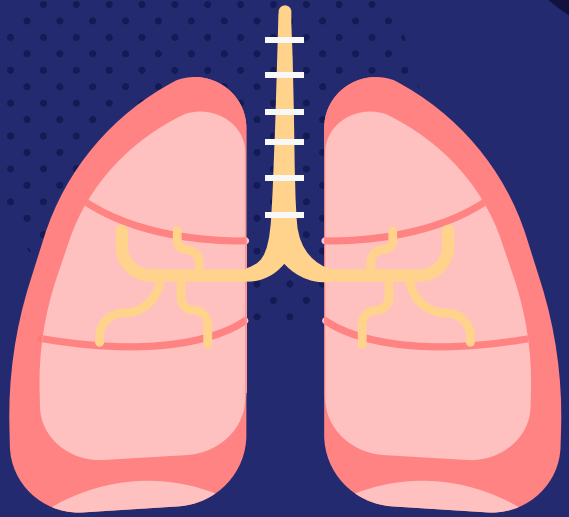


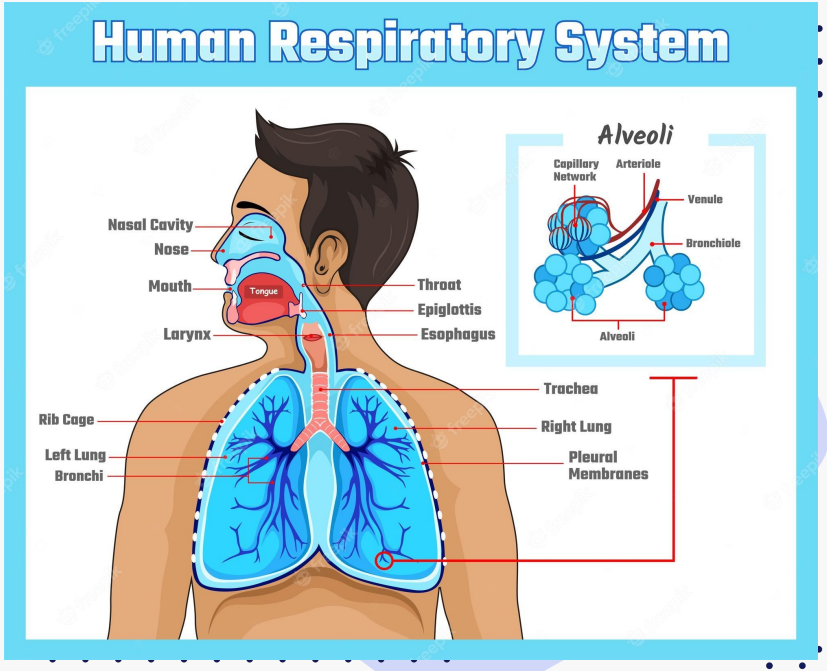
Respiratory Emergencies

By: Marissa Carrillo, Cassidy Choi, Samuel Guo, Kira Holman, David Pilling, Brea Bremer, and FTO Van :)

Respirator y Anatomy

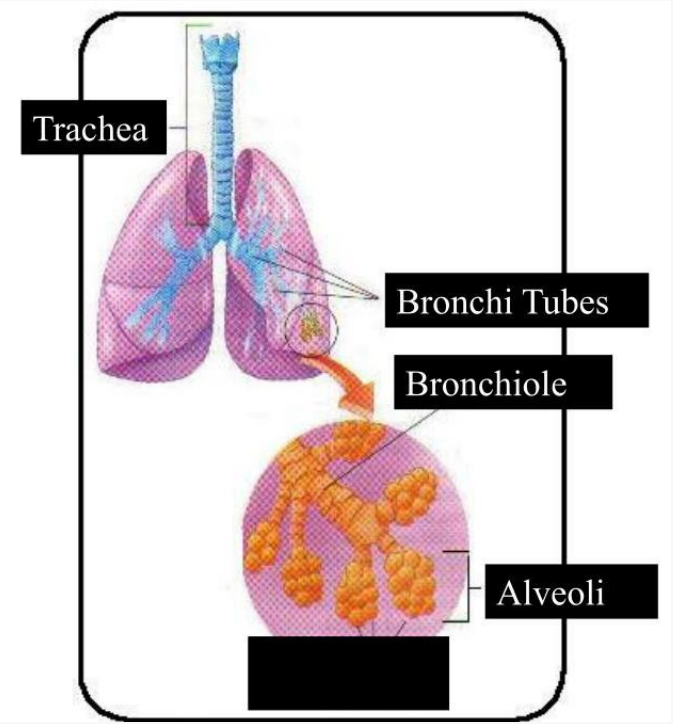
Upper Respiratory Anatomy

- Mouth and Nose
  - Lead to naso- and oro-pharynx
- Epiglottis
    - Small flap that covers trachea
- Larynx (voicebox)
- Trachea (windpipe)
- Esophagus
  - For swallowing



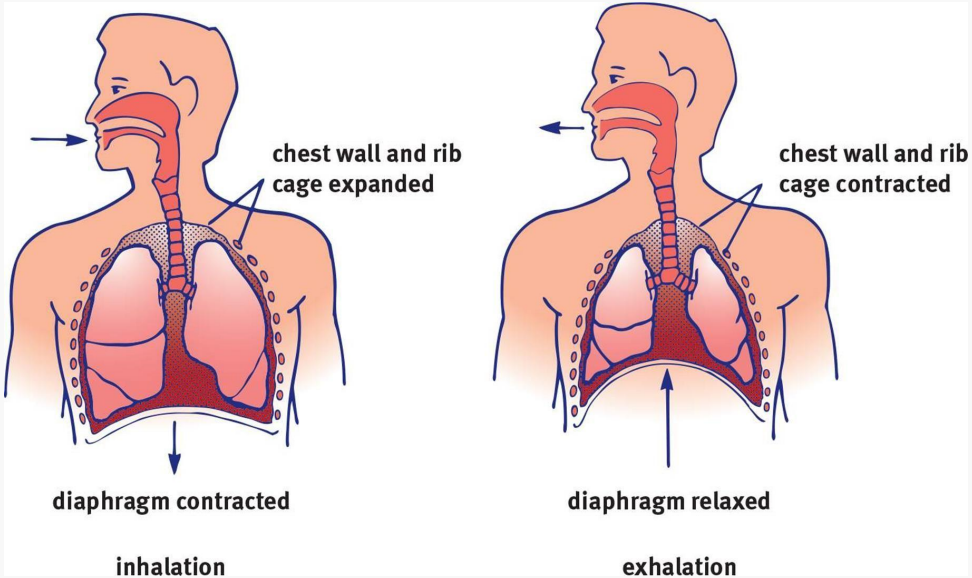
Lower Respiratory Anatomy

- Trachea goes to 2 lungs
- Lung Passageways
  - Bronchi - 1 big one for each lung
    - Secondary and Tertiary
    - Lined with cartilage
  - Bronchioles
    - Many little ones in each lung
    - Connect to Alveoli
  - Alveoli
    - Facilitate o2 and Co2 exchange to capillaries
- Pleural sac
  - Visceral - inner layer covers lungs
  - Parietal - Outer layer lines thoracic cavity
- Diaphragm



Physiology of Breathing

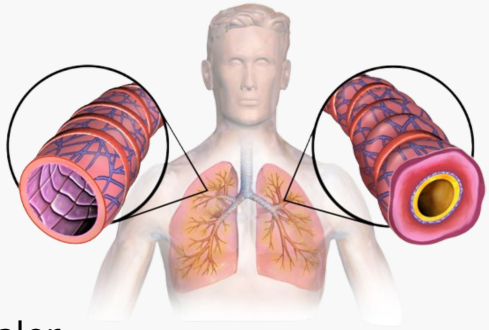
- Diaphragm expands down to create negative pressure
- This pulls the lungs down to pull air in
- O2 flows through the bronchi, bronchioles, and eventually alveoli
- In the alveoli, O2 gets transferred to the blood flow
- Oxygenated blood flows out, bringing O2 into the rest of the body



Common Respiratory Emergencies

Asthma

Chronic inflammatory disease of the airways. Triggered by allergies, exercise, stress, infections



Signs and Symptoms

- Wheezing (especially on exhalation)
- Dyspnea (shortness of breath)
- Coughing (often worse at night)
- Accessory muscle use / tripod position
- Anxiety

Treatment

- Ensure ABCs & oxygen as needed
  - Cannula, NRB, CPAP
- Assist with prescribed inhaler (albuterol) if available
- Calm/reassure patient, reduce triggers
- Rapid transport if severe (Airway loss/compromise = emergency)

Anaphylaxis

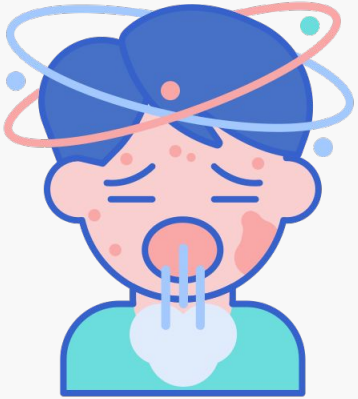
Severe, life-threatening allergic reaction. Rapid onset after exposure to allergen (food, insect sting, meds, etc.)

Signs and Symptoms

- Skin: hives, itching, flushing, swelling (angioedema)
- Respiratory: stridor, wheezing, airway swelling
- Cardiovascular: hypotension, tachycardia, shock
- GI: nausea, vomiting, abdominal pain
- Sense of doom

Treatment

- Immediate: Assist in epinephrine administration
- High-flow oxygen
- Assist with additional meds if prescribed (antihistamines, inhalers)
- Rapid transport + ALS intercept if possible
- Be ready for airway management and CPR



COPD

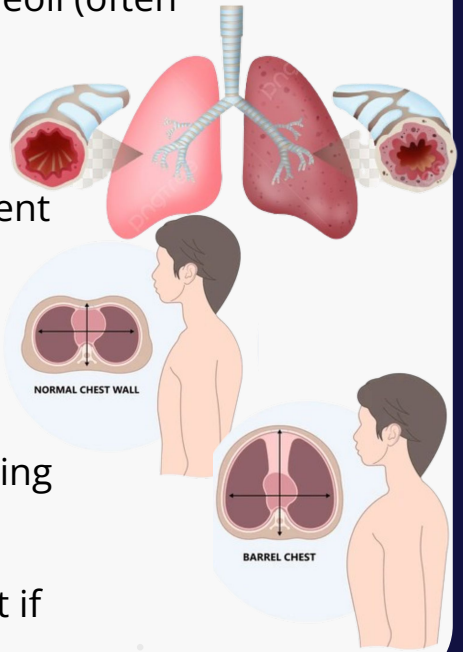
Umbrella term f chronic, progressive pulmonary disease (ie emphysema + chronic bronchitis); Long-term damage to airways & alveoli (often smoking-related)

Signs and Symptoms

- Chronic cough & sputum production
- Dyspnea on exertion = at rest as disease progresses
- Wheezing, prolonged expiration
- Barrel chest, pursed-lip breathing
- Low SpO_2 baseline, cyanosis
- Anxiety, fatigue

Treatment

- Supportive airway management
  - Cannula, NRB, CPAP
- Oxygen (*cautious* if hypoxic, bring to SpO_2 88–92%)
- Assist with prescribed inhaler/nebulizer if available
- Position of comfort, likely sitting upright
- Prepare for possible deterioration; rapid transport if severe



Emphysema

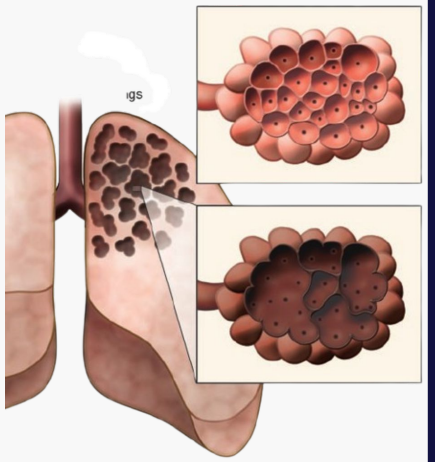
Type of COPD resulting in destruction of alveoli. Loss of lung elasticity creates poor gas exchange, and is strongly linked to long-term smoking.

Signs and Symptoms

- Progressive dyspnea (especially on exertion)
- Barrel chest, thin/cachectic appearance
- Pursed-lip breathing, prolonged expiration
- Diminished breath sounds, wheezing
- Pink skin tone (“pink puffers”) despite hypoxia (hyperventilation)

Treatment

- Position of comfort (often tripod)
- Oxygen (titrate SpO_2 88–92%)
- Assist with prescribed inhaler/nebulizer if available
- Calm, reassure, avoid exertion
- Prepare for deterioration; consider ALS intercept, rapid transport if severe



Chronic Bronchitis

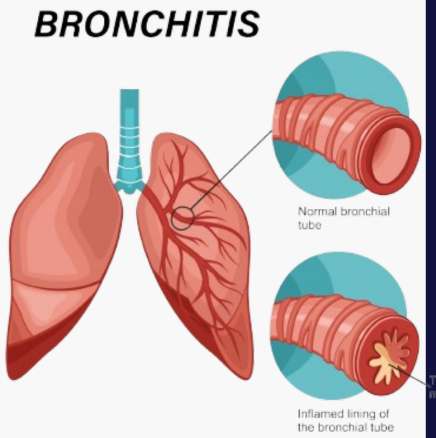
Type of COPD from long-term inflammation of bronchi. Characterized by chronic productive cough ≥3 months-year, but ≥2 years. Often smoking-related

Signs and Symptoms

- Persistent, productive cough (thick mucus)
- Frequent respiratory infections
- Wheezing, rhonchi
- Dyspnea, especially on exertion
- Cyanosis, hypoxia → “blue bloater”
- Edema (cor pulmonale from right heart strain)

Treatment

- Unlike emphysema, the main problem here is airway inflammation + mucus -> obstruction and hypoxia.
- Airway support, position of comfort
- Oxygen (titrate SpO_2 88–92%)
- Assist with prescribed inhaler/nebulizer if available
- Calm, reassure, limit exertion
- Rapid transport if in distress



Obstruction

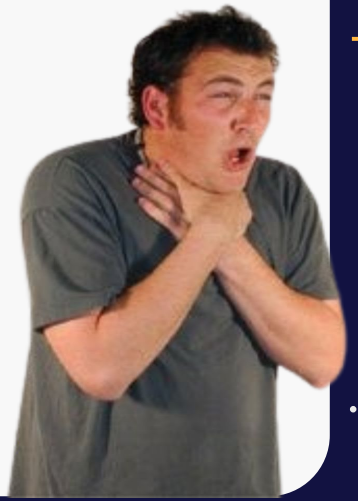
Blockage of airway by foreign object (food, small objects). Can be partial or complete.

Signs and Symptoms

- Partial obstruction: Coughing, gagging, wheezing, stridor
- Complete obstruction: Inability to speak/breathe, cyanosis, panic, unconsciousness
- Grabbing throat (universal sign)

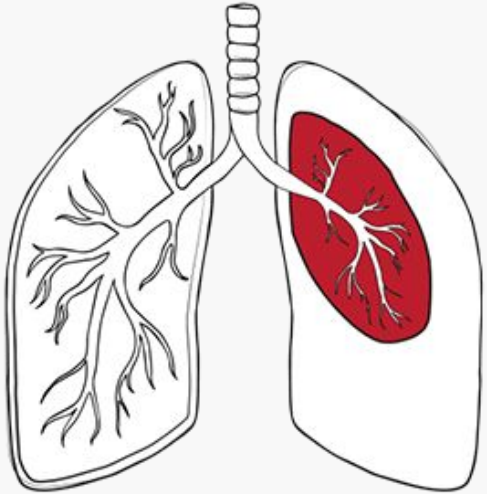
Treatment

- Encourage coughing if partial obstruction
- Heimlich maneuver / abdominal thrusts for complete obstruction in conscious adults
- Back blows/chest thrusts for infants
- CPR (apneic/pulseless) may dislodge object. CHECK!
- Remove visible object if safe
- High-flow O_2 if tolerated
- RAPID transport



Pneumothorax

- ★ What is pneumothorax?
  - Collapsed Lung
  - Air enter space between lung and chest wall
- ★ Indications
  - Sudden onset of sharp stabbing chest pain that worsens with breathing
  - Shortness of breath or difficulty breathing
  - Rapid HR and breathing
  - Cough
  - Cyanosis
  - Decreased SPO2 levels
- ★ Treatment
  - Chest tube insertion
  - Needle aspiration
  - Video Assisted thoracic surgery
  - Hospitalization

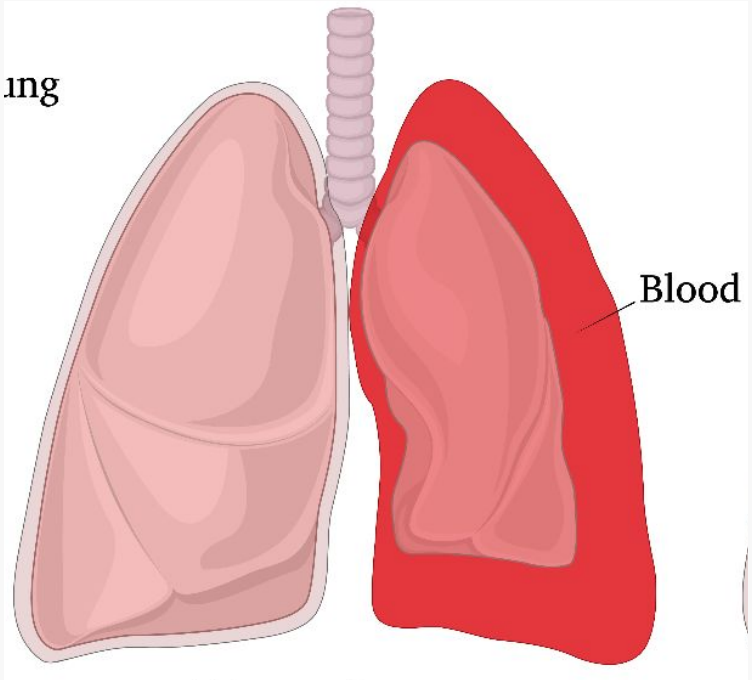


Tension vs Spontaneous Pneumothorax

- ★ **Tension Pneumothorax**
  - A life-threatening condition where air accumulates in the pleural space (between the lung and chest wall) and exerts pressure on the heart and lungs.
  - Trauma
  - Underlying lung disease
- ★ **Spontaneous Pneumothorax**
  - A pneumothorax that occurs without any external trauma or underlying lung disease.
  - Rupture of air sacs in lungs
  - Weakened lung tissue

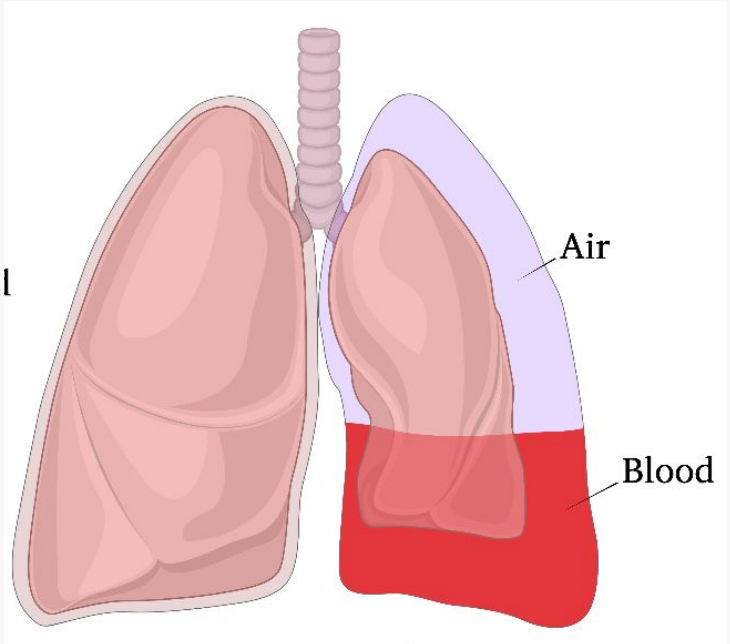
Hemothorax

- **What is hemothorax?**
  - Blood enters your pleural space
- **Indications**
  - Chest pain
  - Shortness of breath or difficulty breathing
  - Cough
  - Dyspnea
  - Hypotension
- **Treatment**
  - Chest tube insertion
  - Observation
  - Surgery



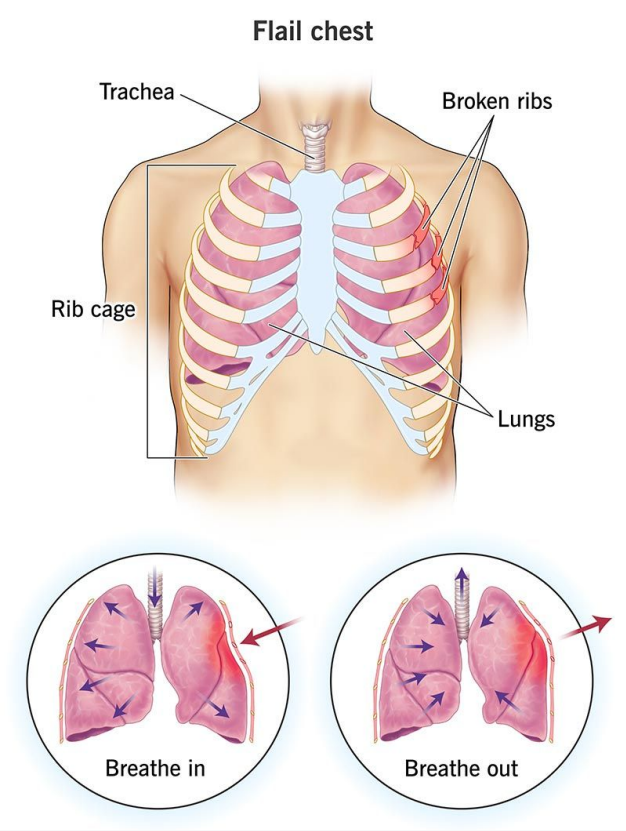
Hemopneumothorax

- ★ **What is hemopneumothorax?**
  - Blood AND air enters your pleural space
- ★ **Indications**
  - Blood loss
  - Lung collapse
  - Shortness of breath
  - Rapid breathing and heart rate
  - Hypotension
  - Fatigue
- ★ **Treatment**
  - Chest tube insertion
  - Needle decompression
  - Surgery



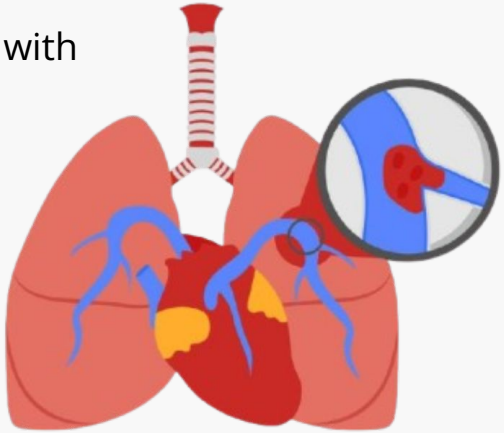
Flail Chest

- ★ What is flail chest?
  - Section of the chest wall to become detached and move paradoxically during breathing usually caused by blunt force trauma
- ★ Indications
  - Severe localized chest pain
  - Chest flailing
  - Difficulty breathing
  - Bruising
  - Tenderness
- ★ Treatment
  - Chest wall stabilization
  - Pain management
  - Breathing support



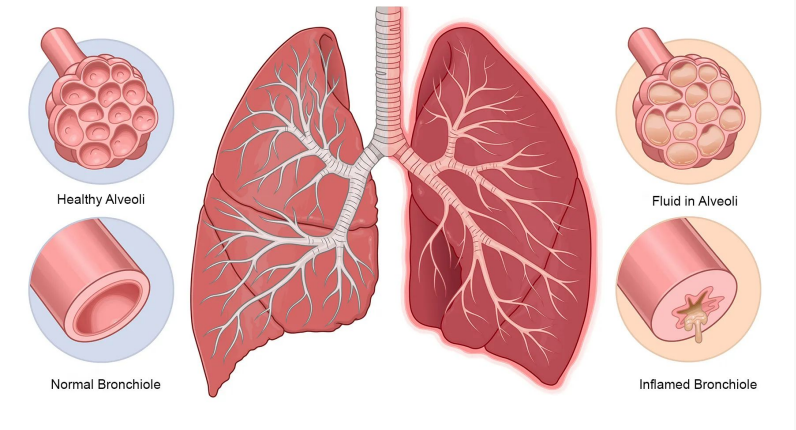
Pulmonary Embolism

- ★ **What is pulmonary embolism?**
  - Blood clot travels from other part of body to pulmonary arteries of lung
- ★ **Indications**
  - Sudden onset of sharp stabbing chest pain that worsens with breathing
  - Shortness of breath or difficulty breathing
  - Rapid HR and breathing
  - Cough may be bloody
  - Leg pain or swelling
- ★ **Treatment**
  - Anticoagulation Therapy
  - Catheter-Directed Thrombolysis:
  - Surgical Intervention
  - Oxygen Therapy

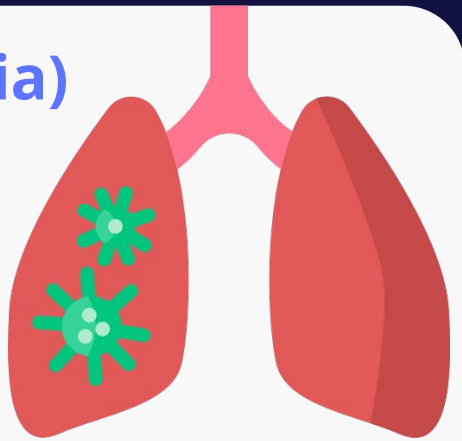


Pneumonia vs..

- ★ What is pneumonia?
  - Infection of the lung that causes inflammation of the air sacks (alveoli)
- ★ Indications
  - Cough with green, yellow or bloody color
  - Fever with chills
  - Shortness of breath or difficulty breathing
  - Fatigue or tiredness
- ★ Treatment
  - Antibiotics
  - Hospitalization



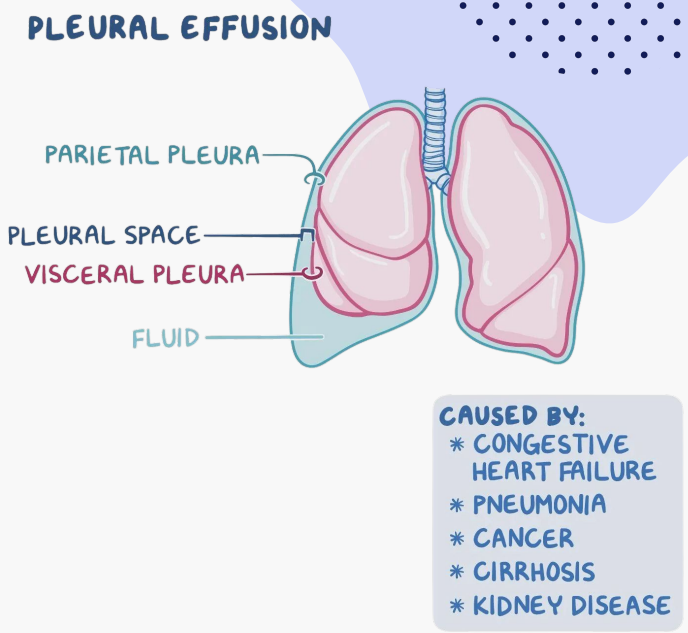
Respiratory Infection (not pneumonia)



- ★ What is respiratory infection?
  - An inflammation of the respiratory system, which includes the nose, throat, windpipe (trachea), and lungs
- ★ Indications
  - Nasal congestion
  - Sore throat
  - Cough
  - Headache
  - Fatigue
  - Hoarse voice
- ★ Treatment
  - Over-the-counter medications
  - Surgery
  - Therapies
  - Lifestyle changes

Pleural Effusion

- ★ What is a pleural effusion?
  - A buildup of fluid between the tissues that line the lungs and the chest
    - This occurs due to poor pumping from the heart or other causes such as inflammation
- ★ Signs and Symptoms
  - Cough
  - Sharp chest pain
  - Dyspnea
- ★ Treatment
  - Antibiotics/Diuretics in hospital
  - Oxygen 95%
  - Transport



Croup versus Epiglottitis + Whooping Cough

- ★ **What is Croup?**
  - A common infection of the upper airway, typically caused by a virus but sometimes by bacteria
- ★ **Indications**
  - Common in children (6 months to four years)
  - Slow onset
  - Low grade fever
  - “Seal-bark” cough
  - Stridor
- ★ **Treatment**
  - Oxygen 94% (humidified is preferred)
  - Transport

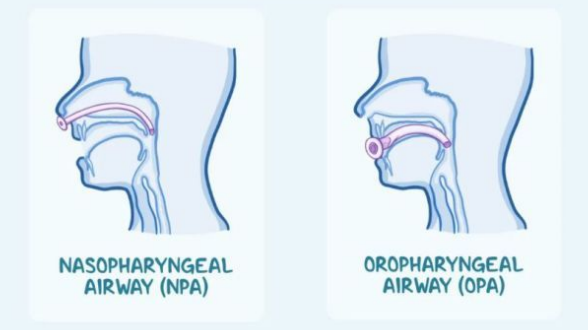
- ★ **What is Epiglottitis?**
  - A condition that resembles croup, it is caused by a bacterial infection that inflames and causes swelling of epiglottis
- ★ **Signs and Symptoms**
  - Pain on swallowing
  - Dyspnea
  - High fever (102-104)
  - Inspiratory Stridor

- ★ **What is Whooping Cough?**
  - Pertussis (whooping cough) is a respiratory disease detailed with uncontrolled coughing.
    - Bacterial infection in upper airway
    - Distincted by “crowing” or a “whooping” sound during inhalation
    - S&S- low grade fever, malaise, dyspnea

OPA versus NPA + Suction

- ★ Oropharyngeal airway (OPA) is a semicircular device that holds the tongue away from the back of the airway
- ★ Contraindications
  - Patient must be unresponsive
  - Lack gag/cough reflex
  - Mouth injuries/facial fractures
- ★ Overall serves as an airway adjunct to perform the best airway management

- ★ Nasopharyngeal airway (NPA) is a curved hollow tube used as another airway adjunct.
  - Used instead if patients have clenched teeth, injuries to the maxilla, or unable to tolerate OPA
- ★ Contraindications
  - Head trauma (BSF)/ Nose Deformity

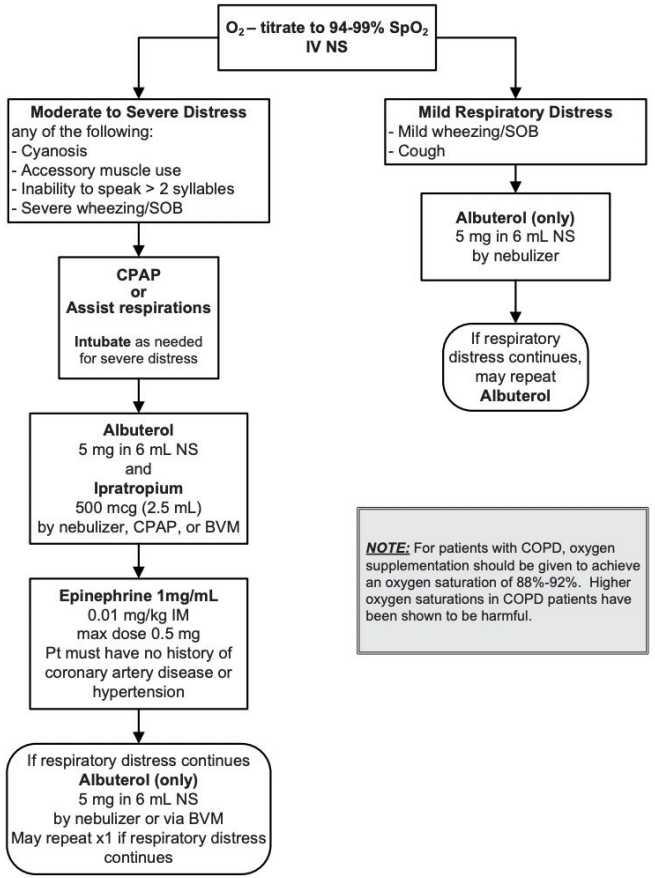


- ★ Suctioning must be done to avoid aspiration
- ★ When to suction:
  - If gurgling is heard during ventilation
  - Visible secretions upon inspection of the airway

ALCO Protocol

RESPIRATORY DISTRESS

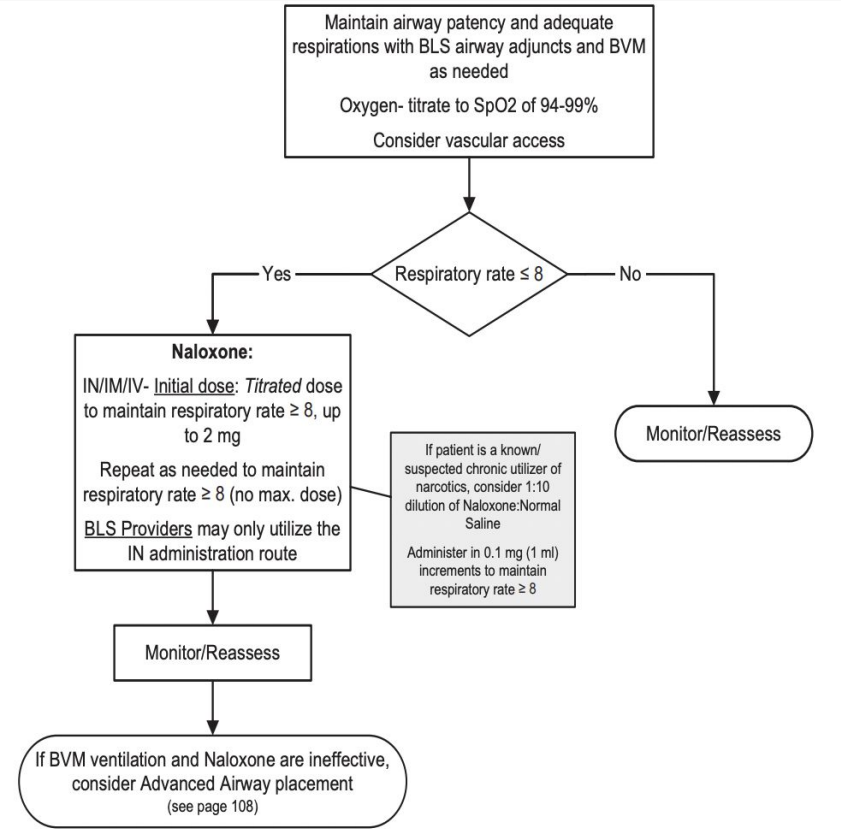
- **Routine Medical Care**
  - → Asthma
  - → COPD
  - → Bronchospasm
  - → Pulmonary edema (see **page 45**)
- Limit physical exertion, reduce patient anxiety



ALCO Protocol

RESPIRATORY DEPRESSION OR APNEA (SUSPECTED NARCOTIC OD)

- **Routine Medical Care**
- **Naloxone can cause acute withdrawal symptoms (agitation,vomiting, etc.) in patients who are chronic utilizers of narcotics**
- Naloxone can cause cardiovascular side effects (chest pain, pulmonary edema) or seizures in a small number of patients (1-2%)
- Older patients are at higher risk for cardiovascular complications
- Patients who are maintaining adequate respirations with decreased level of consciousness do not generally require Naloxone for management



Assessment , Vitals, and Techniques

Typical Respiratory Rates

Age group	0-1 mo (neonate)	1-12 mos (infant)	1-3 yrs (toddler)	4-5 yrs (preschool)
Rate breaths/min	30-60	30-60	24-40	22-34
Notes	Belly breathing			

Age group	6-12 yrs (school age)	13-18 yrs (adolescent)	adult	elderly
Rate breaths/min	18-30	12-20	12-20	12-20
Notes				May be slightly irregular

Typical SpO2s

SpO2 %	96-100	91-95	86-90	<85
Classification	normal	mild hypoxia	moderate hypoxia	severe hypoxia

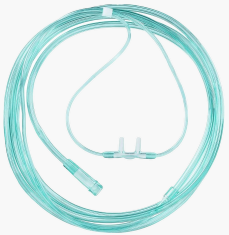
O2 Administration

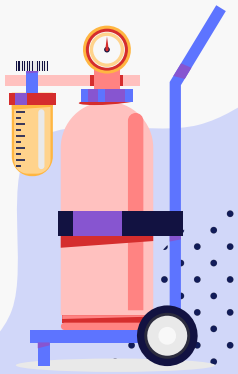
Non-rebreather mask

- High flow O2
- Pt breathing on their own but needs significant supplemental O2
  → respiratory failure, smoke/CO inhalation, suspected shock
- Flow rate: 10-15 L
- FiO2: 60-90%
- Contraindications: severe AMS, facial trauma, obstructed airway

Nasal cannula

- Low/moderate flow O2
- Pt breathing on their own, needs minimal supplemental O2
  → use if pt can't tolerate NRB
- Flow rate: 2-6 L
- FiO2: 24-44%
- Contraindications: nasal/airway/facial obstruction, epistaxis





O2 Administration

Bag-valve mask

- Positive pressure ventilation
- Pt has absent or inadequate breathing
  → apnea, hypoventilation, severe AMS
- Flow rate: 15 L
- Ventilation rate: 1 breath/5-6 sec (adults), 1 breath/2-3 sec (peds)
- FiO2: 100%
- Contraindications: facial trauma, obstructed airway

CPAP

- Non-invasive positive pressure ventilation
- Pt has moderate to severe respiratory distress
  → COPD, asthma, pulmonary edema, CHF, pneumonia
- Pressure: 5-10 cm
- Contraindications: severe AMS, systolic BP <90, suspected pneumothorax, head injury, facial/chest trauma, vomiting, GI bleed/recent gastric surgery

P

Provocation: What **caused** the difficulty breathing? Does anything make it **easier or more difficult** to breathe?

A

Associated chest pain: Does the patient have pain associated with breathing or pain in the chest area?

S

Sputum: Is the patient **coughing up sputum**? If so, what is its **color and consistency**?

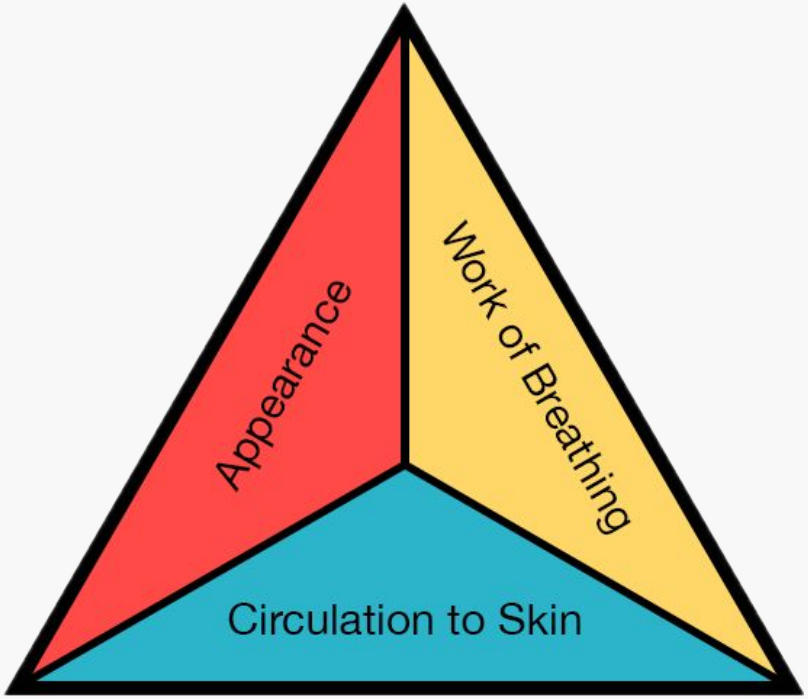
T

Talking/tiredness: Is **speaking** difficult for the patient? Does the patient seem **confused or tired**?

E

Exercise tolerance: Would a patient be able to **do a simple activity** (like walking across the room) right now, and is this **comparable** to their ability to do the activity at their baseline health?

Pediatric Assessment Triangle



Appearance:
LOC, skin color, muscle tone, interaction with caregivers

- Significantly impaired → neurological/metabolic

Work of breathing:
Respiratory rate, effort of breathing, airway sounds

- Significantly impaired → respiratory distress

Circulation:
Heart rate, cap refill, skin temperature

- Significantly impaired → shock

Respiratory Assessment

General impression

- AVPU and ANOs – ALOC may affect respiratory rate/rhythm/quality, AMS may signal hypoxia
- Observe for pt position (tripoding?) and skin signs (cool, pale/cyanotic, diaphoretic?)

ABCs

- **A:** suction airway before ventilating if needed
- **B:** respiratory rate/rhythm/quality + work of breathing (peds – nasal flaring/accessory muscle use)
- **C:** respiratory distress usually → tachycardia (adults) / bradycardia (peds)

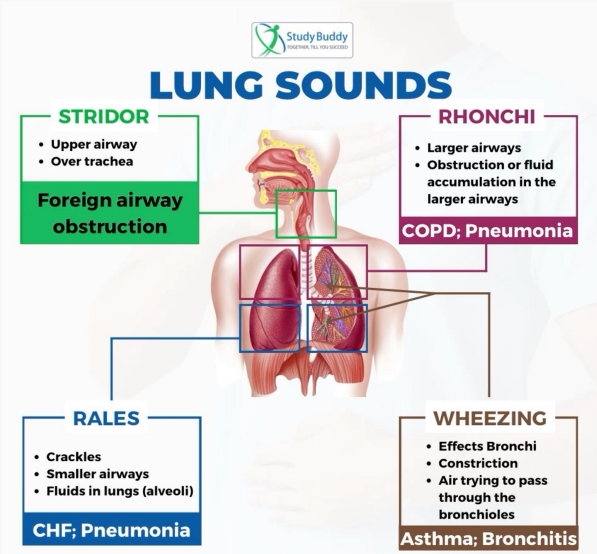
Focused assessment

- Palpate chest wall, check for crackling sensation under skin
- Auscultate lung sounds – equal and bilateral?
- Check equal chest rise and fall

Auscultation

Lung Sounds!

1. Clear - HOORAY
2. Wheezing:
   a. High pitched, airy sound
   b. Narrowing bronchi - Asthma, Bronchitis
3. Crackles/ Rales
   a. High pitched liquid breaking - mostly in inhalation
   b. Thin fluid in lungs - CHF, Pneumonia,
4. Rhonchi
   a. Low pitch, gurgling sound
   b. Thicker fluid/ mucus in lungs - pneumonia, COPD
5. Stridor
   a. High pitched sound
   b. Associated with an obstruction of the airway
6. Pleural friction rub
   a. Grating and pain when breathing
   b. Pleura rubbing against ribs - Embolism, Pleurisy, TB in pleural area
7. Nothing



How to Auscultate

- Auscultate chest and back of pt.
- Ask pt. To breath in and out on each one
- Z pattern to compare sounds on different sides

Z Pattern

Z Pattern

Z Pattern

Z Pattern

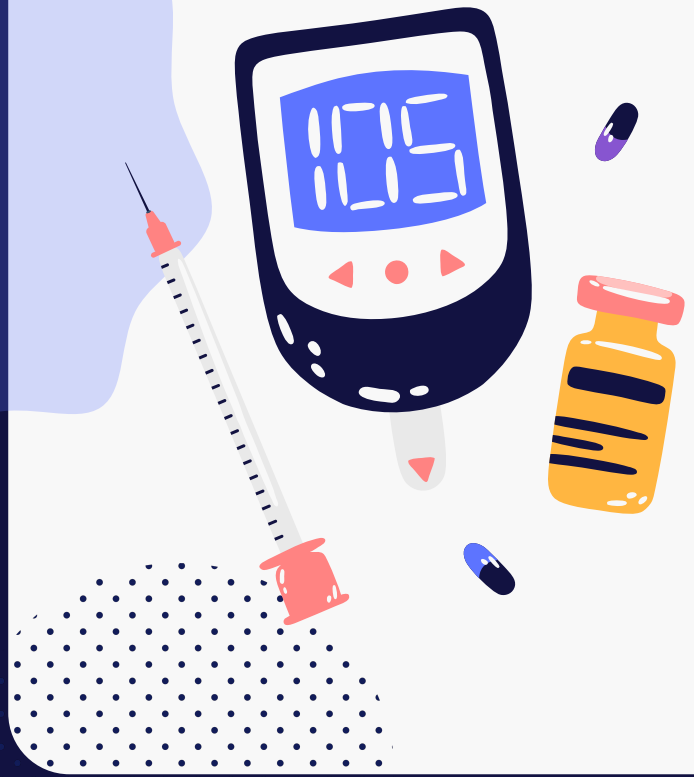
Z Pattern

Z Pattern

Z Pattern

Common Respiratory Medications

Albuterol



- ★ **What is it?**
  - A bronchodilator (relaxes airways) and a beta 2 agonist
- ★ **Indications**
  - Patient is in respiratory distress
  - Wheezing
  - it passes DICCE
- ★ **Contraindications**
  - Patient unable to coordinate inhalation
  - No order from medical control
  - Max dose taken
  - Does not pass DICCE

Rescue vs Maintenance Inhalers

Rescue

- When to take:
  - These are used **AS NEEDED** to **STOP** symptoms
- They are very fast acting to relieve symptoms
- Are within EMT scope of usage as long as it meets indications and there are no contraindications
- An example of this would be Albuterol

Maintenance Inhalers

- When to take:
  - Taken **EVERYDAY** to **PREVENT** symptoms
- Take a long time to actually work and treatment is hard to see
- Opens airways by reducing inflammation and dilating airways
- They come in different inhaler forms such as triple therapy inhalers or single drug inhalers
- Used as PRESCRIBED
- An example would be Salmeterol

Salmeterol

- **What is it?**
  - A bronchodilator (relaxes patients airway) by being a long active beta agonist
- This bronchodilator is used for long term symptoms versus albuterol which is used for short term symptoms

- Not within EMT scope of practice
- Is used for
  - Chronic Asthma
  - Chronic Obstructive Pulmonary Disease
  - Exercise-Induced Bronchospasms

Epinephrine

- **What does it do:**
  - Increases heart rate and B/P
  - Bronchodilators
  - Peripheral vasoconstriction
- **How is it given:**
  - Through an autoinjector
- **When to give**
  - Severe allergic reaction(anaphylactic; affects more than two body systems) that have symptoms shock or respiratory distress

- **Indications**
  - Dyspnea
  - Wheezing
  - Coughing
  - Difficulty speaking
- **Contraindications**
  - Does not meet the indications
  - Does not DICCE out

THAN K YOU!!!

Any questions?