Continuous Positive Airway Pressure (CPAP)

Indications and Use in the Prehospital Field
CPAP in Two Slides, Part 1

- CPAP provides support to a patient in respiratory distress **but**:
  - Does not replace a bag-valve mask
  - Does not replace intubation
With pulmonary edema, CPAP provides pressure which splints open the patient’s lungs:

- During inspiration and expiration, and;
- Can literally push fluid out of the lungs, and;
- Increase the surface area in lungs for gas exchange
Surfactant

- Not all of the alveoli are used when taking a breath
- Surfactant is a lubricant to enable equal use
- Pulmonary edema washes away surfactant
  - This reduces the ability to properly breathe
Causes of Pulmonary Edema

- Congestive Heart Failure
  - Poor compliance with meds (Lasix)
  - Increased sodium diet (Holiday failure)

- Acute Myocardial Infarction

- Dysrhythmias (Atrial Fibrillation)

- Pregnancy
How CPAP Works

- Step One: The patient exhibits signs & symptoms warranting CPAP
- Step Two: The CPAP mask is applied to the face and strapped into place
- Step Three: This creates a pressurized closed circuit
Higher Pressure Will

- Splint open the alveoli so the muscles do not have to work as hard

- Open up more lung tissue to create better gas exchange

- Begin to push unneeded fluid out of lung space
CPAP Candidate History

- Prolonged respiratory distress
- History of CHF or similar ailment
- Takes Lasix (furosemide), Digoxin, or similar med
- Needs more than one pillow to sleep
- Could be an ex-smoker, maybe on home O₂
CPAP Candidate Indications

- Adult patient
- Shortness of breath, hypoxemia
- Awake or responsive to verbal stimuli
- Able to obey simple commands
- Able to maintain their own airway
CPAP Contraindications

- Inadequate respiratory drive
- Cardiac/Respiratory arrest
- Unresponsive or responding only to painful stimuli
- Inability to maintain their own airway
- Inability to follow simple commands
- Major trauma (especially head trauma)
- Vomiting
CPAP Contraindications

- Suspicion of pneumothorax
- Facial anomalies (e.g. burns, fractures)
- Active GI bleed
CPAP Relative Contraindications

- History of pulmonary fibrosis
- Systolic BP <100 mmHg
- Do not apply CPAP if you suspect the problem is Asthma or COPD
  - Treat with bronchodilators first
  - If pulmonary edema is discovered, then treat with CPAP
Adverse Effects from CPAP

- Barotrauma
- Aspiration
- Skin abrasions
- Sinus pressure
- Decreased cardiac output
- Conjunctivitis
- Air-Trapping
- Gastric distension
- General to profound discomfort
CPAP is an Intensive Procedure

- The patient needs to be coached, reassured, and continually reassessed

- You cannot simply place the mask on the patient’s face
Always Remember

- By the time 911 is called, your patient has been struggling for a while

- Most CHF patients know what it is like to be intubated \(\rightarrow\) And they don’t like it

- A mask can induce the feeling of a smothering effect
CPAP Coaching

- Tell your patient about CPAP and what will happen at each step
- Tell them that this device may help prevent them from being intubated
- “Try CPAP for five minutes” as a “compromise”
Equipment

- Corrugated tubing
- PEEP Valve
- PEEP Gauge
- O₂ Tubing
- O₂ Reservoir
- O₂ Flow rate /PEEP control
- PEEP control
- Venturi Knob
Equipment

Positive Pressure Face Mask (3 Sizes)

Harness
Adjust PEEP to 5 - 10 cm H$_2$O
Reassess

- $\text{SaO}_2$
- Respiratory Rate
- Breath Sounds
- Airway Pressure Gauge
- Blood Pressure
- Mental Status
- EKG
- ETCO$_2$ (if available)
Stable or Improving Patient

- Continue CPAP and continue to follow NH Patient Care Protocols
If the Patient Deteriorates

- Discontinue CPAP

- Bag-Valve Mask
  - OP or NP Airway

- Establish patent airway