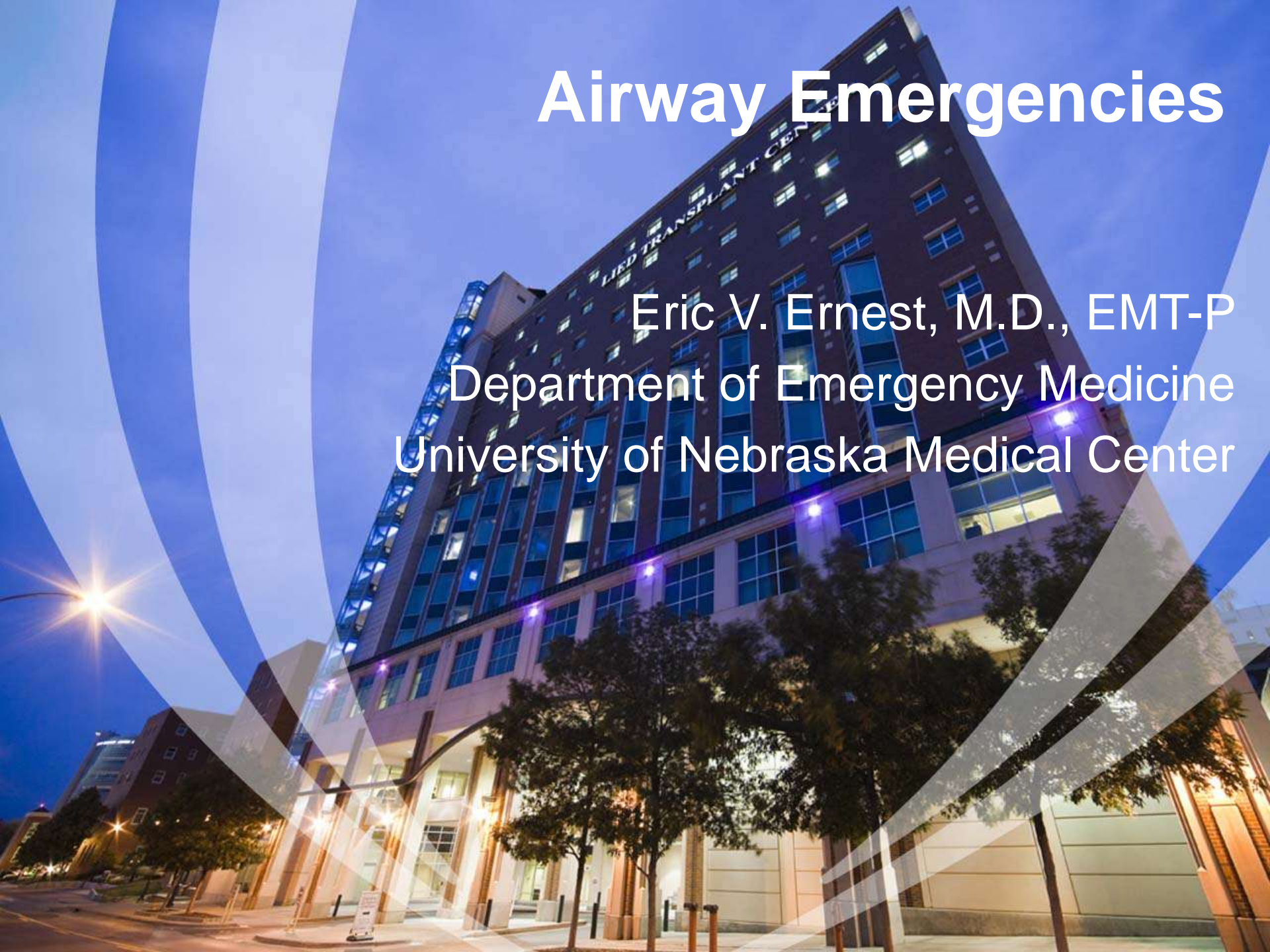


Airway Emergencies

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Overview

- Respiratory System Review
 - Anatomy
 - Physiology
 - Pathophysiology
- Breathing Assessment
 - Adequate Breathing
 - Breathing Difficulty
 - Focused History and Physical Examination
- Common Adult Respiratory Medical Conditions
- Controversies in Airway Management
- Case Studies



RESPIRATORY SYSTEM REVIEW



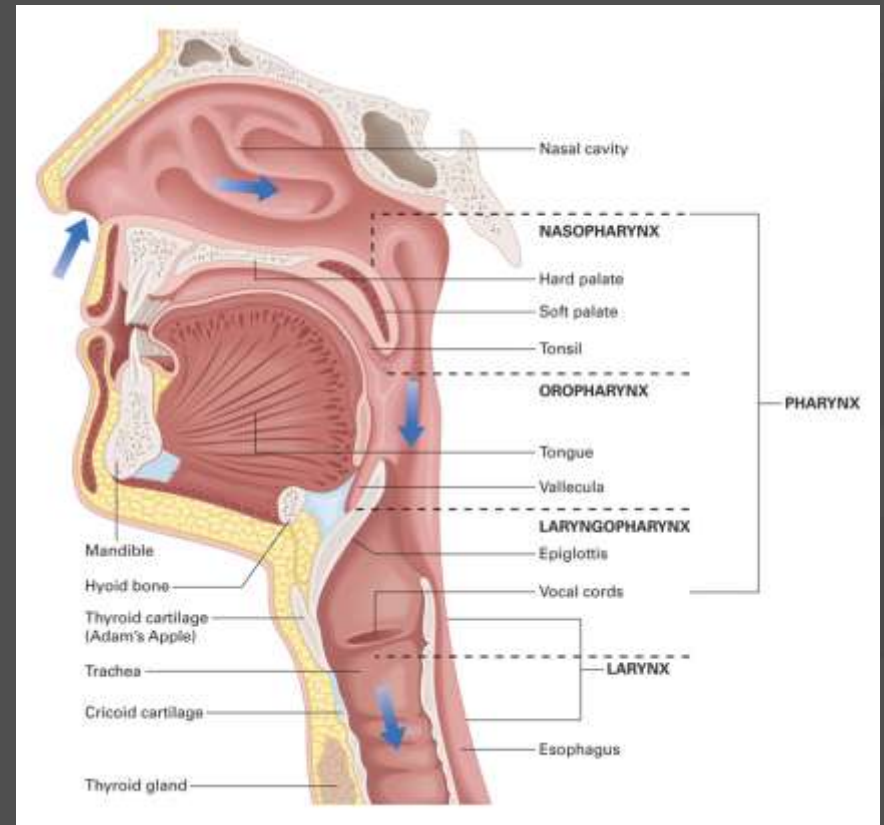
The Respiratory System

- The respiratory system takes oxygen from the air and makes it available for the blood to transport to every cell and rids the body of excess carbon dioxide
 - All living cells need energy
 - Cells obtain energy through aerobic respiration
 - Requires O_2 /produces CO_2
 - Respiratory system enables O_2/CO_2 exchange



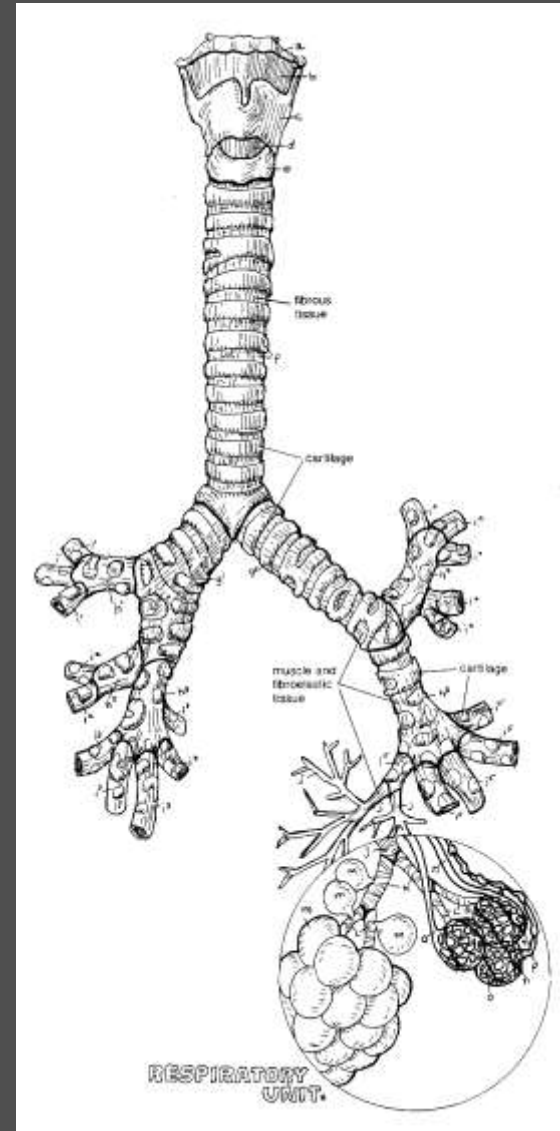
Upper Airway

- In through nose
 - Warms
 - Humidifies
 - Filters
- Past epiglottis
- Into trachea
 - Anterior to esophagus





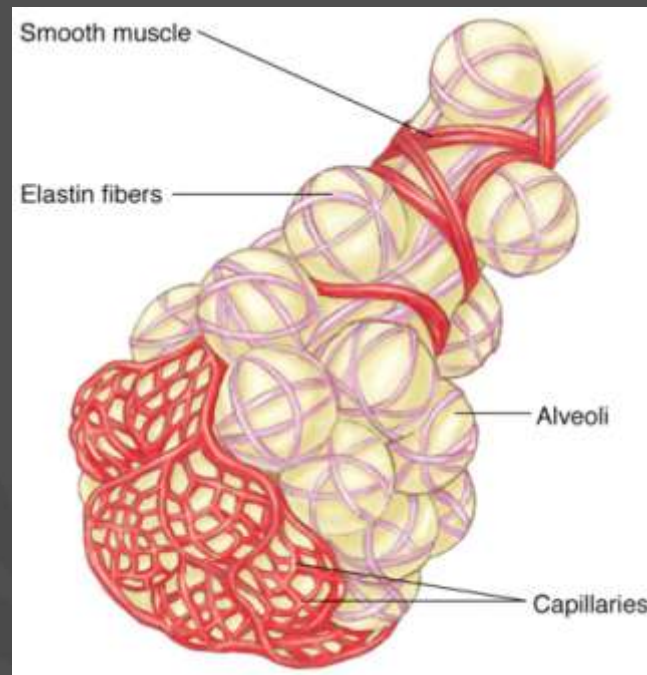
- Bronchi
 - Branch off trachea
- Bronchioles
 - 33 divisions to alveoli
 - No air exchange until alveoli
 - Dead air space





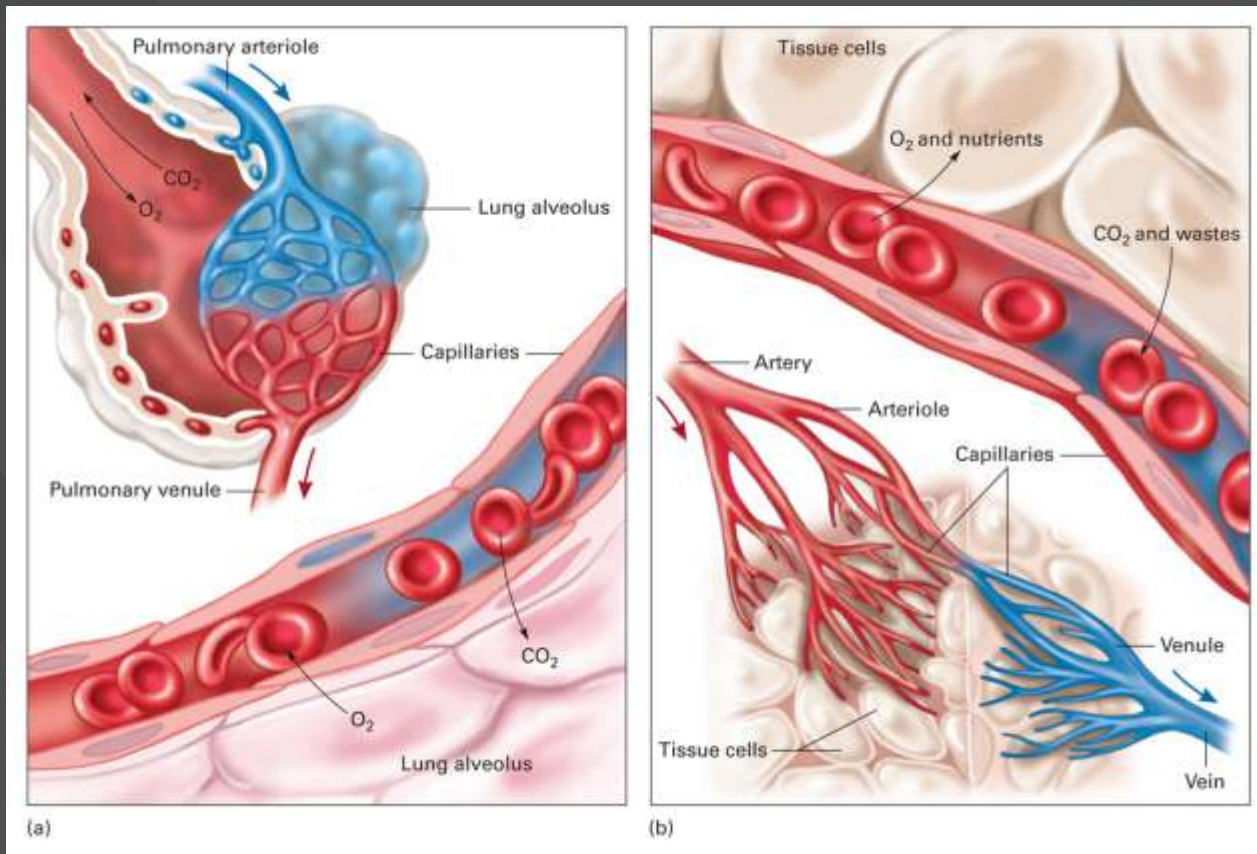
Alveoli

- Network of capillaries around alveoli for gas exchange





Exchange of oxygen and carbon dioxide





Functions of the Respiratory System

- Vocal Communication
- Air In & Out
- Gas Exchange
- Protection
- Defense from Pathogens
- Blood Volume/Pressure and pH



Respiratory Terminology

- Ventilation
 - The movement of air
- Respiration
 - The exchange of gases



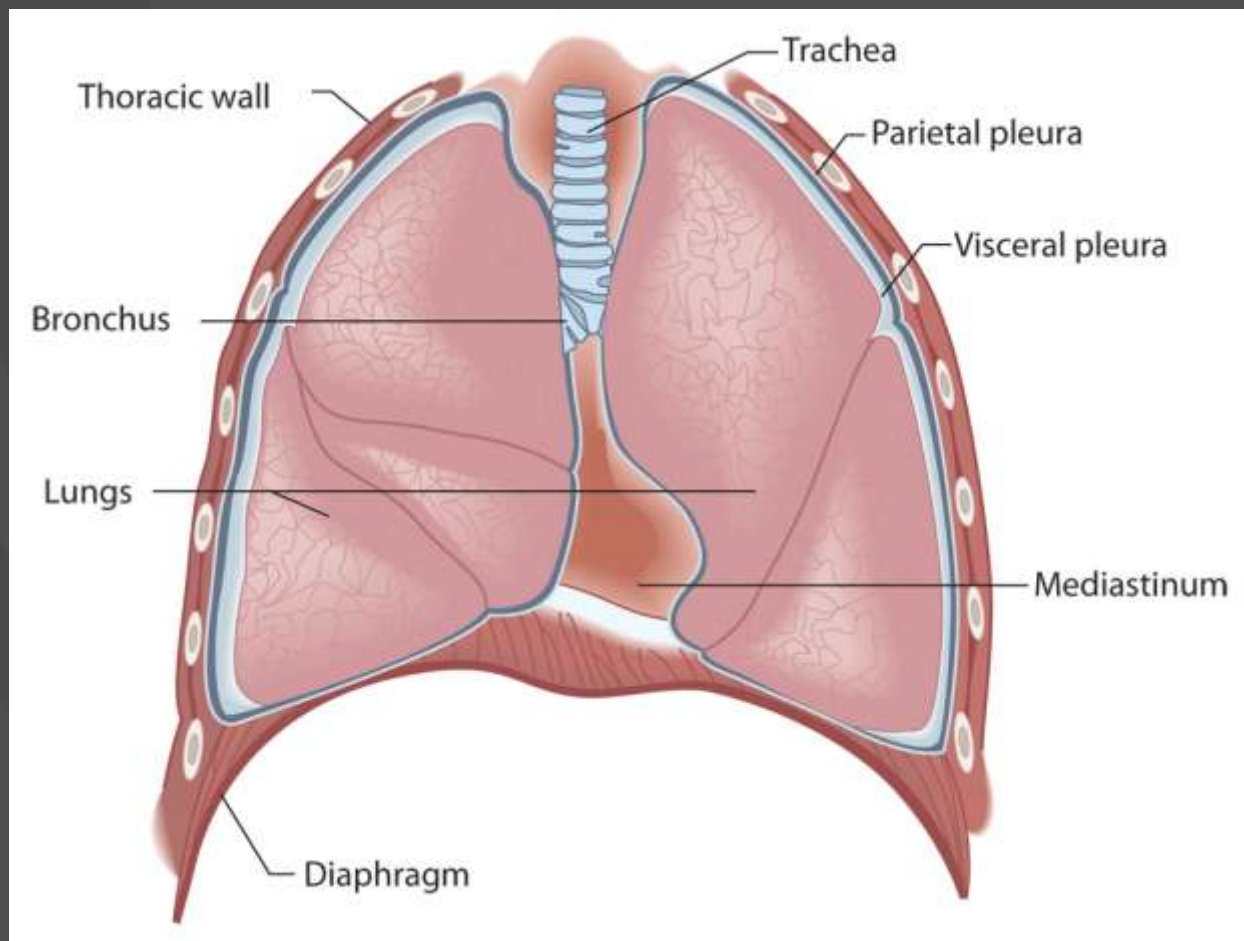
Ventilation is

- Movement of air in and out





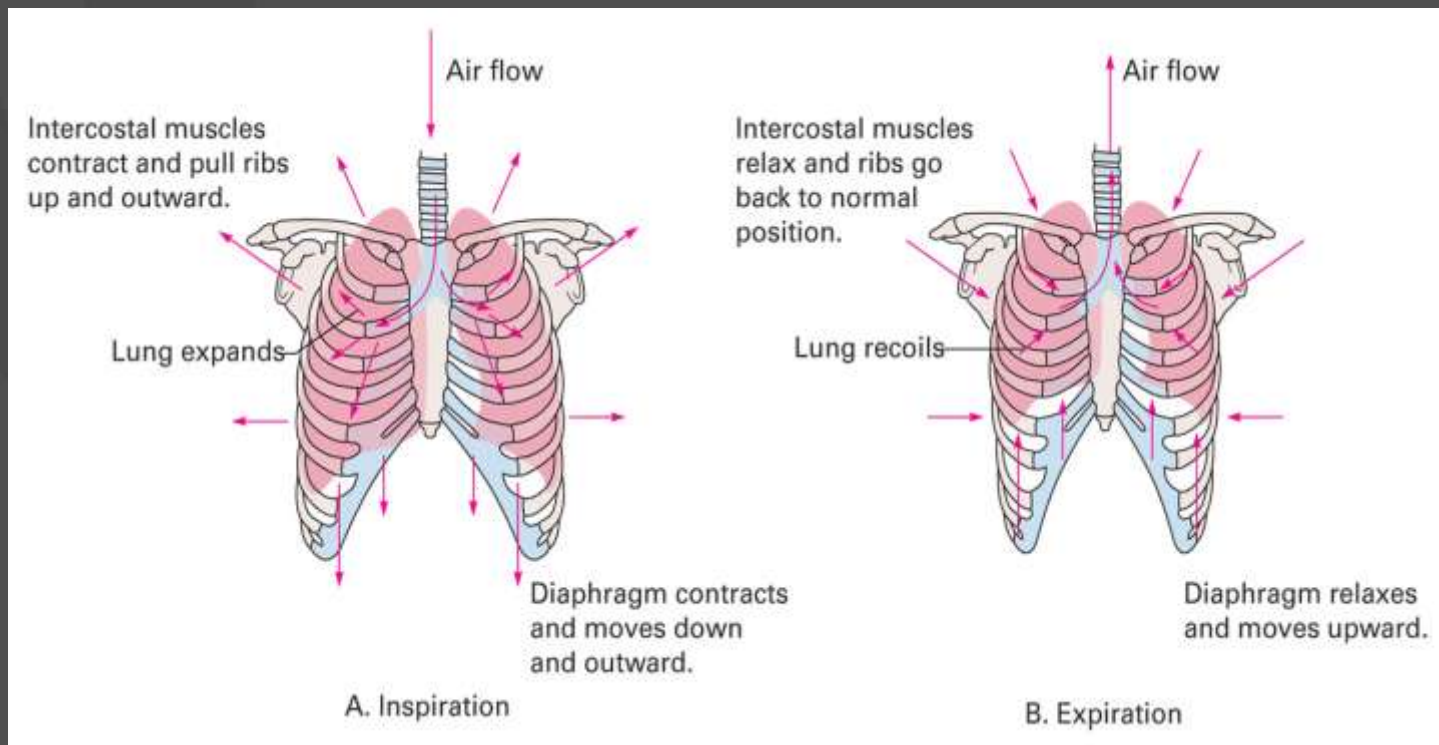
Ventilation





Mechanics of Breathing

- Inspiration chest expands – creates vacuum – air rushes in
- Expiration chest contracts – creates pressure – air rushes out



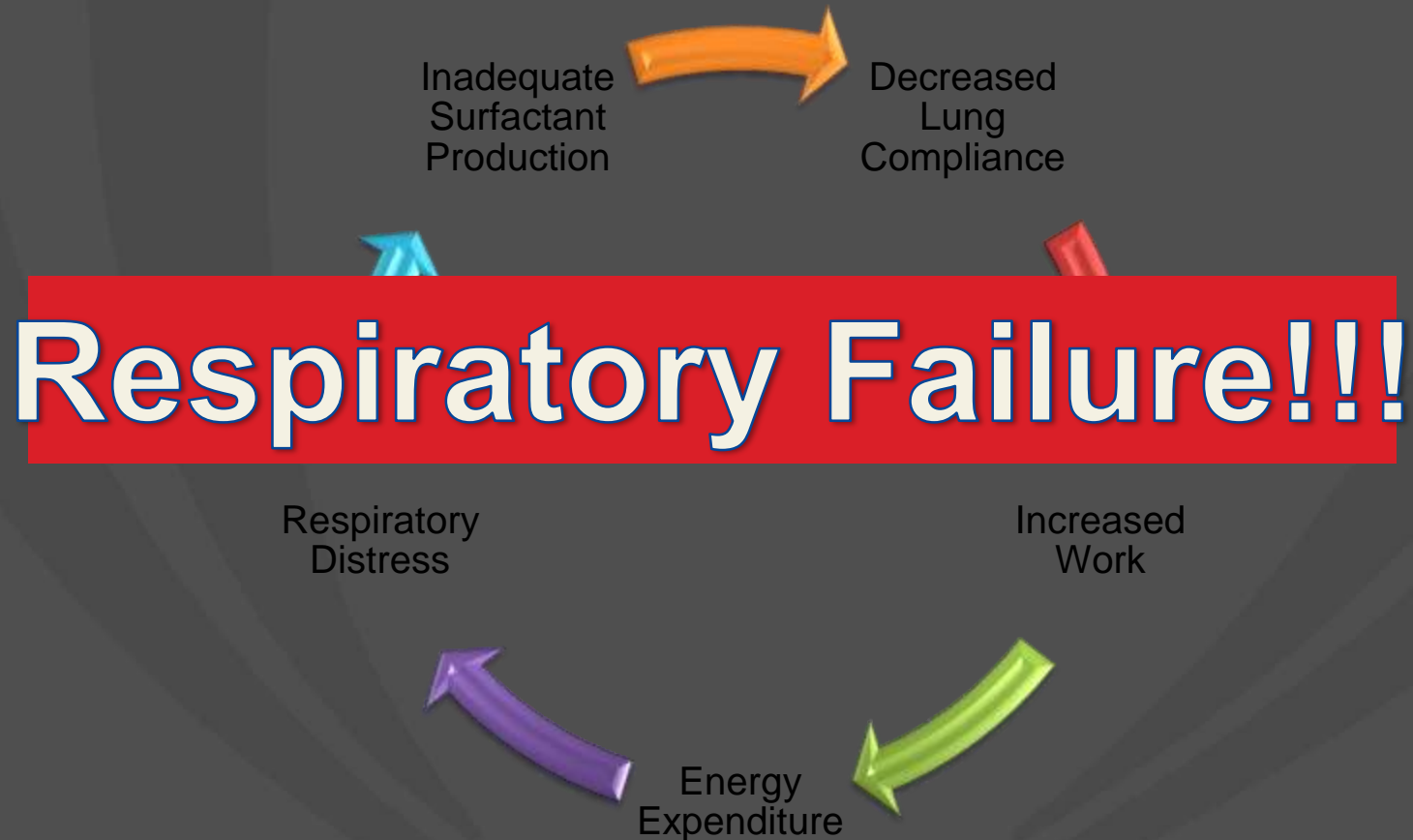


Lung Compliance

- Ability to Expand Under Pressure
- Factors
 - Lung Tissue
 - Alveolar Surface Tension
 - Surfactant Production



Lung Compliance





Respiration

- Alveolar respiration
 - Gas exchange in the lungs
 - Diffusion Process
 - *Body strives to maintain Homeostasis, even with the surrounding air*
- Cellular respiration
 - Gas exchange in the tissues of the body



Alveolar Respiration

- Alveolar/capillary exchange
 - Oxygen-rich air enters the alveoli during each inspiration
 - Oxygen-poor blood in the capillaries passes into the alveoli
 - Oxygen enters the capillaries as carbon dioxide enters the alveoli



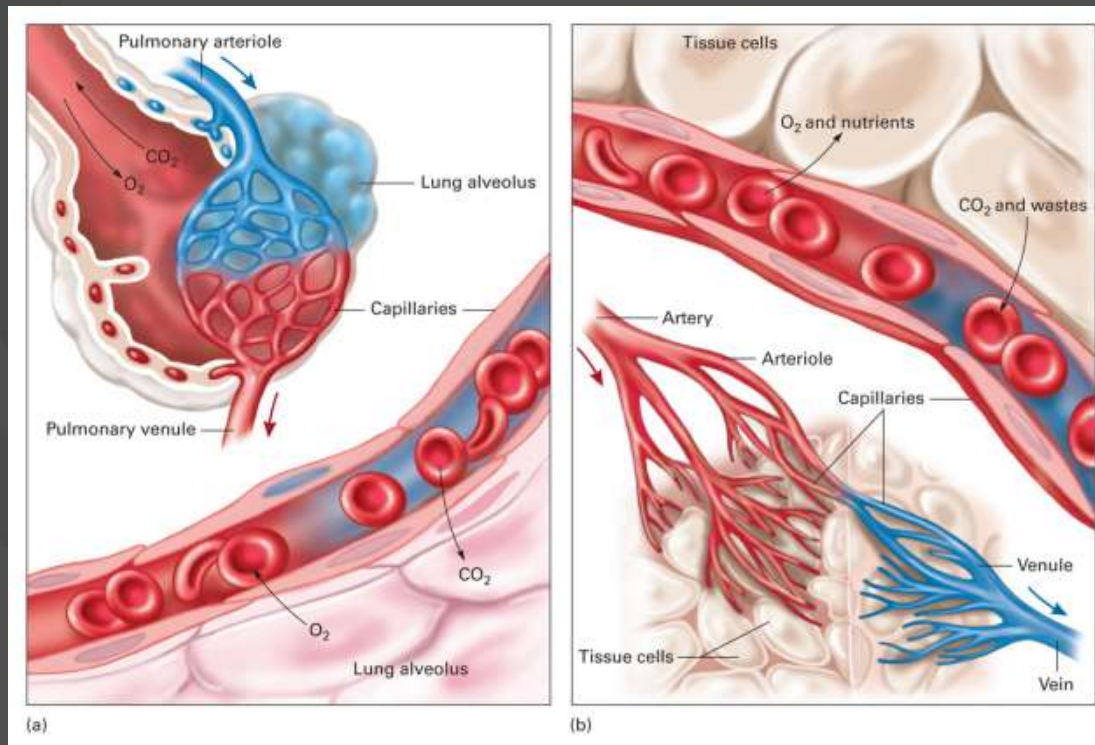
Cellular Respiration

- Capillary/cellular exchange
 - Cells give up carbon dioxide to the capillaries
 - Capillaries give up oxygen to the cells



Hemoglobin

- 98% of inspired oxygen attached to the protein, hemoglobin in RBC
alveoli cells





Respiratory Centers

- Chemoreceptors
 - Stimulus sites for breathing
 - Activated By:
 - Increased CO₂ Level
 - Decreased O₂ Level
 - Increased pH level.
 - *pH is a measurement of the acidity of the blood, reflecting the number of hydrogen ions present.*
 - Respond to changes in the pO₂ and pCO₂ in the blood and cerebral spinal fluid (CSF)



pCO₂ (Partial Pressure of Carbon Dioxide)

- The Amount of Carbon Dioxide Gas Dissolved in the Blood
 - Someone who is hyperventilating will "blow off" more CO₂, leading to lower pCO₂ levels
 - Someone who is holding their breath will retain CO₂, leading to increased pCO₂ levels



pO_2 (Partial Pressure of Oxygen)

- The amount of oxygen gas dissolved in the blood
- Oxygen Saturation (SaO_2) measures the percent of hemoglobin which is fully combined with oxygen
 - Normal oxygen saturation on room air is in excess of 95%
 - With deep or rapid breathing, this can be increased to 98-99%
 - While breathing oxygen-enriched air (40% - 100%), the oxygen saturation can be pushed to 100%



ASSESSMENT



Assessment

- Scene size up
 - Scene safety
 - Environment
 - What in and around the patient suggests that this is a respiratory emergency?





General Impression of Patient

- Position
- Color
- Mental Status
- Ability to Speak
- Respiratory Effort



Is this patient in distress?





Look for pursed lip breathing or prolonged expiration





Tripod position suggests distress, resting weight on knees helps with chest expansion





Slow labored breathing is a sign of respiratory failure





Cyanosis – blue discoloration suggests hypoxia



A.



B.



C.



D.



Initial Assessment

- Airway – open, no noises
- Breathing – 12-20 times per minute
- Circulation – warm, pink, dry, strong pulses
- Disability – mental status clear
- Vital Signs





Focused History

- SAMPLE
- OPQRST
 - How long has this been going on?
 - Start gradual or abrupt
 - Better or worse with position
 - Cough
 - Productive of sputum
 - Color of sputum– white? Yellow? Red? green? brown?



Additional Symptoms

- Chest pain
- Fever/chills
- Wheezing
- Smoking history
- Trauma





Medications Currently Taking

- Antibiotics
- Oxygen
- Steroids
 - Emphysema
 - Asthma
- Inhalers/nebulizers
 - Emphysema
 - Asthma
- Cardiac drugs





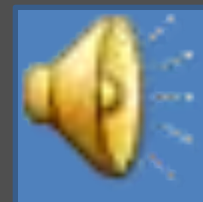
Normal Breathing

- Normal respiration should be effortless



- Adult—12-20/minute

- Child—15-30/minute



- Infant—25-50/minute



Assessing Breathing

- Rate
- Rhythm
- Quality
- Breath sounds
- Chest expansion
- Effort of breathing
- Depth (tidal volume)
 - *The amount of air exchanged in one breath*



Assessing Breathing

- Listen - To Pt. Breathe or Talk
 - Noisy Breathing is Obstructed Breathing
 - Not All Obstructed Breathing is Noisy
 - Snoring - Tongue Blocking Airway
 - Stridor - “Tight” Upper Airway from Partial Obstruction



Assessing Breathing

- Anticipate Airway Problems in Patients With:
 - Decreased LOC
 - Head Trauma
 - Maxillofacial Trauma
 - Neck Trauma
 - Chest Trauma
- OPEN - CLEAR - MAINTAIN



Assessing Breathing

– LOOK - LISTEN - FEEL

- Look for Symmetry of Chest Expansion
- Look for Signs of Increased Respiratory Effort
- Look for Changes in Skin Color
- Listen for Air Movement at Mouth & Nose
- Listen for Air Movement in Peripheral Lung Fields
- Feel for Air Movement at Mouth & Nose
- Feel for Symmetry of Chest Expansion



Assessing Breathing

- Tachypnea/Bradypnea?
- Orthopneic?
 - *Ability to breathe easily only while standing, seen in congestive heart failure*
 - *A body position that enables a patient to breathe comfortably. Usually it is one in which the patient is sitting up and bent forward with the arms supported on a table or chair arms*
- Signs of Respiratory Distress
 - Nasal Flaring
 - Tracheal Tugging
 - Retractions
 - Accessory Muscle Use
 - Use of Abdominal Muscles on Exhalation



Assessing Breathing

- Cyanosis? (Late, unreliable sign of Hypoxia)
- Oxygenate Immediately! Especially If:
 - Decreased LOC
 - Possible Shock
 - Possible Severe Hemorrhage
 - Chest Pain
 - Chest Trauma
 - Respiratory Distress or Dyspnea
 - *Subjective sensation that breathing is excessive, difficult, or uncomfortable*
 - HX of Any Kind of Hypoxia



Assessing Breathing

- Consider Assisting Ventilations
 - <8
 - >24
 - Insufficient Inspiratory O₂ (Tidal Volume Inadequate)
- If the Pt. has compromised breathing, bare the chest and assess for:
 - Open Pneumothorax
 - Flail Chest
 - Tension Pneumothorax



Assessing Breathing

- Restlessness, Anxiety, Combativeness = **HYPOXIA** Until Proven Otherwise
- Drowsiness, lethargy = **HYPERCARBIA** Until Proven Otherwise
 - *Too Much CO₂ in the Blood*
- **When the patient stops fighting, the patient is not necessarily getting better**



Effort of Breathing

- Accessory muscles
 - Additional muscles used to draw air into the chest
 - Includes the muscles of the neck, abdomen, and chest

*Use of accessory muscles is a sign of
respiratory distress!*



Secondary Assessment

– Respiratory Pattern

- Kussmaul
 - *Deep and labored breathing pattern often associated with severe metabolic acidosis (DKA)*
- Cheyne-Stokes
 - *Progressively deeper and sometimes faster breathing, followed by a gradual decrease that results in a temporary stop in breathing*
- Central Neurogenic Hyperventilation
 - *Abnormal pattern of breathing characterized by deep and rapid breaths at a rate of at least 25 breaths per minute*



Secondary Assessment

– Neck

- Trachea Midline?
- Jugular Vein Distention (JVD)?
- Sub-Cutaneous Emphysema?
- Accessory Muscle Use/Hypertrophy?



Secondary Assessment

– Chest

- Barrel Chest?
- Deformity/Discoloration/Symmetry?
- Flail Segment/Paradoxical Movement?
- Breath Sounds?



Secondary Assessment

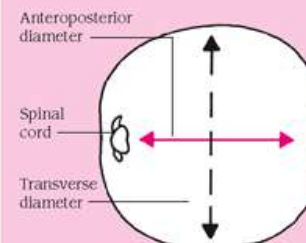
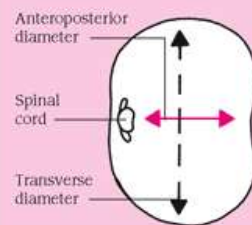
Recognizing barrel chest

In a normal adult chest, the ratio of anteroposterior to transverse (or lateral) diameter is 1:2. In patients with barrel chest, this ratio approaches 1:1 as the anteroposterior diameter enlarges.

NORMAL CHEST



BARREL CHEST





Adventitious Sounds

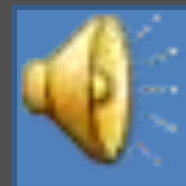
- Snoring respiration
 - Upper Airway
 - Partial obstruction of the upper airway by the tongue
- Stridor
 - High pitched crowing sound
 - Usually heard on inspiration
 - Indication of a tight upper airway





Adventitious Sounds

- Wheezing
 - Whistling sound
 - Usually heard on expiration
 - Indication of narrowing of lower airways caused by:
 - Bronchospasm
 - Edema
 - Foreign material

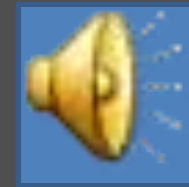


What 2 breath sounds do you hear in this clip?



Adventitious Sounds

- Rhonchi
 - Rattling sound
 - Caused by mucus in larger airways
- Rales
 - Fine crackling sound
 - Indication of fluid in the alveoli





Adventitious Sounds

- Pulmonary Edema
 - Fluid accumulation in the air spaces and parenchyma of the lungs
 - It leads to impaired gas exchange and may cause respiratory failure
 - It is due to either failure of the left ventricle of the heart to adequately remove blood from the pulmonary circulation ("cardiogenic pulmonary edema") OR
 - An injury to the lung parenchyma or vasculature of the lung
 - *The 'functional' parts of an organ in the body*



Adventitious Sounds

- Cough
 - Forced exhalation against partially closed glottis
 - Reflex response to mucosa irritation
 - Determine circumstances
 - At work
 - Postural changes
 - Lying down
 - Productive vs non-productive



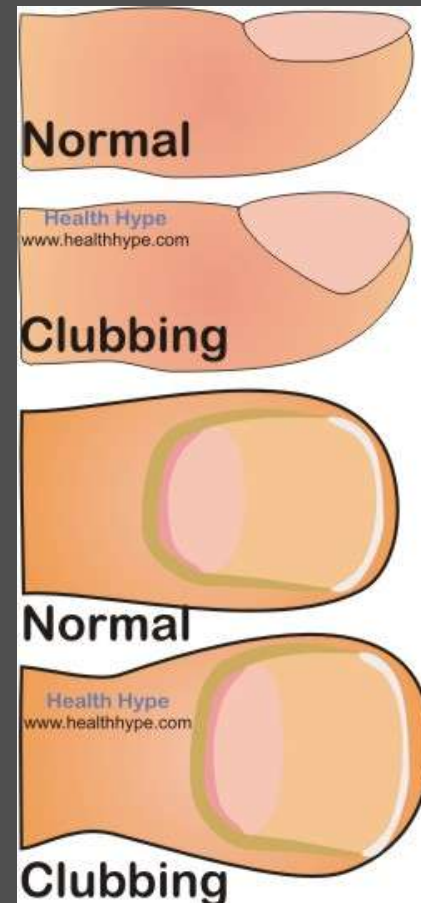
Adventitious Sounds

- Sneeze
 - Forced exhalation via nasal route
 - Clears nasal passages
 - Reflex response to mucosa irritation
- Sighing
 - Slow, deep inspiration - Prolonged, audible exhalation
 - Re-expands areas of Atelectasis
 - *Collapse or closure of alveoli resulting in reduced or absent gas exchange*



Secondary Assessment

- Extremities
 - Pre-tibial/Pedal Edema
 - Nailbed Color
 - “Clubbing” of digits





Adults vs. Children Respiratory Anatomy

- Mouth and nose
 - In general, all structures are smaller and more easily obstructed than in adults



Adults vs. Children Respiratory Anatomy

- Tongue
 - Infants' and children's tongues take up proportionately more space in the mouth than adults
- Trachea (windpipe)
 - Narrower tracheas that are obstructed more easily by swelling
 - Softer and more flexible in infants and children
- Cricoid cartilage
 - Less developed and less rigid
- Chest wall is softer
 - Tend to depend more heavily on the diaphragm for breathing

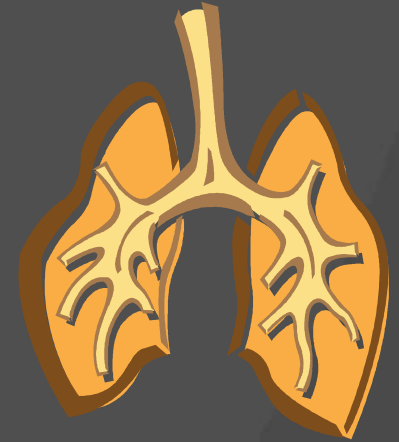


RESPIRATORY EMERGENCIES



Causes of Respiratory Emergencies

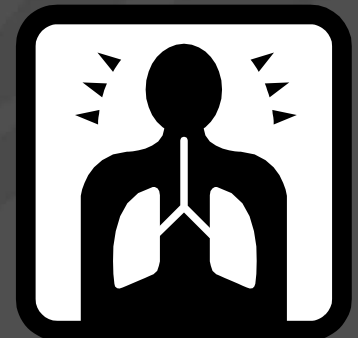
- Failure of:
 - Ventilation: air in/ air out
 - Diffusion: movement of gases
 - Perfusion: movement of blood
- Relieved by: epinephrine based medications
(such as Beta 2 agonist– albuterol, terbutaline)
- Compounded by:
 - Inflammation/mucus production





Hypoxia – low oxygen to cells

- Causes of hypoxia
 - Hypoxic hypoxia – not enough oxygen
 - Anemic hypoxia – not enough hemoglobin
 - Stagnant hypoxia – not enough perfusion
 - shock
 - Histotoxic hypoxia – unable to download
 - Cyanide poisoning





Respiratory Emergencies

- For each, consider
 - Cause/Pathology
 - Signs and symptoms
 - Management





Upper Airway Obstruction

- Due to
 - Foreign bodies – food, toys
 - Tongue
 - Swelling
- Underlying Problem – VENTILATION
- Assessment/Associated Symptoms
 - Airway movement
 - Ability to speak
 - Dyspnea
 - Hypoxia
 - Sounds – snoring, stridor
 - Oxygen saturation will be low




Upper Airway Obstruction

- Management
 - BLS– Heimlich maneuver
 - ALS Foreign Body – Magill Forceps
 - Allergic Reaction – diphenhydramine, epinephrine, and albuterol
 - Epiglottitis – racemic epinephrine
 - Croup– humidified oxygen
 - Sleep apnea– Prescribed CPAP



Chronic Obstructive Pulmonary Disease (COPD)

- COPD is a broad category that encompasses several disease processes
 - Emphysema
 - Asthma
 - Chronic bronchitis



How do we treat??

A blue thought bubble with a dark blue outline and three smaller bubbles trailing off to the bottom left. The text "How do we treat??" is written in black inside the main bubble.



Hypoxic Drive

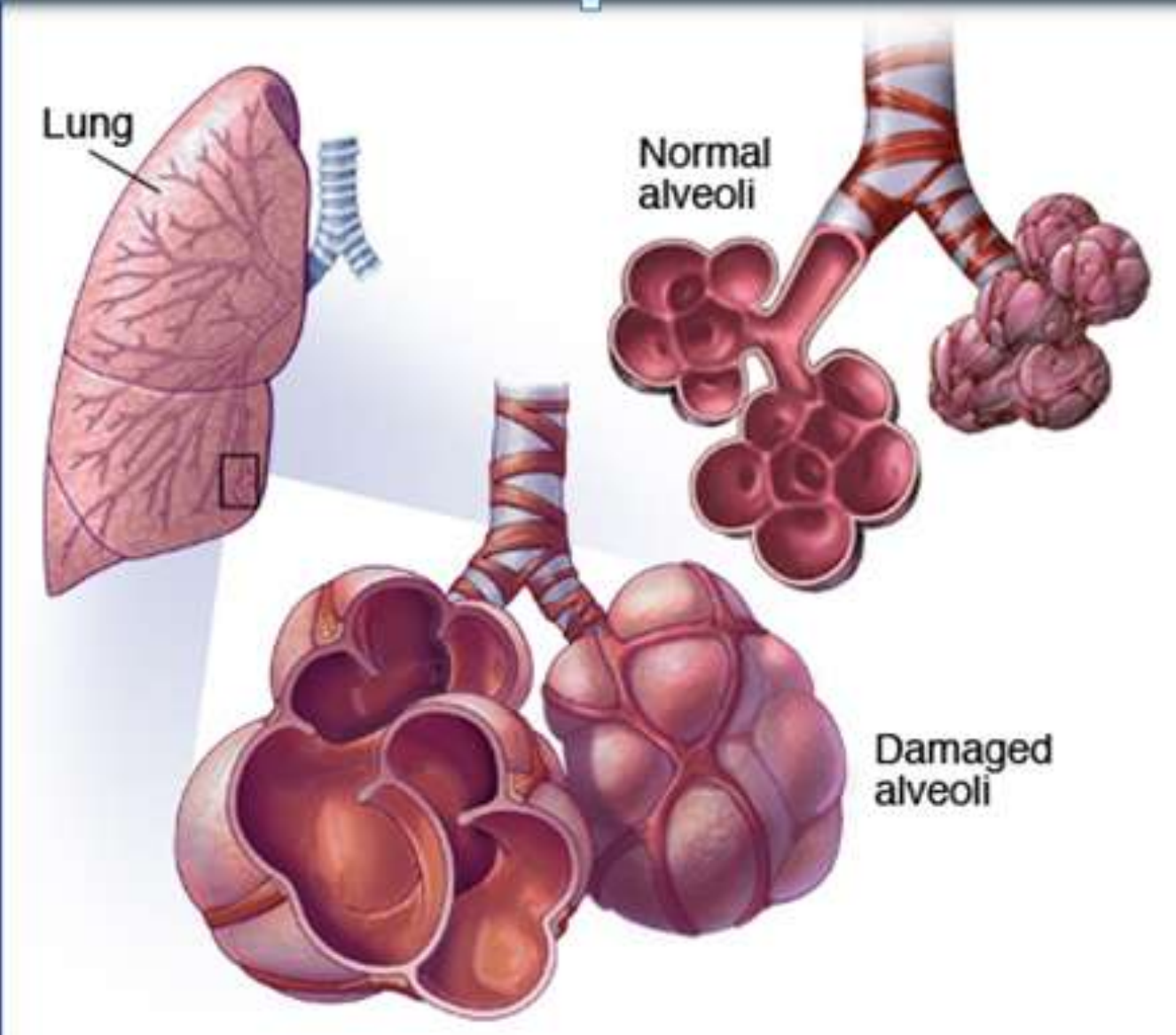
- COPD/Emphysema patients
- Low levels of oxygen in the body stimulate breathing
 - Normally CO_2 stimulates chemoreceptors to activate respiratory drive
- In theory too much oxygen can cause the body to reduce or stop breathing
- Usually occurs with high concentrations of O_2 over 24 hours



Emphysema

- Destruction of alveolar walls
- Underlying Problem: Diffusion
- Assessment/Associated Symptoms
 - Dyspnea with exertion
 - History of exposure
 - Barrel chest
 - Prolonged expiratory phase
 - Pursed lip breathing
 - Thin and emaciated
 - Pink puffer (extra hemoglobin to make up for poor oxygen pick up)







Management

- Won't call till there is a problem
- Secure airway
- Correct hypoxia
 - Respiratory drive from low oxygen not high CO₂
- IV access (dehydration)
- Albuterol for Bronchodilation if wheezing





Chronic Bronchitis

- Increased mucus production
- Decreased alveolar ventilation
- Underlying Problem: VENTILATION AND INFLAMMATION
- Assessment/Associated Symptoms
 - History of long term exposure to toxins
 - Frequent respiratory infections
 - Heavy sputum production
 - Obese and cyanotic (blue bloater)





Management

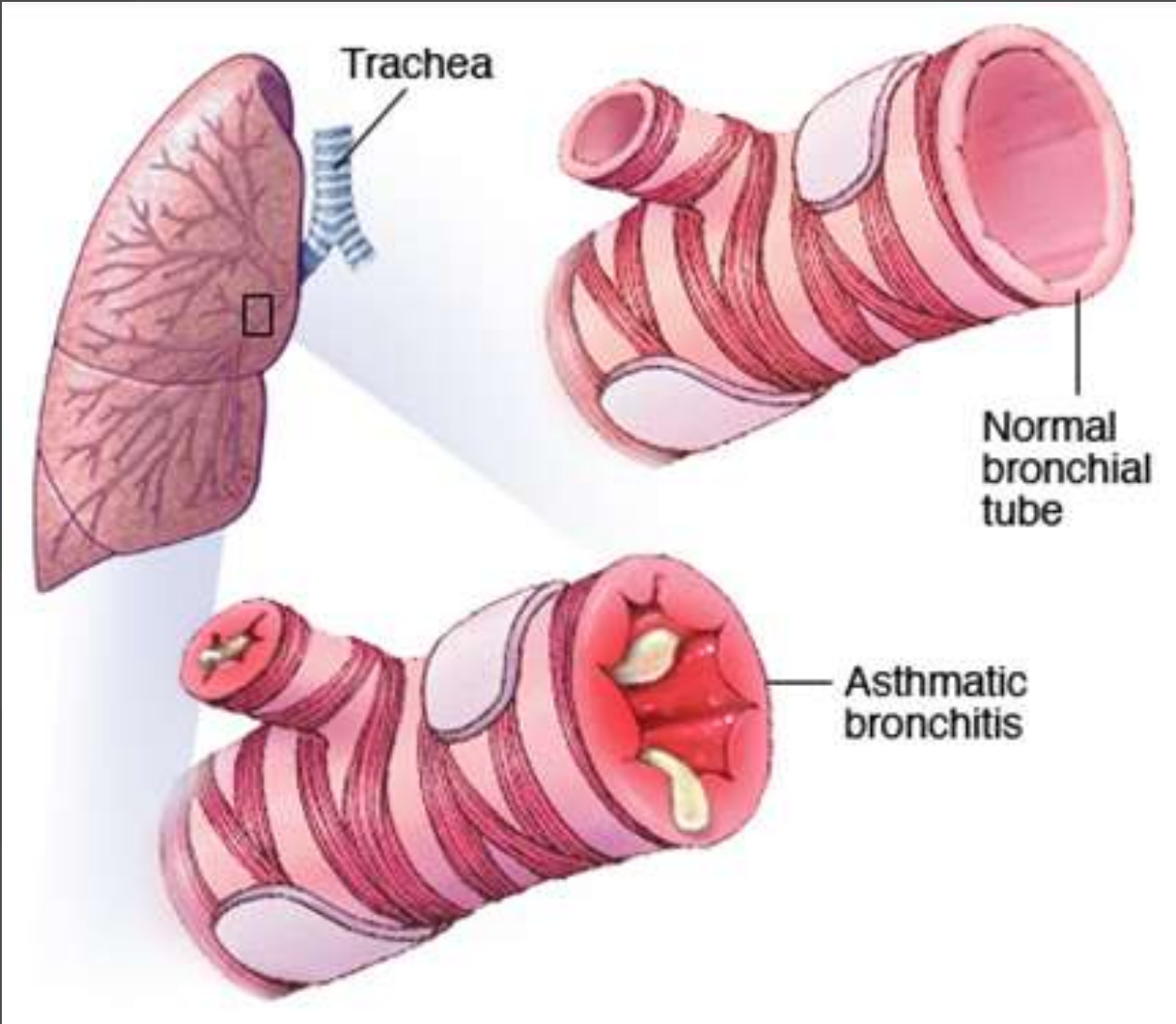
- Secure airway
- Correct hypoxia
 - How Much?
- IV access (dehydration)
- Albuterol Bronchodilation if wheezing





Asthma

- Lower airway obstruction
 - Bronchospasm
 - Edema
 - Mucus
- Caused by
 - Irritants
 - Respiratory infection
 - Emotional distress





Asthma

- Underlying Problem: VENTILATION AND INFLAMMATION
- Assessment/Associated Symptoms
 - Non productive cough
 - Wheezing
 - Speech dyspnea – one word sentences
 - Use of accessory muscles
 - Status Asthmaticus – not responding to treatment



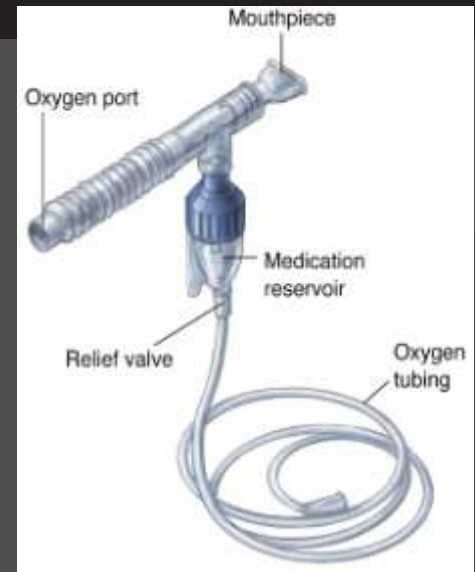
- Breath sounds?
- IF BRONCHOLES TOTALLY OCCLUDED
NO BREATH SOUNDS AT ALL ---SILENCE
IS BAD, BAD, BAD





Management

- Secure airway
- Correct hypoxia
- IV access (dehydration)
- Bronchodilation Beta 2 agonist
 - Inhaled, nebulized and/or subcutaneous
 - Albuterol, terbutaline





Pneumonia

- Infection of the lungs
- Alveoli and interstitial spaces fill with fluid
- Includes Severe Acute Respiratory Syndrome (SARS)
- Underlying Problem: DIFFUSION



- Assessment/Associated Symptoms
 - Looks ill
 - Fever and chills
 - Productive cough
 - Chest pain with respiration





Management

- BSI – wear a mask
- Secure airway
- Correct hypoxia
- IV access (dehydration)
- If wheezing -- Bronchodilation Beta 2 Agonist
-- albuterol





Costochondritis

- Viral chest wall pain
- Inflammation of muscle walls and cartilage of chest
- Underlying problem: VENTILATION AND INFLAMMATION



- Assessment/Associated Symptoms
 - Sudden onset
 - No trauma
 - Pain on deep inhalation
 - Pain on palpation
 - May have fever or history of cold



Management

- Correct hypoxia
- Symptom relief
- Anti-inflammatory medications
 - Ibuprofen





Congestive Heart Failure

- Common condition in the elderly
- Frequent end result of chronic HTN
- May also be the end result of chronic COPD
- Three fundamental physiologic disturbances
 - Volume overload
 - Excessive systemic vascular resistance
 - L ventricular dysfunction



Congestive Heart Failure

- Left Sided Heart Failure
 - Pulmonary edema
 - Distended neck veins
 - Swollen feet and pitting edema
- Right Sided Heart Failure
 - Distended Neck Veins
 - Swollen feet and pitting edema
 - Eventually pulmonary edema



Acute(Flash) Pulmonary Edema

- Excessive amount of fluid between alveoli and capillary space
- Disturbs gas exchange
- Causes hypoxia
- Cardiogenic and non-cardiogenic



Acute(Flash) Pulmonary Edema

- Signs/Symptoms
 - Dyspnea worse with exertion
 - Orthopnea
 - Blood tinged sputum
 - Also called pink, frothy sputum
 - Tachycardia
 - Pale, moist skin
 - Swollen lower extremities



Toxic Inhalation

- Inhalation of
 - Super heated air
 - Chemicals
 - Combustion products
 - Steam
- Lower airway edema
- Bronchospasm
- Underlying Problem: VENTILATION, INFLAMMATION, DIFFUSION



- Assessment/Associated Symptoms
 - Nature of inhalant
 - Burns to face, nose, mouth
 - Strider





Management

- Rescuer safety
- Remove from further exposure
- Secure airway – may need intubation
- Correct hypoxia
- IV access
- Rapid transport
- Correct wheezing with beta 2 agonist--
albuterol



Carbon Monoxide Poisoning

- Inhalation of gas that binds with hemoglobin
- Underlying Problem: CELLULAR HYPOXIA
- Assessment/Associated Symptoms
 - Headache
 - Irritability
 - Errors in judgment
 - Confusion
 - Vomiting
 - Flu symptoms
 - Pink color
 - Others with same symptoms



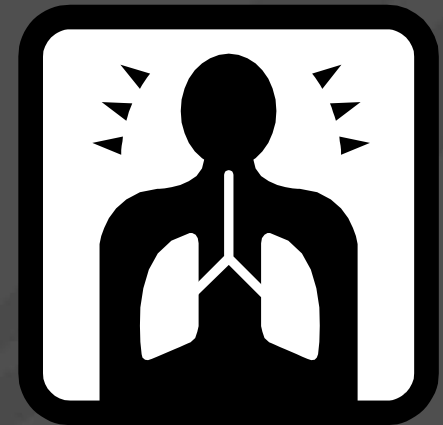
Management

- Rescuer safety
- Remove from source
- Secure airway
- High flow oxygen
- Hyperbaric chamber
 - Always?



Pulmonary Emboli

- Blood clot (or other emboli) in pulmonary circulation blocking blood flow
- Ventilation perfusion mis-match
- Underlying problem: PERFUSION, DIFFUSION





- Assessment/Associated Symptoms:
 - Sudden onset acute chest pain
 - Sudden onset acute dyspnea
 - Tachypnea – fast breathing
 - Tachycardia – fast heart rate
 - Recent history of being inactive



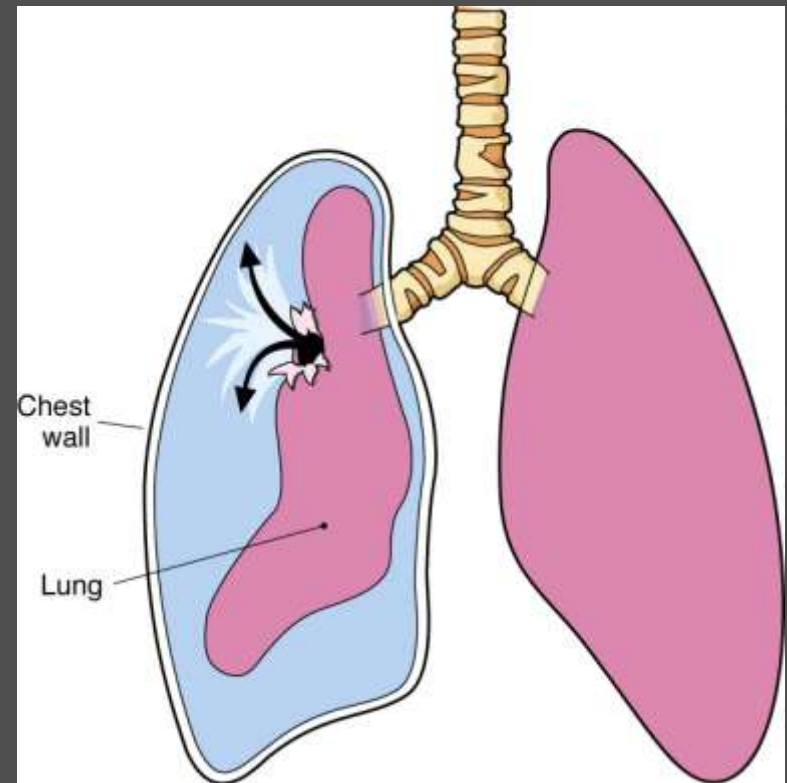
Management

- Secure Airway
- Correct hypoxia
- IV Access



Spontaneous Pneumothorax

- Sudden loss of pleural seal
- Underlying Problem: DIFFUSION,





- Assessment/Associated Symptoms
 - Non traumatic
 - Sudden onset dyspnea
 - No pain on palpation
 - May develop tension and JVD
- Breath sounds absent on 1 side



Management

- Secure airway
- Correct hypoxia
- Watch for tension pneumothorax
- IV access
- Needle Thoracostomy?





Hyperventilation

- Increased minute volume
- Underlying problem: too much oxygen and not enough carbon dioxide (ACID/BASE DISRUPTION)
- Assessment/Associated Symptoms
 - Tachypnea
 - Numbness and tingling of fingers, toes, mouth (Carpopedal spasms)



- Breath sounds are present on both sides
- Oxygen Saturation is greater than 94% on room air





Management

- Secure airway
- Correct respiratory rate – slow down
- Oxygen by mask as 6 liters
- IV access





Central Nervous System Dysfunction -- Brain

- Head trauma, stroke, brain tumor, insulin shock, drug toxicity
- Underlying Problem: VENTILATION

Assessment/Associated Symptoms

slow shallow breathing

decreased tidal volume and minute volume

cyanosis



Management

- Secure airway
- Correct hypoxia
- May need to assist ventilations
- IV access
- Treat underlying cause if able





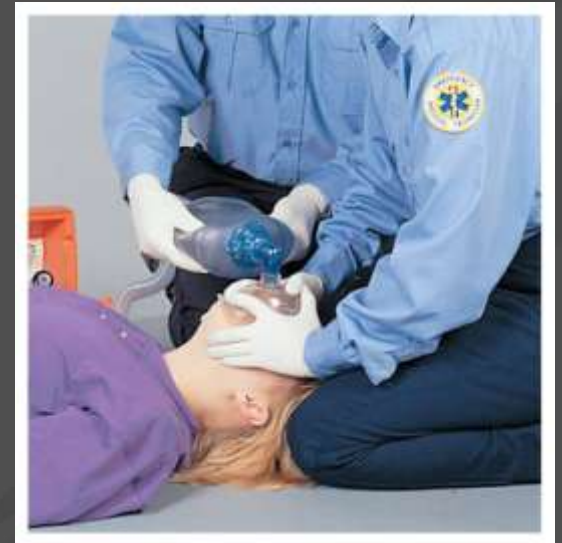
Central Nervous System Dysfunction– Spinal Cord

- Trauma, polio, multiple sclerosis, myasthenia gravis, ALS
- Underlying problem: Ventilation
- Assessment/Associated Symptoms:
 - Slow shallow respirations
 - Poor use of chest muscles
 - Decreased tidal volume and minute volume



Management

- Secure airway
- Correct hypoxia
- May need to assist ventilations
- IV access





Respiratory Failure

- Inability of the to meet the basic demands for tissue oxygenation
- Underlying Problem: VENTILATION, PERFUSION, DIFFUSION





- Assessment/Associated Symptoms:
 - Gradual onset of
 - Inadequate oxygen production
 - Inadequate CO₂ removal
 - Tachycardia and Tachypnea
 - Followed in end stages by
 - Bradycardia and Bradypnea
 - Cyanosis
 - Poor chest wall movement
 - Profound acidosis



Management

- Open airway and mechanically ventilate
- IV access and correct hypovolemia
- Work to correct underlying problem



CASES



Scenario 1: Dispatched to a 35yom

“Asthma Attack”

- **Events**

- Woke up with wheezing, went to work with Combivent and Proventil, came home with inhalers empty and barely able to talk

- **Meds**

- Combivent (albuterol + ipratropium), Proventil (albuterol), Intal (cromolyn), Accolate (zafirlukast), regular allergy shots

Wife tells you he is out of his Intal and Accolate

- **Allergies**

- Molds, pollen, animal dander, mushrooms, penicillin, tetracycline

- **PMH**

- Asthma since childhood; intubated several times as child; last admission 5 yr ago, no ET required; relocated to this area 3 months ago



Scenario 1

- Vital Signs
 - BP 90/52
 - RR 32
 - O₂ Saturations 86%
 - Lung Sounds - silent in bases, wheezes in upper lobes
- Issues to consider
 - Fatigue factor
 - Significance of history
 - Hydration status
 - Response to medications



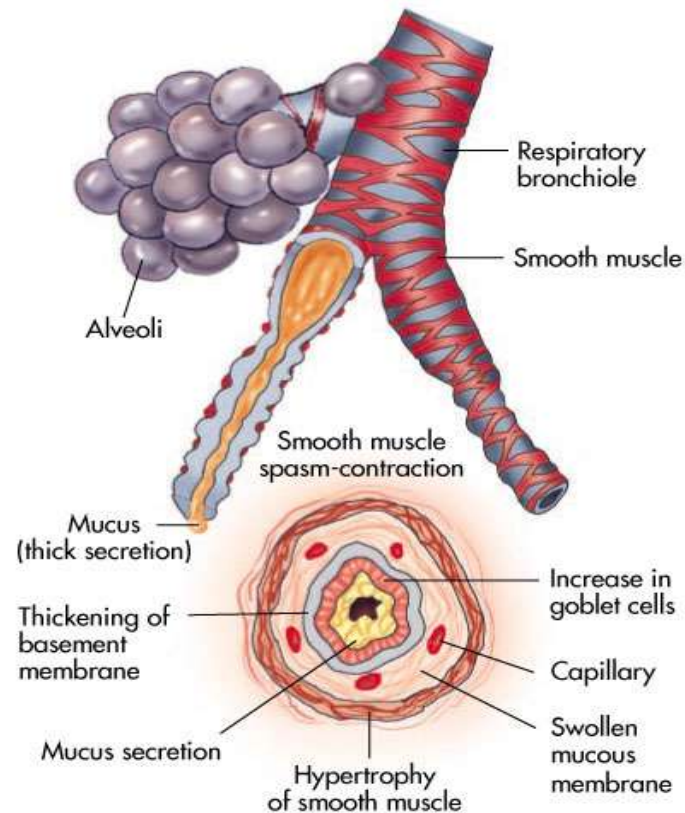
Scenario 1

- Treatment
 - Assisted Ventilations?
 - CPAP?
 - Fluid Replacement?
 - Medications
 - Epinephrine SQ?
 - Duo Neb tx?
 - Albuterol tx?



Scenario 1

- Treatment
 - Epi IM 0.3 mg, 1:1,000 SQ
 - Continuous Albuterol Nebulized Tx
 - IV x 2 - 500 ml bolus given
- Pt improved enroute to hospital and was admitted for overnight observation



In asthma, the process of bronchoconstriction involves both the sympathetic (inhibition of) and parasympathetic (stimulation of) systems.



Symptom	Mild	Moderate	Severe	Arrest Imminent
Breathlessness	While walking Can lie down	While talking, Prefers sitting	While at rest Sits upright	
Talks in . . .	Sentences	3-4 word phrases	Single words or not at all	Unable to talk
Alertness	May be agitated	Agitated	Agitated	Drowsy or confused
Resp Rate	Increased	Increased	Often >30	
Accessory Muscle Use	None	Common	Present	Paradoxical chest- abdominal movement
Wheeze	Often only end exhalation	Throughout exhalation	Inhalation and exhalation	No sound
Pulse/min	< 100/min	100-120 (Age appropriate)	>120 (Age appropriate)	Bradycardia (Age appropriate)
Paradoxical Pulse	Absent	May be present	Present	Absence suggests resp. muscle fatigue



Scenario 2: Dispatched to a 54yof with “SOB”

- 54 yof presents with CC of shortness of breath
- Sitting in chair, supporting herself by leaning on table
- Appears pale, tired affect, and awake
- Husband is present



Scenario 2

- **Initial Assessment**
 - Airway clear
 - Breathing at 22/min, non-labored, seems out of breath when talking, LS Clear Bilaterally
 - Circulation
 - Skin pale, warm and dry
 - VS: P radial @ 92 and regular, R 22, BP 156/90



Scenario 2

- **Events**

- States she was doing laundry when she suddenly felt like she couldn't catch her breath so she sat down. Now she is feeling better but feels "weak".

- **PMH**

- HTN, Diabetes, Iron Deficiency Anemia

- **Meds**

- Timolol, Glucophage, and Iron

- **Allergies**

- Vasotec (enalapril)



Scenario 2

- **Issues to Consider**
 - **Age/Gender**
 - Atypical MI
 - Pain perception
 - **Compliant with medications**
 - **Effect of diabetes**
 - Peripheral neuropathy
 - Unrecognized infection
 - Unrecognized diabetic related reaction
 - DKA/Hypoglycemia



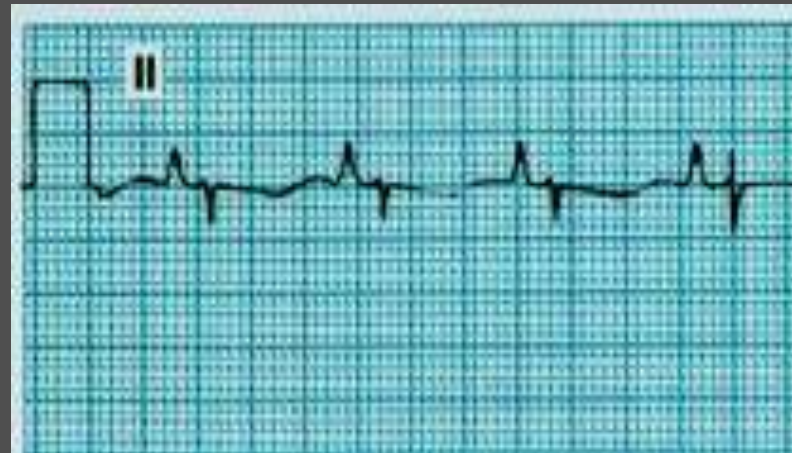
Scenario 2

- How would you begin treatment?
 - Oxygen
 - IV ??
- Is there any additional assessment you would like to do?
 - Diagnostic tests?
 - Additional physical findings?
 - Any additional history?



Scenario 2

- Diagnostics tests
 - BGL 230 mg/dl
 - SaO₂ 96%
 - ECG



– Now what would you like to do?



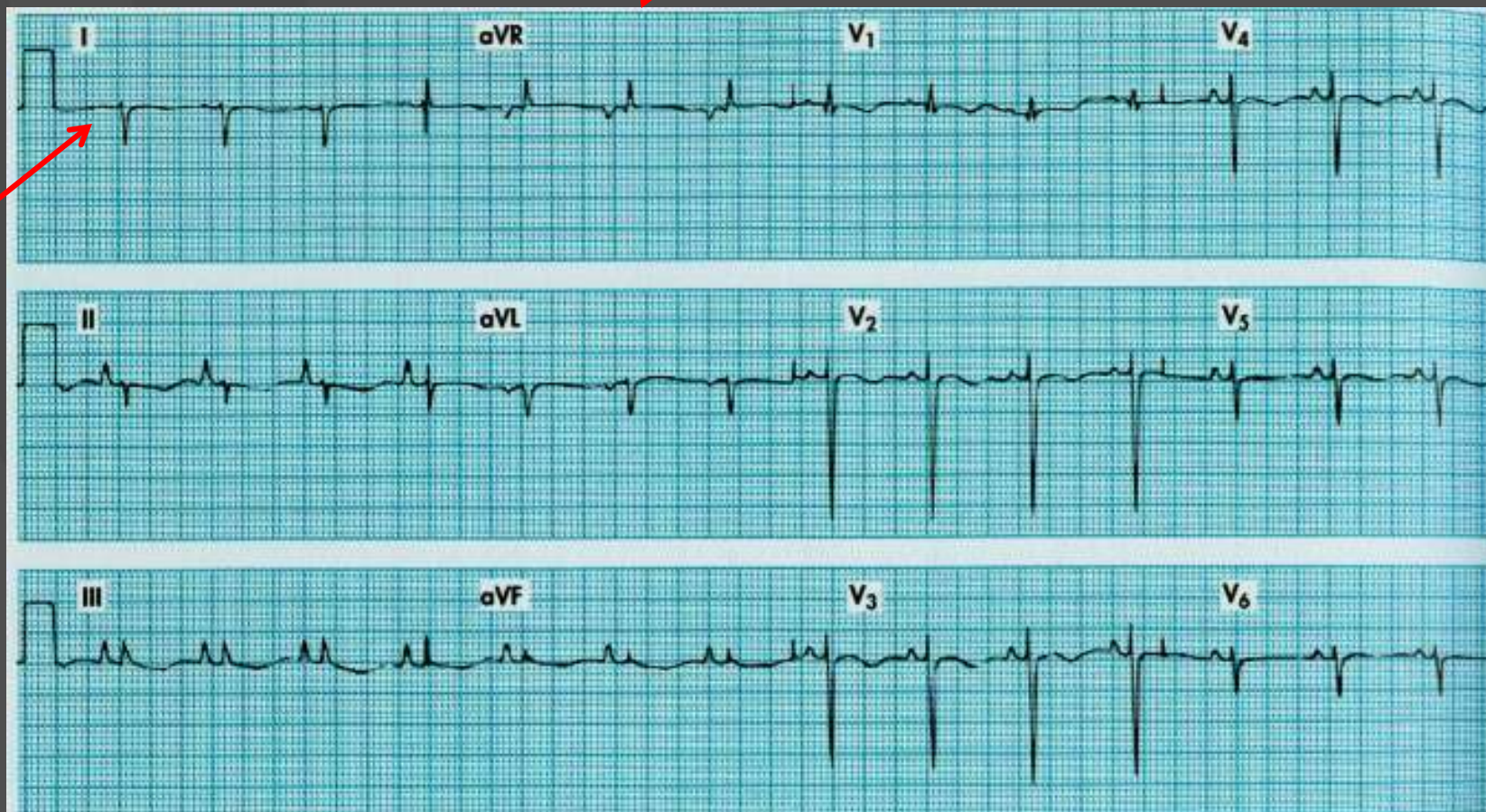
Scenario 2

- Additional History
 - Has “aggravated” old skiing injury in R knee and had “ache” in chest “because I’ve been moving furniture this week”. Denies “ache” now.
- Additional Physical
 - R knee appears normal
 - Complains of pain when back of knee palpated
 - Feels warm to the touch
 - Denies pain on palpation to chest wall



Limb Lead Reversal?

Scenario 2





Scenario 2

- What is in your differential now?
 - Occult MI?
 - PE?
 - Costochondritis?
 - *Benign inflammation of the costal cartilage, which is a length of cartilage which connects each rib*
 - Pneumonia?
 - Something else?

How would you continue treatment?



Scenario 2

- O2 NRM at 15 Lpm
- IV NS at tko
- ASA, 320 mg
- Repeat VS: P 96, R 22, BP 142/88
- Denies any pain or discomfort

What about nitro???

Risk/Benefit??



Scenario 2

- Outcome
 - 2nd ECG unchanged
 - ABG's: pH 7.43, pCO₂ 58, pO₂ 80
 - *Normal ~ pH 7.35-7.45, pCO₂ 35-45, pO₂ 80-100*
 - Contrast CT showed multiple PE
 - Troponin level WNL
 - Admitted and started on heparin



Points on PE

- Few consistent presentations
- Requires high index of suspicion
- Assessment Includes:
 - Recent fractures
 - Hip/Pelvis
 - Leg/Arm
 - Long flights
 - Calf Pain (Deep Vein Thrombus (DVT)), swelling and warm/hot to the touch



Pulmonary Emboli: There's Never Just One



No consistent sign or symptom . May c/o sudden onset SOB (85%), sharp pleuritic chest pain (75%), anxiety (60%), syncope (10%) May find tachypnea (90% > 16), tachycardia (40%), etc.





Interesting Facts of PE

- Type of emboli may determine s/s
 - Clot vs fat vs amniotic fluid vs foreign substance (IV drug users)
- Typically have multiple small emboli (dyspnea, pleuritic pain) prior to “big one” (hypotension and shock)
 - 95% from deep veins of pelvis and legs
- Risk factors include immobilization, orthopedic surgery, COPD, pregnancy, smoking and BCP, especially the latter two



Scenario 3: Dispatched to a 75yof with “SOB”

- Your patient is sitting bolt upright with a hand held fan blowing in her face, attempting to give herself a nebulizer treatment (wt. 120 kg)
- She appears ashen and diaphoretic
- She is awake, alert and anxious
- Her husband is with her, holding her medications and an Epi-Pen™



Scenario 3

- Events
 - Her husband tells you she had onset of SOB when it started to rain 30 minutes ago and it got progressively worse.
 - About 5 minutes prior to your arrival she gave herself the Epi-Pen
 - Husband states she was feeling okay but was a “little” SOB when she got up this am & didn’t feel bad until it started to rain.



Scenario 3

- Assessment
 - Airway – open and clear
 - Breathing – 28/min, unable to talk, LS silent in bases, faint wheezes in upper R lobe, using accessory muscles to breathe
 - Circulation – Skin ashen, cool & clammy VS: P 130 irregular, R 28 & labored, BP 156/100



Scenario 3

- **PMH**
 - AMI x 3, Stent 1 yr ago, Asthma, COPD
- **Meds**
 - Lasix, Aldactazide, K-Dur, Lanoxin, Albuterol, Combivent, Serevent, Prednisone, EpiPen, Home Nebulizer Equipment
- **Allergies**
 - Pollen, Animal Dander, Mold, Many Foods, has had severe allergic reactions to mold



Scenario 3

- Additional information
 - Per husband she got scared so she administered the EpiPen to herself in her L thigh
 - Most pill bottles are empty, husband states she ran out two days ago and was waiting for SS check to get meds
 - Upon observation, you note that she is unable to seal her lips around the mouth piece of the home nebulizer



Scenario 3

- Additional Assessment
 - SaO₂ 78%
 - She denies any pain or discomfort
 - Obeys command
- What else do you need to check?
 - Legs have 4+ pitting edema to her knees



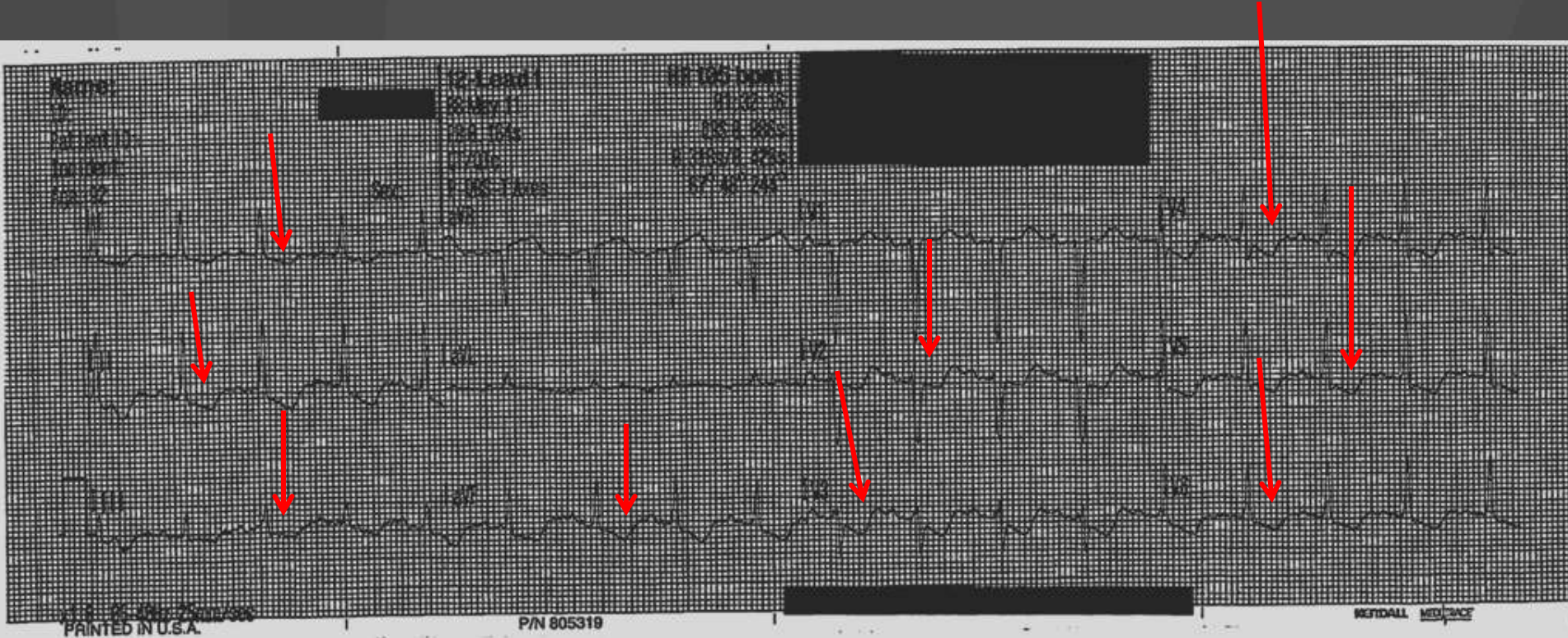
Scenario 3

- Issues to Consider
 - Epinephrine on board
 - Medications
 - Hx of AMI in past
- What's in your differential?
 - CHF?
 - Asthma?
 - Allergic Rx?
 - Combination of Above?



Global Hypoxia

Scenario 3





Scenario 3

- How would you begin treatment?
 - O2 – how?
 - CPAP?
 - BVM?
 - Advanced Airway?
 - IV – how many and how fast?
 - Pharmacologic tx?
 - Nitro?
 - Duo Neb?
 - Albuterol?



Scenario 3

- Treatment
 - CPAP at 10 cm H₂O pressure
 - IV x 2 at tko
 - Ntg x 3
 - In-line Duo Neb x 1
 - In-line Albuterol x 1
 - Repeat VS
 - VS P 90 and irregular, R 22 with bilateral wheezes, BP 138/86, SaO₂ 98%
 - Talking in 5-6 word phrases



Scenario 3

- At ED
 - Doesn't want to give up her CPAP
 - Lasix – total dose of 160 mg
 - Ntg – drip
 - Urine output in ED 1.2 L
 - Admitted for cardiac workup, lung function tests and medication adjustment
- Diagnosis: Acute onset CHF



CHF vs Asthma Tidbits

- CHF and Asthma often co-exist
 - They will precipitate each other
- Thorough assessment to determine which to treat first
- Rule of thumb
 - In older patient, treat CHF first, reassess
 - If wheezes not gone by use of CPAP or first round of meds, consider Albuterol



Take Home Points

- There is no direct relationship between hypoxia and the severity of respiratory distress
- The Respiratory and Cardiovascular Systems are inter-related
- Therefore, the chief complaint of difficulty breathing:

Always warrants a complete assessment



What do you know? Question 1

- You are in a restaurant when a middle-aged man at the next table begins to act strangely while eating steak. He appears to be in acute distress but is completely silent. His eyes are open wide and he is staggering about. As you approach him, he slumps into your arms unconscious. What has possibly happened to this man?
 - A. Acute asthma attack
 - B. Emphysema
 - C. Foreign body airway obstruction
 - D. Hyperventilation



Question 1 part B

- How do you want to manage the patient in question 1?
 - A. call 911 and apply oxygen
 - B. call 911 and attempt BLS maneuvers to remove a Foreign Body
 - C. call 911 and administer an epi-pen
 - D. Begin CPR



Question 2

- You are called to attend a 56-year old man whose chief complaint is dyspnea. He states that he has a chronic cough that has gotten worse over the last few days. The sputum he is coughing up has changed in color from white to yellow/green. The man is heavy set and has a cyanotic color. He has loud wheezes and gurgling in his chest. His vitals are BP 150/90, Pulse 110 and respirations 28. Oxygen saturation on room air is 88%. What is wrong with this man?
 - A. Acute foreign body airway obstruction
 - B. Allergic reaction to the environment
 - C. Asthma
 - D. Chronic bronchitis with an acute infection



Question 2 part B

- How do you want to manage the patient in question 2?
 - A. apply oxygen
 - B. attempt BLS maneuvers to remove a Foreign Body
 - C. administer an epi-pen
 - D. begin CPR



Question 3

- You are called to help a 24 year old woman with difficulty breathing. She is sitting up when you find her, bending forward and fighting to breathe. Her chest is not moving much and only faint wheezing can be heard when you listen to her chest. She is so short of breath that she cannot talk. She takes inhalers daily. What is wrong with this patient?
 - A. Acute asthma attack
 - B. Airway obstruction from a Foreign body
 - C. Hyperventilation syndrome
 - D. Pneumonia



Question 3 part B

- How do you want to manage the patient in question 3?
 - A. apply oxygen
 - B. attempt BLS maneuvers to remove a Foreign Body
 - C. administer an epi-pen
 - D. apply oxygen and assist the patient with taking her inhaler or (advanced providers) administer albuterol



Question 4

- You are called to a restaurant to attend a patient in respiratory distress. Speaking hoarsely, he tells you that he was eating shrimp cocktail and that his throat feels swollen. He tells you that he has been allergic to lobster in the past. You notice that he has swelling of his lips and hives on his face. His respiratory distress is increasing and his respirations are wheezing and shallow. What is wrong with this patient?
 - A. Acute asthma attack
 - B. Acute allergic reaction
 - C. Acute foreign body airway obstruction
 - D. Chronic bronchitis



Question 4 part B

- How do you want to manage the patient in question 4?
 - A. apply oxygen
 - B. attempt BLS maneuvers to remove a Foreign Body
 - C. apply oxygen and administer an epi-pen
 - D. begin CPR



Question 5

- A 60 year old woman has been unable to walk since surgery. She has been either in bed or in a chair for several weeks. She only walks to the bathroom and back. Suddenly she feels extremely short of breath and has developed sharp chest pain . You find her anxious with labored respirations. Her vitals are BP 100/60, pulse 120, respirations 28, oxygen saturation 90% on room air. What is most likely wrong with this woman?
 - A. Acute asthma attack
 - B. Pulmonary emboli
 - C. Acute myocardial infarction
 - D. Acute allergic reaction



Question 5 part B

- How do you want to manage the patient in question 5?
 - A. apply oxygen and transport immediately
 - B. apply oxygen and administer albuterol by nebulizer
 - C. apply oxygen and administer an epi-pen
 - D. begin CPR and prepare to defibrillate



Question 6

- You are called to a large party for a man who is short of breath. You find a thin 19 year old man who is breathing 40 times a minute. His respirations are not wheezing and his skin is pink, warm and dry. He is very anxious and complaining of tightness in his chest. His fingers are painful and cramped. What is wrong with this patient?
 - A. Acute asthma attack
 - B. Acute myocardial infarction
 - C. Hyperventilation syndrome
 - D. Foreign body airway obstruction



Question 6 part B

- How do you want to manage the patient in question 6?
 - A. apply oxygen by mask at 6 liters and attempt to slow breathing
 - B. attempt BLS maneuvers to remove a Foreign Body
 - C. apply oxygen and administer an epi-pen
 - D. begin CPR and prepare to defibrillate



Question 7

- You respond to a house fire to assist a 30 year old woman. She has facial burns with singed eyebrows and nasal hairs. Her voice is very hoarse and she has soot in her sputum. What two airway emergencies are going on with this lady?
 - A. Toxic inhalation and chronic bronchitis
 - B. Acute asthma attack and airway burns
 - C. Foreign body obstruction and chronic bronchitis
 - D. Toxic inhalation and airway burns



Question 7 part B

- How do you want to manage the patient in question 7?
 - A. apply oxygen, if Advanced provider prepare to intubate
 - B. attempt BLS maneuvers to remove a Foreign Body
 - C. apply oxygen and administer an epi-pen
 - D. begin CPR and prepare to defibrillate



Question 8

- Most respiratory emergencies are due to a failure of:
 - A. Perfusion
 - B. Ventilation
 - C. Diffusion of gases
 - D. All of the above



Question 9

- Respiratory emergencies are frequently complicated by:
 - A. Inflammation
 - B. Mucus production
 - C. History of toxic exposure such as cigarette smoke
 - D. All of the above



Question 10

- Hypoxia, low oxygen delivery to the cells can be caused by:
 - A. Hypoxic hypoxia – insufficient oxygen
 - B. Anemic hypoxia – insufficient red blood cells
 - C. Stagnant hypoxia – shock
 - D. Histotoxic hypoxia – oxygen unable to download at the cell
 - E. All of the above



Answers

- 1. C Part B. B
- 2. D Part B. A
- 3. A Part B. D
- 4. B Part B. C
- 5. B Part B. A
- 6. C Part B. A
- 7. D Part B. A
- 8. D
- 9. D
- 10. E



CONTROVERSIES IN AIRWAY MANAGEMENT

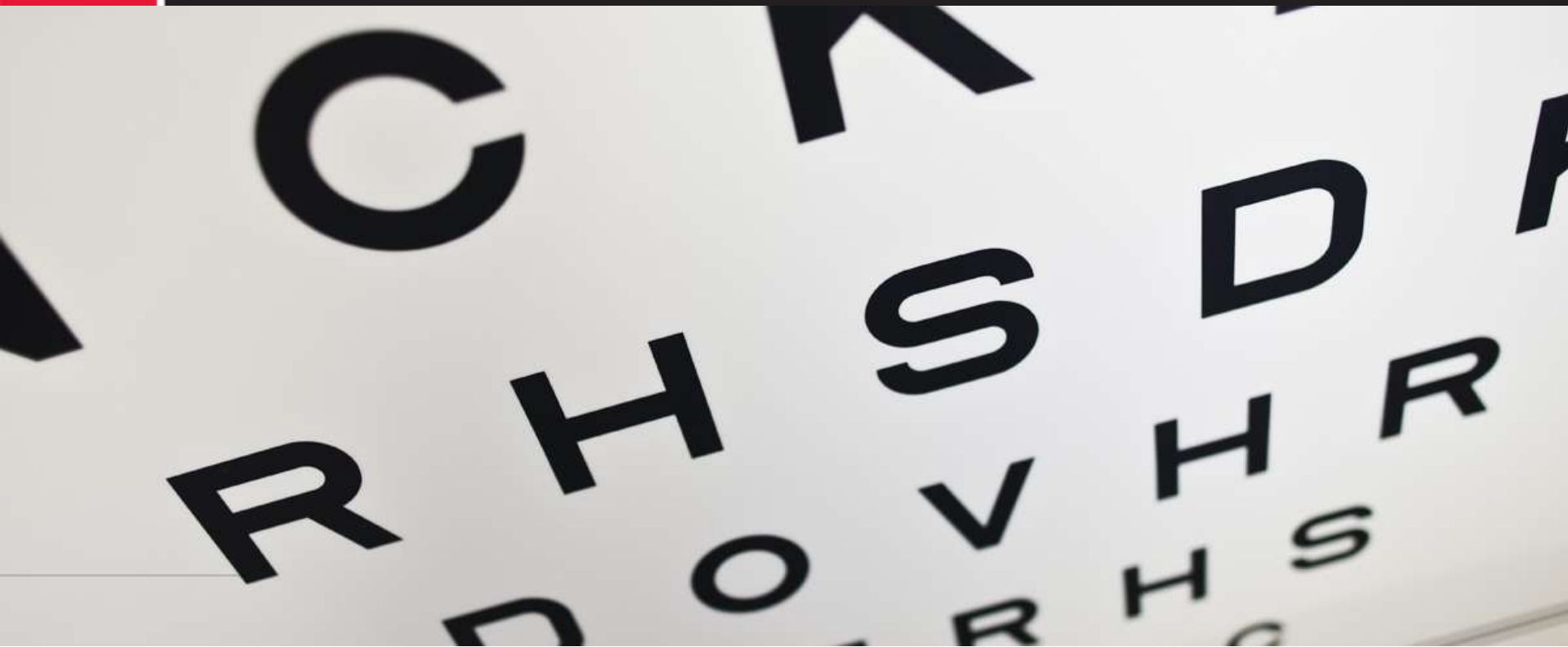


Endotracheal Intubation

Should we be doing it in the field?



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