Mechanical Ventilation 101
Shamelessly plagiarized by Jon Snider

Escalation of oxygen delivery:
- Nasal cannula (up to 6L) → Facemask (up to 10L) → Non-rebreather (up to 100%) → Is patient DNI? → Bipap (conscious patient, must be in ICU) → intubation (ICU) → ECMO? → 
- Good rule of thumb: if patient EVER complaints of SOB or desats, get an ABG.

When to consider intubation:
- Respiratory distress/arrest (tachypnea, fatigue, “wearing out”)  
- Hypoxia/hypoxemia/hypercarbia/acidosis refractory to more conservative means  
- Airway protection (reduced consciousness, loss of gag reflex/cough, bleeding into airway, etc)

Modes of Ventilation:
1. Volume control: You set amount of volume  
   a) Assist Control: Set minimum #/volume of breaths → If pt exceeds minimum, machine sets volume of extras.  
   b) SIMV: Set minimum #/volume of breaths → If pt exceeds minimum, machine not set volume extras (not help).  
   c) Pressure support: NO SET # OR VOLUME → ONLY ENHANCES pt’s own breaths; pt must breath on own

2. Pressure control: You set amount of pressure.

Good starting settings (rule of 10’s):
- Mode: Assist Control  
- RR: 10  
- Tidal volume: 10 cc/kg (based on ideal body weight)  
- FIO2: 100% (titrate down quickly as tolerated)  
- PEEP: 5  
- NOTE: these rule-of-thumb settings may vary, depending on disease state (ARDS, etc).

How to present settings on rounds:
- Mode/RR/TV/PEEP/FIO2  
- Ex) VC/ 12/ 350/ 5 / 100%

To correct Hypoxia: Increase PEEP, FIO2, and oxygen delivery (Hgb, etc)  
To correct Hypercapnia: Increase Tidal volume, respiratory rate.

Monitoring/management while on vent:
- Daily portable chest xray (complications, tube placement), daily ABGs, frequent suctioning/respiratory care  
- Daily weaning trials/sedation holidays to assess progress.

Potential Side Effects:
- Hypotension (increased pressure impairs cardiac venous return)  
- Pneumothorax (from increased barotraumas)  
- Infections (VAP, etc)  
- Oxygen toxicity  
- Trachial/laryngeal damage (tracheomalacia), vocal cord damage, airway trauma  
- GI stress ulcers (give PPI’s if intubated)  
- Deconditioning.  
- Potential psychological (agitation/anxiety) and cognitive side effects.

- BUT REMEMBER, it is (arguably) always better to be breathing with complications, than NOT breathing without complications.
**When to try weaning patient off vent:**

- Predictors of success: RR < 35, Minute ventilation (RR x TV) < 10L/min, RR/TV < 100, TV > 5 cc/kg, FIO2 < 50%, PEEP 5-8, clear mental status/follows commands/cooperates, hemodynamically stable, resolved underlying disease process that got them intubated, minimal secretions, strong cough/gag, no upcoming major procedures/tests.
- To do a weaning trial, first trial pressure support, then spontaneous breathing trial for at least a few hours.

**Wean trial fail:**

- Hypoxia, tachycardia/bradycardia, hyper/hypotension, tachypnea/increased RR, decreased TV, no air leak around tube cuff when deflated (suggests airway swelling)
- It is better to fail a weaning trial and try again tomorrow, then extubate too early and need to re-intubate.

**Pop quiz, hot shot:** Patient on the ventilator starts acutely crumping. What are two extremely helpful vent values NOT MENTIONED HERE to narrow down the cause, and how do you interpret them?? Tune in next time for Ventilation 201…