Clinical Manifestations of Resp Dz

- Dyspnea
- Abnormal Breathing Patterns
- Hypoventilation
- Hyperventilation
- Cough
- Hemoptysis
- Cyanosis
- Pain
- Clubbing
- Abnormal Sputum

Dyspnea

- Difficulty breathing, Can't catch my breath, Short of breath, air hungry
- No exact cause
  - Length/tension inappropriateness theory
  - Chemoreceptors
  - Lung receptors
- S/S: flaring nostrils, accessory muscle use, retractions,
- DOE: early sign
- Orthopnea, PND

Abnormal Breathing Patterns

- Normal
  - tidal volume 400 – 800 ml; 6 – 20/min
  - Short expiratory pause
  - Sigh breaths 10-12 per hour
- Kussmaul (strenuous exercise or acidosis)
  - Large tidal volume; rapid rate
- Labored (obstructed) breathing
  - Slow rate, large tidal volume, prolonged insp or exp
- Restricted breathing
  - Rapid rate, small tidal volume

Abnormal Breathing Patterns

- Panting: exercise (small Kussmaul)
- Gasping: shock, cerebral hypoxia
- Sighing: anxiety
- Cheyne-Stokes: slowing of blood to brain stem
  - Alternating deep and shallow followed by apnea

Hypoventilation Hyperventilation

- Minute volume: (tidal volume) x (resp rate)
- Hypoventilation: in relation to metabolic demands
  - Hypercapnia ($PaCO_2 > 44$) → Resp Acidosis
  - Easy to overlook
  - Causes: Somnolence, disorientation, Secondary hypoxemia
- Hyperventilation
  - Hypocapnia ($PaCO_2 < 36$) → Resp Alkalosis
  - Caused by: Anxiety, head injury, inadequate oxygenation

Cough

- Physiologic reflex: remove mucous and foreign particles from airway
- Most initiated in Larnyx and bronchotracheal tree
  - Mechanical or chemical irritants
  - Others initiated: stomach, EAC, pericardium, pleura, stomach
- Acute: resolves 2-3 weeks
  - URI, allergic rhinitis, acute bronchitis, peneumonia, CHF, Pulmonary embolus, aspiration
- Chronic: last >3 weeks (or 7-8 weeks)
  - Postnasal, asthma, GERD, smokes, cancer, ACEI

Hemoptysis

- Coughing up bloody secretions
  - Usually bright red or pink, alkaline pH
  - Frothy sputum
- Etiology
  - Bronchiectasis, lung cancer, bronchitis, pneumonia
  - Worldwide: Tuberculosis
- Amount and onset

Cyanosis

- Desaturation of 5 g/dl of hemoglobin
- Causes
  - Decreased arterial oxygenation
  - Right to left shunts
  - Decreased CO
  - Cold environments
  - Anxiety
- Adults: not evident until extreme hypoxemia
  - Lips, buccal mucosa, nail beds

Pain

- Pleural (Pleuritic) Pain
  - Caused by movement of inflamed pleura
  - Sharp, well localized
  - Friction rub
  - Also present in infarction d/t Pulmonary embolism
- Pulmonary pain: central chest
  - Esp after coughing
  - Pulmonary hypertension
- Pain chest wall: rib, muscle, or cartilage
  - Can mimic pleural pain

Clubbing

- Selective bulbous enlargement of distal segment of a digit
- Graded 1 – 5 on severity
- Associated with diseases that impair oxygenation
  - Cystic fibrosis
  - Pulmonary fibrosis
  - Lung abcess
  - Congenital heart disease
- Lung cancer

Abnormal Sputum

- Color
- Consistency
- Amount
- Odor

- Sputum is not the same as saliva!!!!

Conditions Caused by Resp Disease or Injury

- Hypercapnia
- Hypoxemia
- Acute Respiratory Failure
- Pulmonary Edema
- Aspiration
- Atelectasis
- Bronchiectasis
- Bronchiolitis
- Pleural Abnormalities
- Abcess & Cavitation
- Pulmonary fibrosis
- Chest Wall restriction
- Flail chest
- Inhalation D/Os
- Systemic D/Os

Hypercapnia

- PaCO2 > 44
- Etiology: Decreased drive to breathe or inability to ventilate in response to drive
  - 1. Depression of resp center by drugs
  - 2. Diseases or injury to medulla
  - 3. Abnormalities in spinal conduction (poliomyelitis)
  - 4. Diseases of neuromuscular junction (myasthenia gravis or muscular dystrophy)
  - 5. Thoracic abnormalities
  - 6. Large airway obstructions
  - 7. Increased work of breathing

Hypercapnia

- Clinical manifestations:
- Primarily through decreased pH → resp acidosis
  - Electrolyte imbalance (K+ esp)
  - Arrhthymias
- Cerebral artery dilation → intracranial pressure
  - Somnolence
  - Coma
- Hypoxemia
- Loss of primary drive to breathe

Hypoxemia

- Reduced oxygenation of blood (not tissue)
- Etiology:
  - 1. Decreased O2 content of inspired air
    - Usually high elevation
    - Administer oxygen (or polycythemia)
  - 2. Hypoventilation
    - Often 2º hypercapnia
  - 3. Diffusion abnormalities
    - Thickened alveolar membrane or decreased surface area
    - Edema, Fibrosis, Emphysema
    - Usually not associated with hypercapnia

Hypoxemia

- Etiology Cont
  - 4. Abnormal V/Q ratios
    - Most common cause
    - Shunting: asthma, pulmonary edema, pneumonia
    - Pulmonary right-to-left shunt: blood is not oxygenated d/t shunting; does not respond to ↑ oxygen
      - ARDS, respiratory distress of the newborn
    - Dead space: pulmonary embolism

Hypoxemia

- Patho/Manifestations
  - Usually assoc w/ hyperventilation and resp alkalosis
  - Widespread tissue injury
  - Hypoxemic pulmonary vasoconstriction
  - Acute s/s: cyanosis, confusion, edema, ↓UOP

Acute Respiratory Failure

- Inadequate gas exchange
  - PaO2 ≤ 50 mmHg OR
  - PaCO2 ≥ 50 mmHg with pH ≤ 7.25
- Etiology: injury to lungs, airway, chest wall, or indirect damage (brain or nerves)
  - If ARF is primarily hypercapnic, then ventilatory assistance is needed (bag or vent)
  - If ARF is primarily hypoxemi, then O2 needed
  - If mixed, then need both

Pulmonary Edema

- Usually lung is fairly dry
  - Balance of hydrostatic and oncotic pressure
  - Lymphatic drainage
  - Surfactant repels water from alveoli
- Most common etiology is cardiac
  - Left sided failure results in backup of fluid
  - Lymphatic drainage can manage small amount
  - Eventually, lymphatic drainage becomes saturated, and edema develop
  - Usually occurs when left atrial pressure ≥ 20 mmHg
  - Can occur at lower temps if ↓ oncotic pressure

Pulmonary Edema

- Other Etiology
  - Increased pulmonary permeability (usually capillary injury or inflammation)
    - ARDS, inhalation toxic gas (ammonia)
  - Decreased lymphatic drainage
    - Cancer, fibrotic tissue, increased venous pressure of large pulmonary veins (heart failure)

Aspiration

- Passage of solid or liquid particles into lung
- Usually occurs with impaired swallowing, cough, or level of consciousness
  - Substance abuse, sedation, anesthesia, seizure, stroke, Myasthenia Gravis, Guillain-Barre
  - Enteral feeding
  - Tracheoesophageal fistula

Aspiration

- Manifestations: depend on what was aspirated
  - Large chunks of food may completely occlude a bronchus (or trachea in small children)
  - Low pH fluids/food may cause local inflammation that leads to bronchiectasis (surgery required)

Aspiration

- Aspiration pneumonia (especially if oral cavity colonized with bacteria)
- Pneumonitis
  - Bronchial damage (loss of cilia action, bronchospam, inflammation)
  - Alveolar hemorrhage, fibrosis, atelectasis
- Clinical manifestations
  - Choking, cough, vomiting, fever, dyspnea, wheezing
  - Recurrent lung infections, chronic cough

Aspiration

- Prevention is better than treatment
  - NURSING CARE!!!!!!
  - Raise HOB, don't eat reclining, thickened fluids, set enteral feedings slower, check NG tube placement
- Treatment
  - Aspiration pneumonitis has 50% mortality rate
  - Bronchoscopy
  - NG suction
  - Mechanical ventilation, O2, PEEP
  - Antibiotics is indicated

Atelectasis

- Collapse of lung tissue
- Compression atelectasis
  - External pressure: tumor, pleural effusion, abdominal distension
- Absorption atelectasis
  - Gradual collapse 2° hypoventilation or obstructed airway
- Manifestations
  - Dyspnea, cough, fever, leucocytosis

Atelectasis

- Treatment
  - Compression: relieve compression
  - Absorption: deep breathing
    - Promotes ciliary clearing of secretions
    - Stabilizes alveoli by spreading surfactant
    - Permits collateral ventilation through pores of Kohn

Bronchiectasis

- Persistent abnormal dilation of bronchi
  - Usually occurs w/ other respiratory conditions
  - Also occurs with systemic disorders
    - AIDS, IBD, rheumatologic disease
  - Cause is found < 40% of cases
- Dilation
  - Cylindrical
  - Saccular
  - Varicose
- Manifestations: copious sputum, hemoptysis, hypoxemia

Bronchiolitis

- Inflammatory Obstruction of bronchioles
- Most common in children
- Viruses or inhalation of toxic gas
- Atelectasis or emphysema distally
- Usually diffuse
- Manifestations
  - Tachypnea, accessory muscle use, fever, dry cough, hyperinflated chest, hypoxemia
- Treatment: abx, steroids, chest therapy
- Bronchiolitis obliterans: late stage fibrosis

Pleural Abnormalities

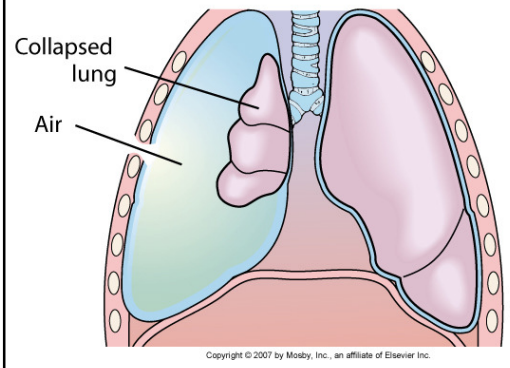
- Pneumothorax
- Pleural effusion
- Empyema

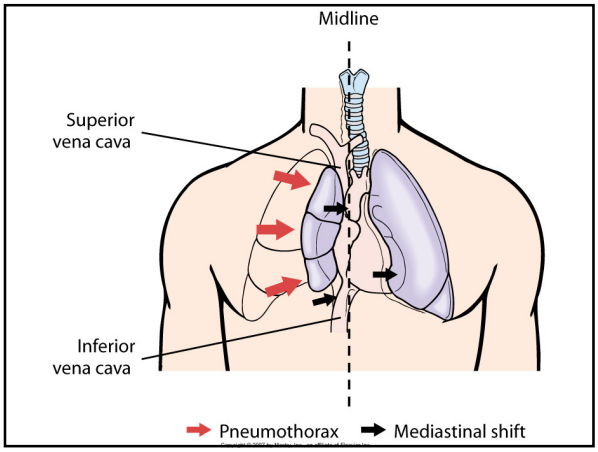
Pneumothorax

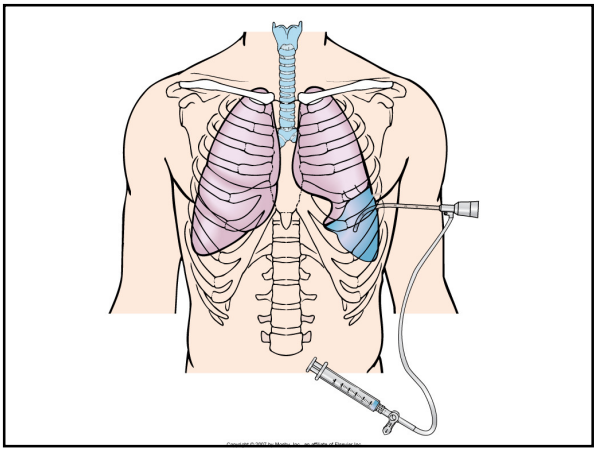
- Presence of air or gas in pleural space
  - Destroys negative pressure
  - Lung recoils and collapses
- Types
  - Open (communicating): pressure equalization
  - Tension: one way valve
  - Spontaneous: rupture of blebs
  - Secondary: resulting from chest trauma

Pneumothorax

- Small: vigilance, O2, aspiration
- Large: chest tube with suction
- Tension: life threatening!!!
  - Severe hypoxemia, dyspnea, hypotension, deviation of trachea away from pneumo
- Pleurodesis
  - Installation of caustic substance into pleural space that causes inflammation and scarring

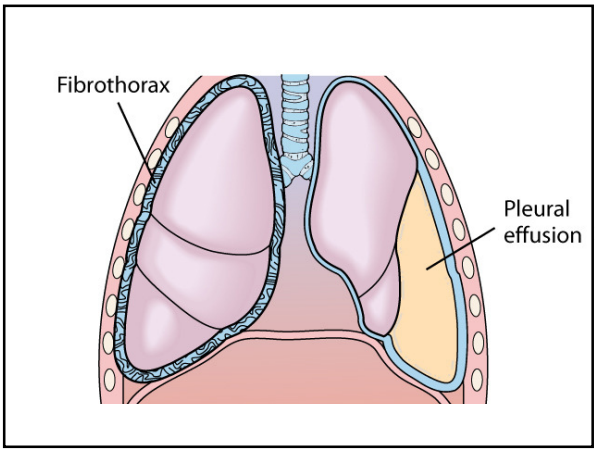




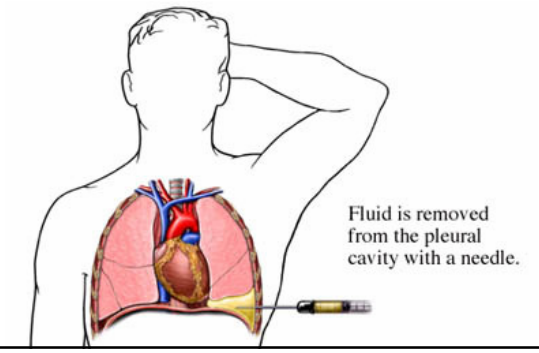


Pleural effusion

- Fluid in pleural space
  - Usually from blood vessels or lymphatics
  - Can cause compression atelectasis
  - Lung does not collapse
  - Fluid
    - Transudate
    - Exudate
    - Chyle: fatty lymph fluid
    - Empyema: pus (need antibiotics)



Thoracentesis



Abcess Formation & Cavitation

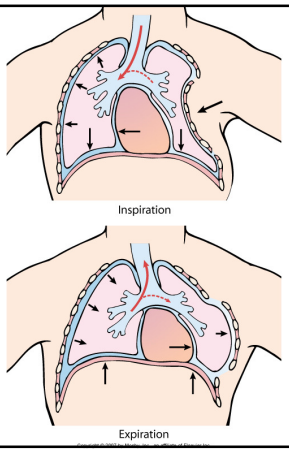
- Abcess: circumscribed area of suppuration and destruction of lung parenchyma
  - Usually occurs after consolidation (alveoli fill with pus, fluid, microorganisms)
  - Most common cause: pneumonia from aspiration, Klebsiella, or Staphylococcus
- Cavitation: emptying of an abcess
- Tuberculosis

Pulmonary Fibrosis

- Excessive scar tissue
  - Reduces ability of lung tissue to expand and compress with ventilation
  - May slow alveolar diffusion

Chest Wall Problems

- Chest Wall Restriction
  - Difficulty breathing d/t chest abnormality
  - Kypho-scoliosis, morbid obesity
- Flail Chest
  - Fracture of several consecutive ribs
  - Chest wall and lung flails in and out
  - Pain, dyspnea, unequal expansion, hypoventilation
  - Internal fixation



Inhalation Disorders

- Exposure to toxic gases
  - Smoke, ammonia, hydrogen chloride, sulfur dioxide, nitrogen dioxide
  - Severe inflammation, pulmonary edema
  - Oxygen toxicity
- Pneumoconiosis: change in lung
  - Silicosis, asbestosis, coal miner lung
- Allergic alveolitis