RESPIRATORY SYSTEM

ANATOMY

- Comprised of the upper airway and lower airway structures.
- **Upper respiratory system**
- Filters, moistens and warms air during inspiration.
  - **Nose**
    - ✓ Serves as a passageway for air to pass to and from the lungs. It filters impurities and humidifies and warms the air as it is inhaled
  - **Paranasal Sinuses**
    - ✓ Prominent function of the sinuses is to serve as a resonating chamber in speech
  - **Pharynx**
    - Throat, is a tube-like structure that connects the nasal and oral cavities to the larynx
  - **Larynx**
    - ✓ Voice organ, is a cartilaginous epithelium lined structure that connects the pharynx and the trachea.
    - ✓ The major function is for vocalization
  - **Trachea (Windpipe)**
    - ✓ Serves as the passage between the larynx and the bronchi
- **Lower respiratory system**
  - Enables the exchange of gases to regulate serum PaO_2, $PaCO_2$ and pH.
  - **Lungs**
    - ✓ Paired elastic structures enclosed in the thoracic cage, which is an airtight chamber with distensible walls
- **Pleura**
  - ✓ Serous membrane that lined the lungs and wall of the thorax
- **Bronchi and Bronchioles**
- **Alveoli**
  - ✓ Basic gas-exchange unit of the respiratory system is the alveoli.
  - ✓ **Alveolar stretch receptors** respond to inspiration by sending signals to inhibit inspiratory neurons in the brain stem to prevent lung over distention.
  - ✓ During expiration stretch receptors stop sending signals to inspiratory neurons and inspiratory is ready to start again.
  - ✓ Oxygen and carbon dioxide are exchanged across the alveolar capillary membrane by process of **diffusion.**
  - ✓ Neural control of respiration is located in the **medulla.** The respiratory center in the medulla is stimulated by the **concentration of carbon dioxide in the blood.**
  - ✓ **Chemoreceptors,** a secondary feedback system, located in the carotid arteries and aortic arch respond to hypoxemia. These chemoreceptors also stimulate the medulla.

DISORDERS OF THE UPPER RESPIRATORY SYSTEM

RHINITIS

- A group of disorders characterized by inflammation and irritation of the mucous membranes of the nose
- **Allergic rhinitis**
  - Further classified as **seasonal rhinitis** (occurs during pollen seasons) **or perennial rhinitis** (occurs throughout the year)
  - Commonly associated with exposure to airborne particles such as dust, dander, or plant pollens in people who are allergic to these substances
  - **Clinical Manifestations**
    - ✓ Rhinorrhea (excessive nasal drainage, runny nose)
    - ✓ Nasal congestion
    - ✓ Sneezing
    - ✓ Pruritus of the nose, roof of the mouth, throat, eyes, and ears
  - **Management**
    - ✓ Antihistamines
    - ✓ Corticosteroid nasal sprays
    - ✓ Desensitizing immunizations
- **Nursing Intervention**
  - ✓ Instruct the patient with allergic rhinitis to avoid or reduce exposure to allergens and irritants
  - ✓ Instructs the patient in correct administration of nasal medications

- ✓ To achieve maximal relief, the patient is instructed to blow the nose before applying any medication into the nasal cavity

VIRAL RHINITIS (COMMON COLD)

- Most frequent viral infection in the general population caused by coronavirus
- Highly contagious because virus is shed for about 2 days before the symptoms appear and during the first part of the symptomatic phase
- **Clinical Manifestation**
  - ✓ Low-grade fever
  - ✓ Nasal congestion
  - ✓ Rhinorrhea and nasal discharge
  - ✓ Halitosis, sneezing
  - ✓ Tearing watery eyes
  - ✓ "Scratchy" or sore throat
  - ✓ General malaise, chills
  - ✓ Headache and muscle aches
- **Management**
  - ✓ Symptomatic therapy
  - ✓ Adequate fluid intake and rest
  - ✓ Prevention of chilling
  - ✓ Warm salt-water gargles to soothe the sore throat
  - ✓ NSAIDs to relieve aches and pains
  - ✓ Antihistamines are used to relieve sneezing, rhinorrhea, and nasal congestion
  - ✓ Inhalation of steam or heated, humidified air

ACUTE PHARYNGITIS

- ❖ A sudden painful inflammation of the pharynx, the back portion of the throat that includes the posterior third of the tongue, soft palate, and tonsils
- ❖ Commonly referred to as a **sore throat**
- ❖ **Clinical Manifestations**
  - Fiery-red pharyngeal membrane and tonsils
  - Swollen lymphoid follicles
  - Enlarged and tender cervical lymph nodes
  - Fever
  - Malaise
  - Sore throat
- ❖ **Pharmacologic Therapy**
  - **Penicillin** is the treatment of choice
  - Cephalosporins
  - Macrolides
  - Gargles with benzocaine may relieve symptoms
- ❖ **Nursing Interventions**
  - Liquid or soft diet is provided during the acute stage
  - Cool beverages, warm liquids, and flavored frozen desserts such as Popsicles are often soothing
  - Warm saline gargles or throat irrigations
  - Increase oral fluid intake
  - Ice collar can relieve severe sore throats
  - CBR during febrile stage
  - Instruct the patient about preventive measures

CHRONIC PHARYNGITS

- ❖ Chronic pharyngitis is a persistent inflammation of the pharynx. It is common in adults, who work in dusty surroundings, use their voice to excess, suffer from chronic cough, or habitually use alcohol and tobacco.
- ❖ Three types of chronic pharyngitis
  - **Hypertrophic –** characterized by general thickening and congestion of the pharyngeal mucous membrane
  - **Atrophic –** late stage of the first type (the membrane is thin, whitish, glistening, and at times winkled)

- **Chronic Granular** ("clergyman's sore throat") – characterized by numerous swollen lymph follicles on the pharyngeal wall

❖ **Clinical Manifestations**
- Constant sense of irritation or fullness in the throat
- Mucus that collects in the throat
- Difficulty swallowing

❖ **Management**
- Nasal sprays or medications containing ephedrine sulfate or phenylephrine hydrochloride
- Antihistamine decongestant medications
- Acetaminophen

❖ **Nursing Management**
- Instruct the patient to avoid contact with others until the fever subsides to prevent the spread of infection
- Avoidance of alcohol, tobacco, secondhand smoke, and exposure to cold or to environmental or occupational pollutants

TONSILITIS AND ADENOIDITIS
- The tonsils are composed of lymphatic tissue and are situated on each side of the oropharynx
- The adenoids or pharyngeal tonsils consist of lymphatic tissue near the center of the posterior wall of the nasopharynx
- Acute inflammation/infection that is usually caused by GABHS (group A beta-hemolytic streptococcus)

Clinical Manifestations
- Sore throat, fever, snoring and difficulty swallowing
- Enlarged adenoids may cause mouth-breathing, earache, draining ears, frequent head colds, bronchitis, foul-smelling breath, voice impairment, and noisy respiration

❖ **Management**
- Penicillin (first-line therapy) or cephalosporins
- Tonsillectomy or adenoidectomy is indicated if the patient has had repeated episodes of tonsillitis despite antibiotic therapy

❖ **Nursing interventions (post-op)**
- In the immediate postoperative period, the most comfortable position is prone, with the patient's head turned to the side to allow drainage from the mouth and pharynx
- Apply ice collar to the neck
- Assess for post op bleeding such as **frequent swallowing**
- Instruct the patient to **refrain from coughing** and too much talking
- Ice chips may be given to the patient
- Alkaline mouthwashes and warm saline solutions are useful in coping with the thick mucus and halitosis that may be present after surgery
- **Milk and milk products (ice cream and yogurt) may be restricted**
- Provide soft, adequate diet
- Instruct the patient to avoid vigorous tooth brushing or gargling
- Encourage the use of a cool-mist vaporizer or humidifier in the home
- Instruct patient to avoid smoking and heavy lifting or exertion for 10 days

PERITONSILLAR ABSCESS (QUINSY)

❖ Most common major suppurative complication of sore throat/tonsillitis. This collection of purulent exudate between the tonsillar capsule and the surrounding tissues, including the soft palate, may develop after an acute tonsillar infection that progress to a local cellulitis and abscess

❖ **Clinical Manifestations**
- Severe sore throat, fever trismus (inability to open the mouth), and drooling.
- Severe pain, raspy voice
- Odynophagia (a severe sensation of burning, squeezing pain while swallowing)
- Dysphagia (difficulty swallowing)
- Otalgia (pain in the ear), tender and enlarged cervical lymph nodes
- Airway obstruction may occur

Management
- Antimicrobial agents (Penicillin)
- Corticosteroid therapy

- Needle aspirations are performed to decompress the abscess

❖ **Nursing Interventions**
- Assist in performing intubation, cricothyroidotomy, or tracheotomy to treat airway obstruction
- Assist in needle aspiration when indicated
- Gentle gargling after the procedure with a cool normal saline gargle may relieve discomfort
- Provide cool liquids
- Instruct the patient to refrain from or cease smoking
- It is also important to reinforce the need for good oral hygiene

LARYNGITIS

❖ An inflammation of the larynx, often occurs as a result of voice abuse or exposure to dust, chemicals, smoke and other pollutans

❖ Most common cause is virus, bacterial invasion may be secondary

❖ **Clinical manifestations**
- Hoarseness of voice – initial sign
- **Aphonia** (complete loss of voice)
- Severe cough
- Throat feels worse in the morning and improves when the patient is in a warmer climate

❖ **Management**
- Instruct the patient to rest the voice and avoid irritants (including smoking)
- Inhaling cool steam or an aerosol is provided
- Administer antibacterial therapy as ordered
- Topical corticosteroids may be given by inhalation
- Increased oral fluid intake

CANCER OF THE LARYNX

❖ **Etiology**
- Most tumors of the larynx are squamous cell carcinoma
- Men > women, age 60-70
- Cigarette smoking and alcohol consumption are associated with laryngeal cancer

❖ **Clinical Manifestations**
- Hoarseness of voice for more than 2 weeks
- Persistent cough and sore throat
- Dyspnea
- Dysphagia
- Pain radiating to ear and burning sensation in the throat
- Weight loss
- Enlarged cervical lymph nodes
- Unilateral nasal obstruction

❖ **Diagnostic Procedures**
- Virtual endoscopy
- Optical imaging
- CT scan MRI
- Direct laryngoscopic examination

❖ **Management**
- Radiation therapy
- Chemotherapy
- Surgery:
  - ✓ **Partial Laryngectomy –** A portion of the larynx is removed, along with one vocal cord and the tumor
  Complication: change in voice quality or hoarseness of voice
  - ✓ **Total Laryngectomy** – Laryngeal structures are removed, including the hyoid bone, epiglottis, cricoid cartilage, and two or three rings of the trachea
  Complication: permanent loss of voice, salivary leak, wound infection, stomal stenosis and dysphagia

❖ **Nursing interventions**
- Arrange for clients with larnygectomies to meet with members of support groups
- Establish a method for communication before surgery
- Maintain airway; have suction equipment at bedside

- Observe for signs of hemorrhage or infection
- Teach about tracheostomy and stoma care
- Assist with period of grieving

DISORDERS OF THE LOWER RESPIRATORY SYSTEM

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

❖ Refers to a disease characterized by airflow limitation that is not fully reversible. The airflow limitations is generally progressive and is normally associated with an inflammatory response of the lungs due to irritants, COPD includes **chronic bronchitis and pulmonary emphysema**

❖ **Diagnostic Criteria:** Cough of 3 months for 2 consecutive years

❖ **Chronic Bronchitis**

- Chronic inflammation of the lower respiratory tract characterized by excessive mucous secretion, cough, and dyspnea associated with recurring infections of the lower respiratory tract characterized by three primary symptoms: chronic cough, sputum production, and dyspnea on exertion
- **Clinical Manifestations**
  - ✓ Blue bloater
  - ✓ Usually insidious, developing over a period of years
  - ✓ Presence of a productive cough lasting at least 3 months a year for 2 successive years
  - ✓ Production of thick, gelatinous sputum; greater amounts produced during superimposed infections
  - ✓ Wheezing and dyspnea as disease progresses

❖ **Emphysema**

- Complex lung disease characterized by destruction of the alveoli, enlargement of distal airspaces, and a breakdown of alveolar walls. There is a slowly progressive deterioration of lung function for many years before the development of illness
- 2 types:
  - ✓ Panlobular Emphysema – destruction of respiratory bronchiole, alveolar duct and alveolus
    - ➢ All air spaces within the lobule are essentially enlarged, but there is little inflammatory disease
    - ➢ Hyperinflated (hyperexpanded) chest, marked dyspnea on exertion, and weight loss typically occur
    - ➢ Negative pressure is required during inspiration to move air into and out of the lungs
    - ➢ Expiration becomes active and requires muscular effort
  - ✓ Centrilobular (Centroacinar) Emphysema – pathologic changes take place mainly in the center of the secondary lobule, preserving the peripheral portions of the acinus
    - ➢ There is a derangement of ventilation-perfusion rations, producing chronic hypoxemia, hypercapnia, **polycythemia,** and episodes of right-sided heart failure
    - ➢ Leads to central cyanosis and respiratory failure, and patient also develops peripheral edma
- **Clinical Manifestations**
  - ✓ Pink puffer
  - ✓ Dyspnea, decreased exercise tolerance
  - ✓ Cough may be minimal, except with respiratory infection
  - ✓ Sputum expectoration
  - ✓ **Barrel chest –** Increased anteroposterior diameter of chest due to air trapping with diaphragmatic flattening

❖ **Diagnostic Procedure for COPD**

- **Spirometry -** used to evaluate airflow obstruction
- **ABG levels –** decreased Pao2, pH, and increased CO2
- **Chest X-ray –** in late stages, hyperinflation, flattened diaphragm, increased retrosternal space, decreased vascular markings, possible bullae
- **Alpha-1-antitrypsin assay** useful in identifying genetically determined deficiency in emphysema

❖ **Medical Management for COPD**

- Smoking cessation
- Bronchodilators to relieve bronchospasm
- Inhaled and systemic corticosteroids
- Alpha 1-antitrypsin augmentation therapy
- Antibiotic agents, Mucolytic agents Antitussive agents, vasodilators and narcotics

- **Surgical Management**
  - **Bullectomy –** surgical removal of enlarged airspaces that do not contribute to ventilation but occupy space in the thorax
  - **Lung Volume Reduction Surgery –** removal of a portion of the diseased lung parenchyma
- **Nursing Interventions For COPD**
  - Pulmonary rehabilitation to reduce symptoms, improve quality of life and increased physical and emotional participation in everyday activities
  - **Pursed-lip breathing** helps slow expiration, prevents collapse of small airways, and helps the patient control the rate and depth of respiration
  - Instruct the patient to coordinate diaphragmatic breathing with activities such as walking, bathing, bending, or climbing stairs
  - Provide small frequent meals and offer liquid nutritional supplements to improve caloric intake and counteract weight loss
  - Administer low flow of oxygen (1-2L/min)
  - Administer bronchodilator as prescribed
  - Adequately hydrate the patient
  - Instruct the patient to avoid bronchial irritants
  - If indicated, perform CPT int the morning and at night as prescribed
  - Encourage alternating activity with rest periods
  - Teach relaxation technique or provide a relaxation tape for patient
  - Enroll patient in pulmonary rehabilitation program where available
  - Monitor respiratory status, including rate and pattern of respirations, breath sounds, and signs and symptoms of acute respiratory distress

BRONCHIAL ASTHMA

- Chronic inflammatory disease of the airways that causes airway hyperresponsiveness, mucosal edema, and mucus production is reversible and diffuse airway inflammation that leads to airway narrowing
- **Clinical Manifestations**
  - Three most common symptoms of asthma:
    - ✓ Cough
    - ✓ Dyspnea
    - ✓ Wheezing
  - Chest tightness, diaphoresis, tachycardia, and a widened pulse pressure, hypoxemia and central cyanosis
- **Pharmacologic Therapy**
  - There are two general classes of asthma medications:
    - ✓ **Quick relief medications** for immediate treatment of asthma symptoms and exacerbations
      - ➢ Short-acting beta2-adrenergic agonists (albuterol [Proventil Ventolin], levalbuterol [Xopenex], and pirbuterol [Maxair])
    - ✓ **Long acting medications** to achieve and maintain control of persistent asthma
      - ➢ Corticosteroids
      - ➢ Long-acting beta2-adrenegic agonists
      - ➢ Leukotriene modifiers (inhibitors)
      - ➢ Antileukotrienes, Montelukast (Singulair), zafirlukast (Accolate), and zileuton (Zyflo)
- **Nursing Interventions**
  - Assesses the patient's respiratory status by monitoring the severity of symptoms, breath sounds peak flow, pulse oximetry, and vital signs
  - Administer medications as prescribed and monitor the patient's responses to those medications
  - Administer fluids if the patient is dehydrated emphasize adherence to prescribed therapy, preventive measures, and the need to keep follow-up appointments with health care providers

BRONCHIECTASIS

- A chronic, irreversible dilation of the bronchi and bronchioles
- **Etiology**
  - Airway obstruction
  - Diffuse airway injury
  - Pulmonary infections and obstruction of the bronchus or complications of long-term pulmonary infections
  - Generic disorders such as cystic fibrosis

- Abnormal host defense (eg, ciliary dyskinesia or humoral immunodeficiency)
- Idiopathic causes

❖ **Diagnostic Procedure**
- **CT scan –** reveals bronchial dilation

❖ **Clinical Manifestations**
- Chronic cough with copious amount of purulent sputum
- Hemoptysis
- Clubbing of the fingers
- Repeated episodes of pulmonary infection

❖ **Management**
- Smoking cessation
- Chest physiotherapy
- Bronchoscopy to remove mucopurulent sputum
- Antimicrobial therapy based on result of culture and sensitivity of the sputum
- Influenza and pneumococcal vaccines
- Bronchodilators
- Surgical interventions for patients who continue to expectorate large amount of sputum and hemoptysis despite adherence to treatment regimen

❖ **Nursing intervention**
- Assess the patient in alleviating the symptoms and in clearing pulmonary secretions
- Encourage the patient in smoking cessation
- Educate the patient and his family in performing postural drainage
- Instruct the patient to avoid exposure to people with upper respiratory or other infection
- Assess nutritional status and ensure adequate diet

OCCUPATIONAL LUNG DISEASES

❖ **Asbestosis** is diffuse interstitial fibrosis of the lung caused by inhalation of asbestos dust and particles.
- Found in workers involved in manufacture, cutting and demolition of asbestos-containing materials

❖ **Silicosis** is a chronic pulmonary fibrosis caused by inhalation of silica dust
- Exposure to silica dust is encountered in almost any form of mining because the earth's crust is composed of silica and silicates (gold, coal, tin, copper mining); also stone cutting, quarrying, manufacture of abrasives, ceramics, pottery, and foundry work

❖ **Sarcoidosis**
- Granulomatous disease in which clumps of inflammatory epithelial cells occur in many organs, primarily in lungs.
- Lymph node enlargement seen on chest X-ray

❖ **Clinical Manifestations**
- Chronic cough; productive in silicosis
- Dyspnea on exertion; progressive and irreversible in asbestosis
- Susceptibility to lower respiratory tract infections
- Bibasal crackles in asbestosis

❖ **Management**
- There is no specific treatment; exposure is eliminated, and the patient is treated symptomatically
- Give prophylactic isoniazid (INH) to patient with positive tuberculin test, because silicosis is associated with high risk of TB
- Persuade people who have been exposed to asbestos fiber to stop smoking to decrease risk of lung cancer
- Keep asbestos worker under cancer surveillance; watch for changing cough, hemoptysis, weight loss, melena
- Bronchodilators may be of some benefit if any degree of airway obstruction is present

❖ **Nursing Interventions**
- Administer oxygen therapy as required
- Administer or teach self-administration of bronchodilators as ordered
- Encourage smoking cessation
- Advise patient on pacing activities to prevent fatigue
- Provide information to healthy workers on prevention of occupational lung disease

PENETRATING TRAUMA

- **Pneumothorax**
  - Pneumothorax occurs when the parietal or visceral pleura is breached, and the pleural space is exposed to positive atmospheric pressure
- **Simple/Spontaneous Pneumothorax**
  - Occurs when air enters the pleural space through a breach of either the parietal or visceral pleura. Most commonly, this occurs as air enters the pleural space through the rupture of a bleb or a bronchopleural fistula
- **Traumatic Pneumothorax**
  - A traumatic pneumothorax occurs when air escapes from a laceration in the lung itself and enters the pleural space or from a wound in the chest wall, it may result from blunt trauma (eg, rib fractures), penetrating chest or abdominal trauma (eg, stab wounds or gunshot wounds), or diaphragmatic fear
- **Open Pneumothorax**
  - One form of traumatic pneumothorax. It occurs when a wound in the chest wall is large enough to allow air to pass freely in and out of the thoracic cavity with each attempted respiration
- **Tension Pneumothorax**
  - Occurs when air is drawn into the pleural space from a lacerated lung or through a small opening or wound in the chest wall. It may be a complication of other types of pneumothorax. The air that enters the chest cavity with each inspiration is trapped. this causes the lung to collapse and the heart, the great vessels, and the trachea to shift toward the unaffected side of the chest (**mediastinal shift)**
- **Clinical Manifestations**
  - **Hyperresonance;** diminisher breath sounds
    - Reduced mobility of affected half of thorax
  - **Tracheal deviation** away from affected side in tension pneumothorax
    - Clinical picture of open or tension pneumothorax is one of air hunger, agitation, hypotension, cyanosis and profuse diaphoresis
  - **Mild to moderate dyspnea** and chest discomfort may be present with spontaneous pneumothorax
- **Management**

Spontaneous Pneumothorax

- Treatment is generally nonoperative if pneumothorax is not too extensive.
  - ✓ Observe and allow for spontaneous resolution for less than 50% pneumothorax in otherwise healthy person.
  - ✓ Needle aspiration or chest tube drainage may be necessary to achieve re-expansion of collapsed lung if greater than 50% pneumothorax
- Surgical intervention by pleurodesis or thoracotomy with resection of apical blebs is advised for patients with recurrent spontaneous pneumothorax

Tension Pneumothorax

- Immediate decompression to prevent cardiovascular collapse by thoracentesis or chest tube insertion to let air escape
- Chest tube drainage with underwater-seal suction to allow for full lung expansion and healing

Open Pneumothorax

- Close the chest wound immediately to restore adequate ventilation and respiration
  - ✓ Patient is instructed to inhale and exhale gently against a closed glottis (Valsalva maneuver) as a pressure dressing (petroleum gauze secured with elastic adhesive) is applied. This maneuver helps to expand collapsed lung
- Chest tube is inserted and water-seal drainage set up to permit evacuation of fluid/air and produce re-expansion of the lung
- Surgical intervention may be necessary to repair trauma

- **Nursing Intervention**
  - Apply petroleum gauze to sucking chest wound
  - Assist with emergency thoracentesis or thoracostomy
  - Position patient upright if condition permits to allow greater chest tubes
  - Maintain patency of chest tubes
  - Assist patient to splint chest while turning or coughing and administer pain medications as needed
  - Monitor oximetry and ABG levels to determine oxygenation
  - Provide oxygen as needed

PLEURAL CONDITIONS

PLEURAL EFFUSION

- Collection of fluid (transudate or exudate) in the pleural space
- Maybe a complication of heart failure, pulmonary infection or nephrotic syndrome
- Usually caused by underlying disease
- **Clinical Manifestations**
  - Dyspnea
  - Difficulty lying on flat
  - Coughing/fever
  - Chills
  - Pleuritic chest pain
- **Diagnostic Procedure**
  - CT scan
  - Lateral Decubitus X-ray
- **Management**
  - Treatment of underlying disease
  - Thoracentesis or chest tube drainage is performed
  - Surgical pleurectomy for pleural effusion caused by malignancy
  - Pleuroperitoneal shunt – fluids from the pleural space is drain into the peritoneum
- **Nursing Intervention**
  - Assist in thoracentesis
  - Record the amount of fluid aspirated and send it to the laboratory
  - Administer medications as ordered such as analgesics and antibiotics
  - Assist the patient in a comfortable position

HEMOTHORAX

- Blood in pleural space as a result of penetrating or blunt chest trauma
- Accompanies a high percentage of chest injuries
- Can result in hidden blood loss
- Patient may be asymptomatic, dyspneic, apprehensive, or in shock
- **Management**
  - Assist with thoracentesis to aspirate blood from pleural space
  - Assist with chest tube insertion and set up drainage system for complete and continuous removal of blood and air
    - ✓ Auscultate lungs and monitor for relief of dyspnea
    - ✓ Monitor amount of blood loss in drainage
- Replace volume with I.V. fluids or blood products

PLEURISY (PLEURITIS)

- Inflammation of both layers of the pleurae (parietal and visceral)
- May develop in conjunction with pneumonia or an upper respiratory tract infection, TB or collagen disease
- When the inflamed pleural membranes rub together during respiration (intensified on inspiration), the result is severe, sharp, knifelike pain
- **Clinical Manifestations**
  - Pleuritic pain during deep breath, coughing or sneezing
  - Pain is limited in distribution rather than diffuse
  - Pleural friction rub can be heard with stethoscope
- **Diagnostic Procedures**
  - Chest X-ray
  - Sputum Analysis
  - Thoracentesis
  - Pleural Biopsy
- **Management**
  - Treatment of underlying condition causing pleurisy
  - Topical applications of heat or cold
  - Indomethacin for pain relief
  - Intercostal Nerve Block if pain is severe

- **Nursing Interventions**
  - Instruct the patient in heat/cold application for pain relief
  - Instruct the patient to turn onto the affected side to splint the chest wall and reduce the stretching of the pleauare
  - Teach the patient to use hands or pillow to splint the ribcage while coughing

EMPYEMA THORACIS

- Accumulation of purulent fluid in the pleural space
- Occur as complication of bacterial pneumonia, lung abscess or chest trauma
- Patient is acutely ill and has signs and symptoms similar to acute respiratory infection
- Diagnosis is established by **chest CT**
- **Main objective is to drain the fluid in the pleural cavity**
- **Thoracentesis** is done if fluid is not too thick
- **Tube Thoracostomy** is done to patients with loculated or complicated pleural effusions
- Open chest drainage via **thoracotomy** is done to remove thickened pleura, pus and debris
- **Nursing intervention:** provide care specific to the method of drainage of the pleural fluid

INFECTIOUS DISEASES OF THE LOWER RESPIRATORY TRACT

PNEUMONIA

- Inflammation of the lung parenchyma caused by various microorganisms, including bacteria, mycobacteria, fungi and viruses
- **Community-Acquired Pneumonia**
  - Occurs either in the community setting or within the first 48 hours after hospitalization or institutionalization
- **Hospital-Acquired Pneumonia**
  - Also known as **nosocomial** pneumonia, is defined as the onset of pneumonia symptoms more than 48 hours after admission in patients with no evidence of infection at the time of admission
- **Aspiration Pneumonia**
  - Refers to the entry pulmonary consequences resulting from entry of endogenous or exogenous substances into the lower airway
- **Clinical Manifestation**
  - Sudden onset, rapidly rising fever of 38.3°C to 40.5°C
  - Cough productive of purulent sputum
  - Pleuritic chest pain aggravated by deep respiration/coughing
  - Dyspnea, tachypnea accompanied by respiratory grunting, nasal flaring use of accessory muscles of respiration fatigue
  - Rapid, bounding pulse
  - Orthopnea
  - Rusty, blood-tinged sputum
  - Poor appetite, diaphoresis
- **Diagnostic Procedure**
  - Chest X-ray shows presence/extent of pulmonary disease typically consolidation.
  - Gram stain and culture and sensitivity test of sputum may indicate offending organism
  - Blood culture detects bacteremia (bloodstream invasion) occurring with bacterial pneumonia
- **Management**
  - Administration of the appropriate antibiotic as determined by the results of a Gram stain
    - ✓ S. pneumonia – macrolide antibiotic (azithromycin, clarithromycin, or erythromycin)
    - ✓ Pseudomonas infection – anti pneumococcal, antipseudomonal beta-lactam
  - Treatment of viral pneumonia is primarily supportive
  - Oxygen therapy if patient has inadequate gas exchange
- **Complications**
  - Shock and respiratory failure
  - Pleural Effusion

NURSING INTERVENTIONS

- Encourage coughing and deep breathing after chest physiotherapy, splinting the chest if necessary
- Maintain semi-Fowler's position
- Promote hydration (2-3 L/day) to liquefy secretions

- Teach effective coughing techniques to minimize energy expenditure; plan rest periods
- Suction if necessary
- Instruct client to cover nose and mouth when coughing
- Teach the need to continue entire course of antimicrobial therapy which is usually seven to ten days
- Teach the patient about proper administration of antibiotics and potential side effects
- Teach that findings are expected to be less within 48 to 72 hours of initial therapy
- Nutritionally enriched drinks or shakes maybe helpful in maintaining nutrition

PULMONARY TUBERCULOSIS

- Tuberculosis (TB) is an infectious disease that primarily affects the lung parenchyma. It also may be transmitted to other parts of the body, including the meninges, kidneys, bones and lymph nodes
- The primary infectious agent, M, tuberculosis, is an acid-fast aerobic rod that grows slowly and is sensitive to heat and ultraviolet light spreads from person to person by airborne transmission
- **Clinical Manifestations**
  - Fatigue, anorexia, weight loss, low-grade fever, night sweats
  - Some patients have acute febrile illness, chills, and flu-like symptoms
  - Cough (insidious onset) progressing in frequency and producing mucoid or mucopurulent sputum
  - Hemoptysis, chest pain, dyspnea (indicates extensive involvement)
- **Diagnostic Evaluation**
  - Sputum smear/Sputum culture confirms a diagnosis of TB
  - Chest X-ray to determine presence and extent of disease
  - Tuberculin skin test (purified protein derivative [PPD] or Mantoux test)
- **Classification**
  - Data from the history, physical examination, TB test, chest x-ray, and microbiologic studies are used to classify TB into one of five classes. A classification scheme provides public health officials with a systematic way to monitor epidemiology and treatment of the disease
    - ✓ Class 0: no exposure; no infection
    - ✓ Class 1: exposure; no evidence of infection
    - ✓ Class 2: latent infection; no disease (eg, positive PPD reaction but no clinical evidence of active TB)
    - ✓ Class 3: disease; clinically active
    - ✓ Class 4: disease; not clinically active
    - ✓ Class 5: suspected disease; diagnosis pending
- **Management**
  - Pulmonary TB is treated primarily with antituberculosis agents for 6 to 12 months
  - The initial phase consists of a multiple-medication regime of INH, rifampin, pyrazinamide, and ethambutol and is administered daily for 8 weeks
  - Continuation phase of treatment include INH and rifampicin and lasts for an additional 4 or 7 months
  - Vitamin B (pyridoxine) is usually administered with INH to prevent IHN-associated peripheral neuropathy

FIRST-LINE ANTITUBERCULOSIS MEDICATIONS

Commonly Used Agents	Adult Daily Dosage	Most Common Side Effects
Isoniazid (INH)	5 mg/kg (300 mg maximum daily)	Peripheral neuritis, hepatic enzyme elevation, hepatitis, hypersensitivity
Rifampicin	10 mg/kg (600 mg maximum daily)	Hepatitis, febrile reaction, purpura (rare), nausea, vomiting
Pyrazinamide	15-30 mg/kg (2.0 g maximum daily)	Hyperuricemia, hepatotoxicity, skin rash, arthralgias, GI distress

Ethambutol (Myambutol)	15-25 mg/kg (no maximum daily dose, but base on lean body)	Optic neuritis (may lead to blindness; very rare at 15 mg/kg), skin rash

❖ **Nursing Intervention**
- Instructs the patient to increase fluid intake and about correct positioning to facilitate airway drainage
- Discuss the medications schedule and side effects of the drugs
- Instructs the patient to take the medication either on an empty stomach or at least 1 hour before meals because food interferes with medication absorption
- Patients taking INH should avoid foods that contain tyramine and histamine because it may result in headache, flushing, hypotension, lightheadedness, palpitations, and diaphoresis
- Monitors for side effects of anti-TB drugs
- Encourage rest and avoidance of exertion
- Provide nutritional plan that allows for small, frequent meals
- Instruct the patient about important hygiene measures, including mouth care, covering the mouth and nose when coughing and sneezing, proper disposal of tissues, and hand washing

ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS)

❖ Severe form of **acute lung injury**. This clinical syndrome is characterized by a sudden and progressive pulmonary edema, increasing bilateral infiltrates on chest x-ray, hypoxemia unresponsive to oxygen supplementation regardless of the amount of Positive End-Expiratory Pressure (PEE) and the absence of an elevated left atrial pressure

❖ Patients often demonstrate reduced lung compliance

❖ **Clinical Manifestations**
- Typically develops over 4 to 48 hours
- Severe dyspnea, severe hypoxemia
- Arterial hypoxemia that does not respond to supplemental oxygen
- Chest x-ray are similar to those seen with cardiogenic pulmonary edema
- Increased alveolar dead space
- Severe crackles and rhonchi heard on auscultation
- Labored breathing and tachypnea

❖ **DIAGNOSTICS**
- Clinical presentation and history of findings
- Hypoxemia on ABG despite increasing inspired oxygen level
- Chest x-ray shows bilateral infiltrates
- Plasma Brain Natriuretic Peptide (BNP)
- Echocardiography
- Pulmonary Artery Catheterization

❖ **Management**
- Treatment of the underlying condition
- Optimize oxygenation
- Intubation and mechanical ventilation
- Sedation may be required
- Paralytic agents may be necessary
- Antibiotics, as indicated
- PEEP usually improves oxygenation
- Supportive drugs includes surfactant replacement therapy, pulmonary antihypertensive agents and antisepsis agent

❖ **Nursing Intervention**
- Requires close monitoring in the intensive care unit
- Assess the patient's status frequently to evaluate the effectiveness of the treatment
- Turn the patient frequently to improve ventilation and perfusion in the lungs and enhance drainage secretions
- Res is essential for patient to limit oxygen consumption and reduce oxygen needs
- Adequate nutritional support is vital, 35 to 45 kcal/kg/day is required to meet caloric requirements
- Identify problems with ventilation that may cause anxiety reaction to the patient

PULMONARY EMBOLISM

- Refers to the obstruction of the pulmonary artery or one of its branches by a thrombus (or thrombi) that originates somewhere in the venous system in the right side of the heart
- Often associated with trauma, surgery (orthopedic, major abdominal, pelvic, gynecologic, pregnancy, heart failure, age older than 50 years, hypercoagulable states, and prolonged immobility
- **Clinical Manifestations**
  - Dyspnea is the most frequent symptom
  - Chest pain (sudden and pleuritic), may be substernal and any mimic angina pectoris or a myocardial infarction.
  - Petechiae over the chest
  - Anxiety, fever, tachycardia and apprehension
  - Cough, diaphoresis, hemoptysis, and syncope. The most frequent sign is tachypnea
- **Diagnostic Procedures**
  - Chest x-ray – shows infiltrates, atelectasis, elevation of the diaphragm on the affected side
  - ECG – shows sinus tachycardia, PR-interval depression and nonspecific T-wave changes
  - Arterial blood gas analysis – shows hypoxemia and hypocapnia
  - Ventilation-perfusion (V/Q.) scan
  - Pulmonary angiography is considered the best method to diagnose PE
  - Spiral computed CT scan of the lung
- **Management**
  - Treatment goal is to dissolve the existing emboli
  - Improve respiratory and vascular status, anticoagulation therapy, thrombolytic therapy, and surgical intervention
  - Stabilize the cardiopulmonary system
  - Nasal oxygen is administered immediately to relieve hypoxemia, respiratory distress, and central cyanosis
  - Intravenous infusion lines are inserted to establish routes for medications or fluids that will be needed
  - Hypotension is treated by a slow infusion of dobutamine (Dobutrex), which has a dilating effect on the pulmonary vessels and bronchi, or dopamine (Intropin)
  - Small doses of IV morphine or sedatives are administered to relieve patient anxiety, to alleviate chest discomfort, to improve tolerance of the endotracheal tube, and to ease adaptation to the mechanical ventilator
  - Anticoagulant therapy (heparin, warfarin sodium
  - Coumadin has traditionally been the primary method for managing PE
  - Thrombolytic therapy (urokinase, streptokinase, alteplase) is used in treating PE, particularly in patients who are severely compromised
  - Surgical embolectomy is performed if the patient has massive PE.
- **Nursing Intervention**
  - Monitor oxygen therapy and assess the patient for hypoxia
  - Watch patient for signs of discomfort and pain
  - Assess patient for bleeding related to anticoagulant or thrombolytic therapy
  - Advise patient of the possible need to continue taking anticoagulant therapy
  - Monitor for potential complication of cardiogenic shock or right ventricular failure
  - Encourage ambulation and active/passive leg exercises to prevent venous stasis
  - Advise the patient not to sit or lie in bed for prolonged periods, not to cross the legs, and not to wear constrictive clothing