pre-RSA respiratory rate and ensure lower EtCO2 if clinical signs of **metabolic acidosis: EtCO2 25-35**

Rapid Sequence Airway (RSA) is performed in the field by MD1 physicians and RSA-credentialed paramedics

RSA Defined:

What is RSA?

- Rapid Sequence Airway involves a carefully orchestrated series of events to establish a definitive airway first with a *sedative* or *induction* agent and then a *paralytic agent*
- This can be life-saving, but *very dangerous* if not performed with expertise and in the correct patients

Why RSA?

- Creates ideal intubating conditions for a higher rate of *first-pass* success with a lower chance of aspiration and other complications than use of sedation alone
- Paralysis allows for better cervical spine control, control of ventilation, blunting of intracerebral pressure and intraocular pressure, and decreases the chance of airway trauma.

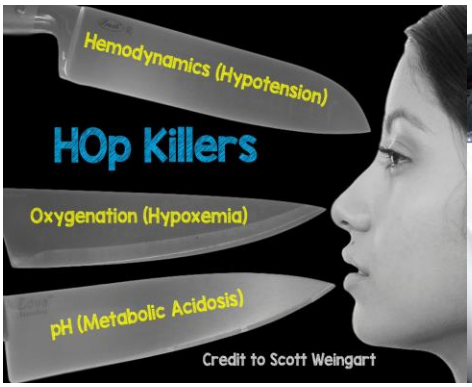
When *shouldn't* we perform RSA?

- Allergy to available RSA meds (e.g. avoid Succinylcholine if history of Malignant hyperthermia)
- Suspected extremely difficult airway (e.g. suspected epiglottitis, severe angioedema, etc)

Predicting the "Physiologically Difficult Airway":

Sedation and/or paralysis can cause harm and even death in patients requiring resuscitation prior to airway control!

- Rushing the preparation including setup or rushing the resuscitation of the patient could mean skipping vital steps, forgetting critical equipment, or causing an under-resuscitated patient to die during an intubation attempt
- Are you ready to take over the body's physiologic control center autopilot which does things like telling them how fast to breath and how much to constrict their blood vessels?



- The medications and mechanics of RSA tend to at least temporarily make blood pressure and oxygen go down, and CO2 (acid) go up. Therefore, if the patient *starts* with low blood pressure, low oxygen levels, and a low pH, RSA ***can worsen and even kill the patient.***
- **Low blood pressure (SBP <90)** is the most significant risk factor for intubation during cardiac arrest **A-EMT🚑!**
    - In a medical, non-trauma patient who does not appear to be in acute pulmonary edema, first run **two liters of Normal Saline wide open through two large bore IV's**.
    - Fluid may not infuse quickly enough, so **vasopressors** might be indicated. This is a good time for ***Push-dose Epinephrine***. At this time, call medical control if you would like to use this option.
    - A good blood pressure goal (in a non-trauma patient) would be 120-140 systolic prior to initiating RSI.
- **Hypoxia** is also a risk factor for cardiac arrest during intubation. Once O2 sat is below 88%, rapid desaturation can occur "*falling off the curve"* resulting in bradycardia and then cardiac arrest. A nonrebreather mask (NRB) at 15lpm may only be providing 60-70% inhaled oxygen (not enough)! The goal is not *only* to raise the oxygen level, but replace the nitrogen in the lungs with 100% oxygen (a reservoir of oxygen for when the patient is apneic). **EMR🚑!**
    - This can be mitigated by good pre-oxygenation with **25lpm NRB *and* 15lpm NC for 3-5 minutes**
    - *Maintain the nasal cannula during intubation at 15lpm even after paralysis* **(apneic oxygenation)**.
    - Consider CPAP if not contraindicated, and **consider PEEP valve on BVM** once induced if you cannot improve O2 sats >90% **EMT🚑!**
- **Acidosis** is bad for cardiac function and can cause cardiac arrest. Time spent *not* breathing lead to increased CO2 (acid) buildup.
    - Minimize apnea time by maximizing your chance of first pass success
    - Match pre-intubation respiratory rate after intubation and then titrate to ETCO2

Sedation & Paralysis:

*****A sedative medication should always be administered prior to a paralytic so that adequate sedation can be achieved. IV and IO routes are much preferred and IM should be considered only a last resort backup**

Sedatives - goal is to make the procedure humane by inducing unconsciousness and amnesia. Pain control is also important.

Ketamine

- Special Properties
    - A very unique medication, technically a ***dissociative anesthetic***
    - Provides ***analgesia*** in addition to sedation
    - ***Maintains airway reflexes*** (so patient keeps breathing under most circumstances)
    - Typically ***increases*** blood pressure and heart rate through *sympathomimetic* effects (good for most hypotension, but bad for cardiac problems)
    - ***Bronchodilator*** effects
- Dosing
    - **2mg/kg IV/IO** (typically 200mg)
        - Onset 30-60 seconds
        - Duration approx 30 minutes

        - 5mg/kg IM (typically 500mg)
            - Onset 1-4 min
            - Duration Approx 30 min
- Caution and Contraindications
    - Can increase **airway secretions**
    - Increased HR and BP **can increase cardiac demand** (contraindicated if suspected ischemia or heart failure)
    - **Emergence phenomenon** is uncommon but can be distressing - can be managed with benzodiazepines or re-dosing medication (½ initial dose)
    - Pregnancy **category C**
    - Possible **laryngospasm** (rare) but more common with less than 3 months of age
    - **Breath holding** can occur if medication is pushed quickly

Midazolam (brand name Versed)

- Special Properties
    - Benzodiazepine (sedative hypnotic) and possesses *amnestic* properties
    - Preferred first-line agent in ***status epilepticus***
    - Preferred if ***cardiac ischemia*** is suspected
    - Does *not* possess analgesic properties
- Dosing
    - 0.1mg/kg IV/IO (max 5mg bolus)
        - Onset 1-2 min
        - Duration 45 min
    - 0.2mg/kg IM (max 10mg bolus)
        - Onset 5 min
        - Duration 60 min
- Cautions and Considerations
    - Pregnancy Category D
    - Re-dosing may be necessary especially if the patient was intubated for status epilepticus
    - May result in hypotension and/or apnea

Paralytics - *after adequate sedation is achieved, the patient is paralyzed to achieve optimal intubation conditions. There are two main types; depolarizing vs nondepolarizing*. *Mercy protocols primarily use succinylcholine which is a depolarizing paralytic (neuromuscular blocker). This will result in fasciculations (muscle twitching), though these may not always be obvious.*

- Advantages
    - Relaxes oropharyngeal muscles and jaw
    - Higher first-pass success for tube placement
    - Lower risk of aspiration and airway trauma
    - Can allow for lower dose of sedative, and therefore better hemodynamic stability
- Disadvantages
    - Causes apnea!
    - Possible oropharyngeal soft tissue collapse which can sometimes worsen view

Succinylcholine

- Special Properties and mechanism
    - Depolarizing neuromuscular blocker.
    - Non-competitively binds to Acetylcholine receptors and causes a membrane depolarization (resulting in **fasciculations**)

- Dosing
    - **2mg/kg IV/IO** (max dose 200mg)
        - Onset 60 seconds
        - Duration 3-5 min
    - Same dosing for IM - *unreliable absorption and effect, emergency backup only*
        - Onset 3-5 min
        - Duration 10-20 min
- Cautions and considerations
    - **Avoid re-dosing for prolonged paralysis**. If redosing is required, have atropine ready (can cause bradycardia)
    - Contraindicated in patients with history of **Malignant Hyperthermia***, anaphylactic reaction, or penetrating eye injury
    - Should not be given under age 2
    - Can cause a **temporary rise in potassium levels** (caution with crush injury, hemodialysis patients, burns > 72 hrs, elderly or chronically debilitated patients (neuromuscular disorders)
    - Pseudocholinesterase deficiency can prolong action of succinylcholine
    - Should be refrigerated; but only 10% degradation at 90 days (Merlin et al 2010)

******Malignant hyperthermia** is a very rare genetic disorder (about 1:50,000). It can cause hyperthermia, increased muscle tone (rigidity). You may see elevated ETCO2 from increased CO2 production. Untreated, death rate is as high as 70%. It's not an anaphylactic reaction. If you suspect it, manage the airway, cool the patient, and notify the receiving hospital of your suspicion, and call medical control.*

Post-Intubation Sedation Medications and Dosing

- May **re-dose with ketamine** (½ initial dose, q10 minutes as needed)
- If RSA performed with midazolam, then **add fentanyl for *analgosedation*** and re-dose versed as needed, ½ initial dose
    - Fentanyl dosing: 100 mcg every 5 minutes as needed up to 300 mcg
- If intubated for *status epilepticus*, assume continued seizures even if paralyzed, and re-dose versed every 5 minutes

Long Term Paralysis - *Ideally is* not *required if patient receives adequate sedation. However, some patients are extremely difficult to sedate and paralysis may be necessary to prevent harm, and may be useful in difficult to ventilate patients such as severe COPD or Asthma*

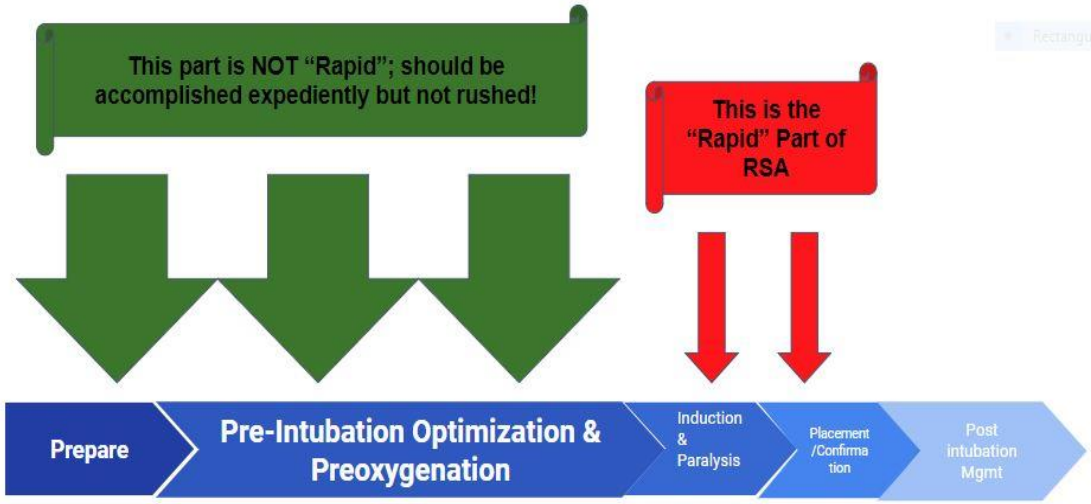
Vecuronium

- A *nondepolarizing* neuromuscular blocker
- Dosing 0.1mg/kg IV/IO Max of 10mg
    - Duration ~30 minutes
    - Reconstitute with normal saline
- Special Considerations
    - Do not give to children under 2 years of age

RSA Quick Overview

Indications and Contraindications - *Remember, assume all airways are difficult, but if you anticipate a very difficult airway, consider temporizing the patient and diverting to the closest Emergency Department because field intubation might be contraindicated.*

- **Indications** - Severe respiratory distress, persistent hypoxia despite high flow O2, altered mental status with need to protect the airway, airway compromise in the multi-trauma patient.
- **Contraindications -** Allergy to RSA medications, suspected epiglottitis, suspected very difficult airway, pediatrics and bariatrics (relative contraindication), COPD or Asthma (try all other aggressive measures first)



Preparation and Pre-Intubation Optimization and Preoxygenation

- Gather adequate staff, IV, O2, Cardiac Monitor, SPo2, ETCo2 **EMT!**, **A-EMT!**
- **Assume all airways are difficult** and have backup airways nearby - think **"mise en place"** and arrange all of your equipment before administering sedation and paralysis
- **Resuscitate your patient first!** Remember the *HOP killers* (Hypotension, Oxygenation, and pH (acidosis)
- All patients being prepped for RSA (unless on CPAP) should get **Non Rebreather Mask at 25lpm *and* Nasal Canula at 15lpm *at the same time*** for 3-5 minutes **EMT!**
- *Do not* remove nasal cannula during intubation! (**apneic oxygenation)**
- **Hypotension should be treated with two large bore IVs** (18g or larger) with fluids WIDE OPEN **A-EMT!**
- Consider starting **vasopressors** for hypotension because fluids may not infuse fast enough. Call medical control and consider *push-dose-epi*. Blood pressure should be >120 systolic before intubation
- Remember to ***match your patient's ventilatory rate*** prior to intubation and titrate to ETCo2 **EMT!**

Sedation- Allows a humane procedure causing unconsciousness and

Agent	Dose	Cautions and Contraindications	Special Considerations
Ketamine	**2mg/kg** IV/IO (typical adult 200mg), or **5mg/kg** IM (typical adult 500mg)	Contraindicated with CAD, CHF, suspected cardiac ischemia. Can cause laryngospasm especially in infants under 3 months	First choice for most patients in the field. Maintains airway reflexes (patients keep breathing), provides *pain* control, and bronchodilation
Versed	**0.1mg/kg IV/IO** (max 5mg bolus), **0.2mg/kg IM** (max 10mg bolus)	Cardiorespiratory depressant	Does not include pain control. Can have variable efficacy if patients are tolerant to benzodiazepines. Preferred as first line for seizures, status epilepticus.

Paralysis - After sufficient sedation is achieved and all backup airways and contingency plans are in place. This allows for the best intubating conditions to achieve first pass success

Agent	Dose	Contraindications	Special Considerations
Succinylcholine	**2mg/kg** IV/IO/IM (max 200mg)	Known Malignant Hyperthermia	Short acting, depolarizing (causes fasciculations)
Vecuronium	**0.1mg/kg** IV/IO (max 10mg)	Known allergy, age <2	Primarily used if necessary for long term paralysis *if needed* for oxygenation and ventilation *after* adequate sedation

Placement & Confirmation

- Increase chances of first pass success with:
  - **Sniffing** position **EMT!**
  - Laryngeal Manipulation **"BURP" maneuver** **EMT!**
  - Consider **Bougie** if using Direct Laryngoscopy
  - Extending safe apnea time with **apneic oxygenation** (Nasal cannula left on at 15lpm the whole time!) **EMT!**
- Inflate balloon & confirm *immediately* with **waveform capnography** **EMT!**

Post intubation management

- **Secure** Tube! **EMT!**
- Provide Post-Intubation **Sedation** - *remember that while Ketamine is both an analgesic (pain control) and sedative, versed does not have pain control properties.*

Agent	Dose	Contraindications	Special Considerations
Ketamine	½ induction dose every 10 minutes as necessary	Same as above	Preferred in hypotension
Versed	½ induction dose	hypotension	Can cause hypotension. Repeat dose if seizures suspected
Fentanyl	100 mcg q5 min as needed up to 300mcg	allergy	Useful in hypotension; also consider use if only Versed was used for induction (to add pain control)
Vecuronium	**0.1mg/kg** IV/IO (max 10mg)	allergy	Should only be used if necessary *after* aggressive adequate sedation.

- Continued **Monitoring**
- **Titrate ETCO2** to 35-45