Hypoxia
2/12/17

ED Hypoxia =

- <94% SaO2 without lung pathology
- <90% SaO2 with lung pathology

*If the patient is hypoxic, then they need oxygen administration!*

Attempt least invasive measures first unless patient is doing really poorly.

**Approach to O2 administration:**

1. **Nasal cannula (NC):** Titrate from 1-6L/min (~24%-44% FiO2). Usually start at 2L/min.
2. **Venturi mask** ('venti mask')
   - Has a bag of colorful adaptors, swap them to change FiO2 with O2 flow adjustment
   - Try 10L/min (red adaptor; 40% FiO2) or 15L/min (green adaptor; 60% FiO2)
3. **Non-rebreather mask (NRB)** = 100% FiO2 (the one with a floppy bag on it) and needs >15L/min O2 flow to work properly
4. **BPAP and CPAP** (NPPV = non-invasive positive pressure ventilation): 21% - 100% FiO2
   - Adds positive pressure -> CPAP: P insp = P exp ...
   - BiPAP: P insp > P exp
   - Use often in patients with COPD or CHF. Decreases work of breathing and increases ventilation (PEEP helps keeps alveoli open)
   - Aspiration risk if pt not awake
5. **Intubation:** for patients that fail attempts at other devices or are doing really poorly

**Quick Facts**

- FiO2 = fraction of inspired oxygen, atmospheric (room air) is 21% at sea level.
- Increase oxygen administration by increasing FiO2.
- **Hyperoxia is bad and can kill people. It's a bad idea to put oxygen on pts having MI/severe illness if they are not hypoxic! Further reading in references below.**
- **FiO2 for NC is roughly atmospheric oxygen (21%) + 4% per liter.** Using 20% makes easy math, and it’s an estimate anyways =) So 2L is equivalent to about 28% FiO2.
- Ask a nurse/MD: where is a venti, NRB, bag mask and how do I use them + set them up?
References

- Retrospective US study. Patients with hyperoxia (PaO2 ≥300 mm Hg) had significantly higher in-hospital mortality (63%) compared with the normoxia group (45%) and the hypoxia group (57%). Hyperoxia = bad.
  
  
  https://jamanetwork.com/journals/jama/fullarticle/185969

- Retrospective Australian study that controlled for confounders. Hyperoxia = no difference

  
  https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3219350/

- Meta-analysis of animal trials. Hyperoxia = bad

  

- Randomized prospective trial. Hyperoxia during STEMI = more recurrent MI/dysrhythmias. Hyperoxia = bad

  
  http://circ.ahajournals.org/content/131/24/2143

- Effect of conservative versus conventional oxygen therapy in ICU. Hyperoxia = bad.

  
  https://jamanetwork.com/journals/jama/fullarticle/2565306