

Adult Nursing Care I

NURS 241

Management of Patients With Chest and Lower Respiratory Tract Disorders

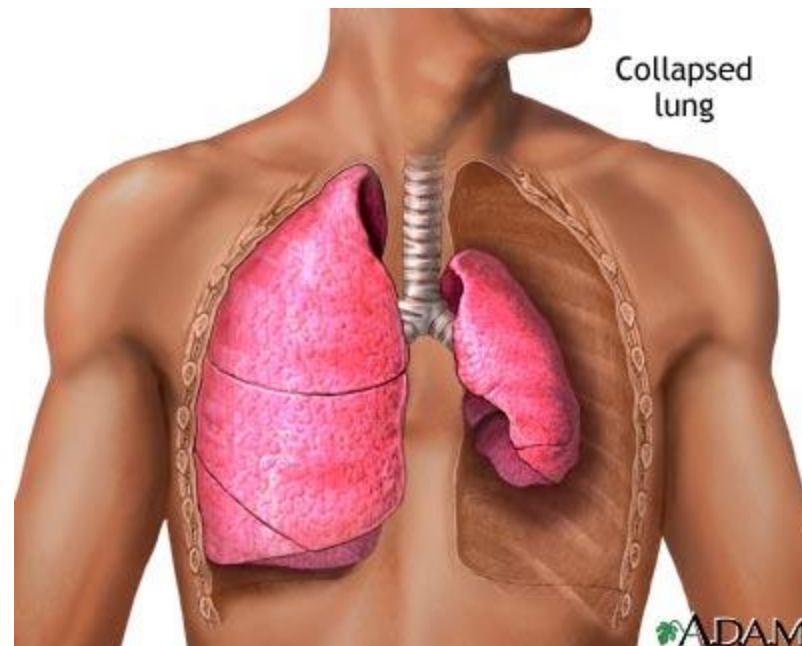
Learning outcomes

- 1. Identify patients at risk for atelectasis and nursing interventions related to its prevention and management.
- 2. Compare the various pulmonary infections with regard to causes, clinical manifestations, nursing management, complications, and prevention.
- 3. Use the nursing process as a framework for care of the patient with pneumonia.
- 4. Relate the therapeutic management techniques of acute respiratory

Atelectasis

- **Atelectasis** refers to closure or collapse of alveoli and often is described in relation to x-ray findings and clinical signs and symptoms.
- Atelectasis may be acute or chronic and may cover a broad range of pathophysiologic changes, from micro-atelectasis (which is not detectable on chest x-ray) to macro-atelectasis with loss of segmental, lobar, or overall lung volume.

Atelectasis



Causes

1. Altered breathing patterns, retained secretions, alterations in small airway function
2. Pain, prolonged supine positioning,
3. Reduced lung volumes due to musculoskeletal or neurologic disorders,
4. Specific surgical procedures (eg, upper abdominal, thoracic, or open heart surgery).
5. Postoperative patients are at risk for atelectasis.
6. Bronchial obstruction with impaired cough mechanism
7. Excessive pressure on the lung tissue, such as pressure produced by fluid accumulating within the pleural space (pleural effusion), air in the pleural space (pneumothorax), or blood in the pleural space (hemothorax), or tumor growth within the thorax, or an elevated diaphragm.

Clinical manifestations

1. Increasing dyspnea
2. cough,
3. sputum production
4. In acute atelectasis involving a large amount of lung tissue (lobar atelectasis), marked respiratory distress (tachycardia, tachypnea , pleural pain, central cyanosis)

Assessment and diagnostic findings

1. Chest x-ray
2. Pulse oximetry demonstrate low saturation of hemoglobin with O₂ (less than 90%)

Prevention

1. Change patient's position frequently, especially from supine to upright position, to promote ventilation and prevent secretions from accumulating.
2. Encourage early mobilization from bed to chair followed by early ambulation.
3. Encourage appropriate deep breathing and coughing to mobilize secretions and prevent them from accumulating.
4. Teach/reinforce appropriate technique for incentive spirometry

Prevention

1. Administer prescribed opioids and sedatives to prevent respiratory depression.
2. Perform postural drainage and chest percussion, if indicated.
3. Institute suctioning to remove tracheobronchial secretions, if indicated.

Medical management

- **The strategies to prevent atelectasis, which include**
 1. frequent turning,
 2. early ambulation,
 3. lung volume expansion maneuvers (eg, deep-breathing exercises, incentive spirometry),
 4. and coughing also serve as the first-line measures to minimize or treat atelectasis by improving ventilation.

Medical management

- The secretions must be removed by coughing or suctioning to permit air to re-enter that portion of the lung.
- Chest physical therapy (chest percussion and postural drainage) may also be used to mobilize secretions.
- Nebulizer treatments with a bronchodilator medication may be used to assist the patient in the expectoration of secretions

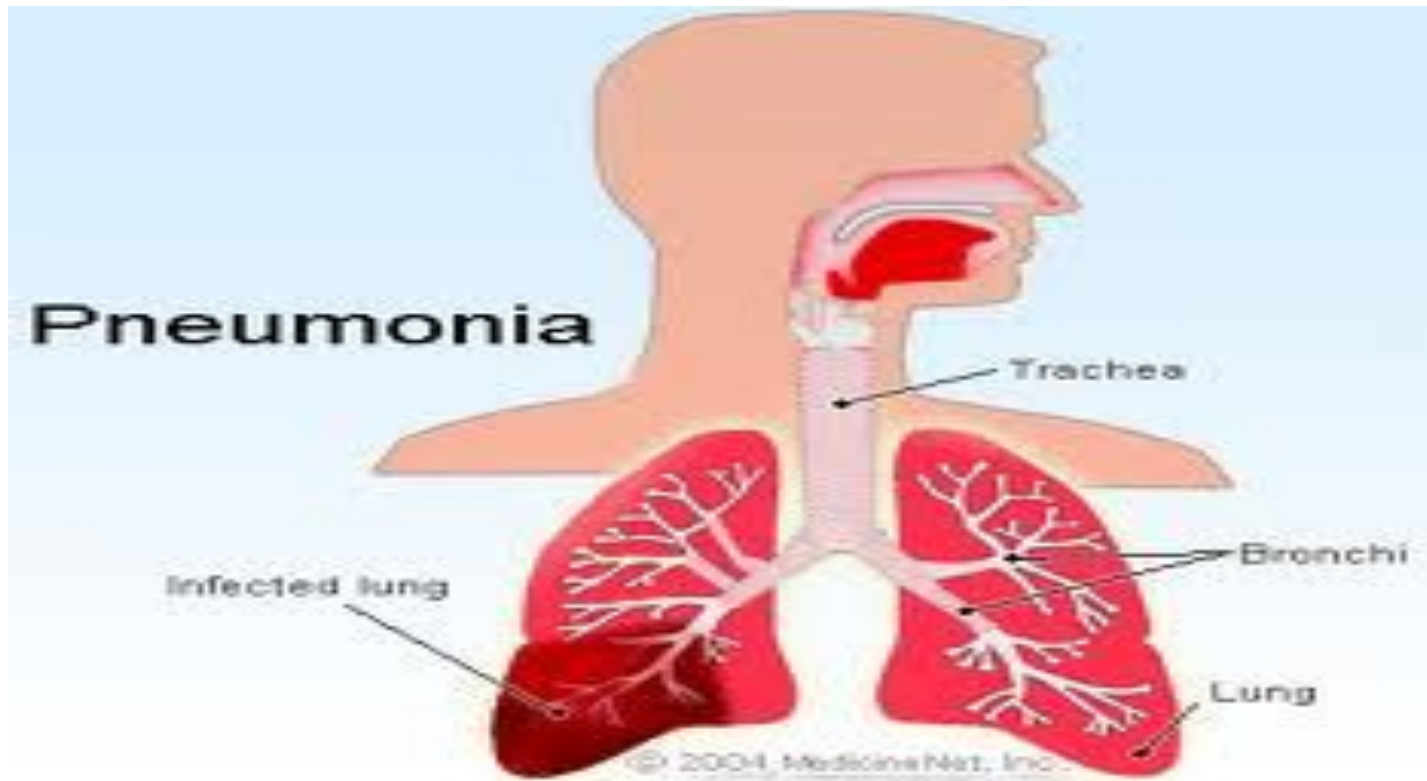
Medical management

- A bronchoscopy is performed to remove secretions and increase ventilation.
- Endotracheal intubation or mechanical ventilation may be necessary.
- Thoracentesis may be indicated to remove the fluid by needle aspiration.

Pneumonia

- Pneumonia is an inflammation of the lung parenchyma that is caused by various microorganisms, including bacteria, fungi, and viruses.
- Pneumonia and influenza are the most common causes of death from infectious diseases in the United States.

Pneumonia



Pneumonia

- Pneumonia is an inflammatory process, involving the terminal airways and alveoli of the lung, caused by infectious agents. It is classified according to its causative agent.

Pathophysiology and Etiology

- The organism gains access to the lungs through aspiration of oropharyngeal contents, by inhalation of respiratory secretions from infected individuals, by way of the bloodstream, or from direct spread to the lungs as a result of surgery or trauma.
- Patients with bacterial pneumonia may have an underlying disease that impairs host defense; pneumonia arises from endogenous flora of the person whose resistance has been altered, or from aspiration of oropharyngeal secretions.
 - A. Immunocompromised patients include those receiving corticosteroids or immunosuppressants, those with cancer, those being treated with chemotherapy or radiotherapy, those undergoing organ transplantation, alcoholics, I.V. drug abusers, and those with HIV disease and acquired immunodeficiency syndrome.
 - B. These people have an increased risk of developing overwhelming infection. Infectious agents include aerobic and anaerobic gram-negative bacilli; Staphylococcus; Nocardia; fungi; Candida; viruses, such as cytomegalovirus; Pneumocystis carinii (also known as P. jiroveci); reactivation of tuberculosis (TB); and others.

- When bacterial pneumonia occurs in a healthy person, there is usually a history of preceding viral illness.
- Other predisposing factors include conditions interfering with normal drainage of the lung, such as tumor, general anesthesia, and postoperative immobility; depression of the central nervous system (CNS) from drugs, neurologic disorders, or other conditions, such as alcoholism, and intubation or respiratory instrumentation
- **Pneumonia may be divided into three groups:**
 1. Community acquired, due to a number of organisms, including *Streptococcus pneumoniae*
 2. Hospital or nursing home acquired (nosocomial), due primarily to gram-negative bacilli and staphylococci
 3. Pneumonia in the immunocompromised person

- **Clinical Manifestations**

- For most common forms of bacterial pneumonia:
 1. Sudden onset; shaking chill; rapidly rising fever of 101° F to 105° F (38.3° C to 40.5° C).
 2. Cough productive of purulent sputum.
 3. Pleuritic chest pain aggravated by respiration/coughing
 4. Dyspnea, tachypnea accompanied by respiratory grunting, nasal flaring, use of accessory muscles of respiration, fatigue
 5. Rapid, bounding pulse

- **Diagnostic Evaluation**

1. Chest X-ray shows presence/extent of pulmonary disease, typically consolidation.
2. Gram stain and culture and sensitivity tests of sputum may indicate offending organism.
3. Blood culture detects bacteremia (bloodstream invasion) occurring with bacterial pneumonia.
4. Immunologic test detects microbial antigens in serum, sputum, and urine.

- **Management**

1. Antimicrobial therapy "depends on laboratory identification of causative organism and sensitivity to specific antimicrobials, or presumptive therapy with broad spectrum agent in milder cases.
2. Oxygen therapy if patient has inadequate gas exchange

- **Complications**

1. Pleural effusion.
2. Sustained hypotension and shock, especially in gram-negative bacterial disease, particularly in elderly patients.
3. Superinfection: pericarditis, bacteremia, and meningitis.
4. Delirium "this is considered a medical emergency.
5. Atelectasis "due to mucous plugs.

Nursing Diagnoses

- Impaired Gas Exchange related to decreased ventilation secondary to inflammation and infection involving distal airspaces
- Ineffective Airway Clearance related to excessive tracheobronchial secretions
- Acute Pain related to inflammatory process and dyspnea
- Risk for Injury secondary to complications

Nursing Interventions

- **Improving Gas Exchange**
- Observe for cyanosis, dyspnea, hypoxia, and confusion, indicating worsening condition.
- Follow ABG levels/ SaO_2 to determine oxygen need and response to oxygen therapy.
- Administer oxygen at concentration to maintain Pao_2 at acceptable level. Hypoxemia may be encountered because of abnormal ventilation-perfusion ratios in affected lung segments.
- Avoid high concentrations of oxygen in patients with COPD, particularly with evidence of CO_2 retention; use of high oxygen concentrations may worsen alveolar ventilation by depressing the patient's only remaining ventilatory drive. If high concentrations of oxygen are given, monitor alertness and Pao_2 and $Paco_2$ levels for signs of CO_2 retention.
- Place patient in an upright position to obtain greater lung expansion and improve aeration. Frequent turning and increased activity (up in chair, ambulate as tolerated) should be employed.

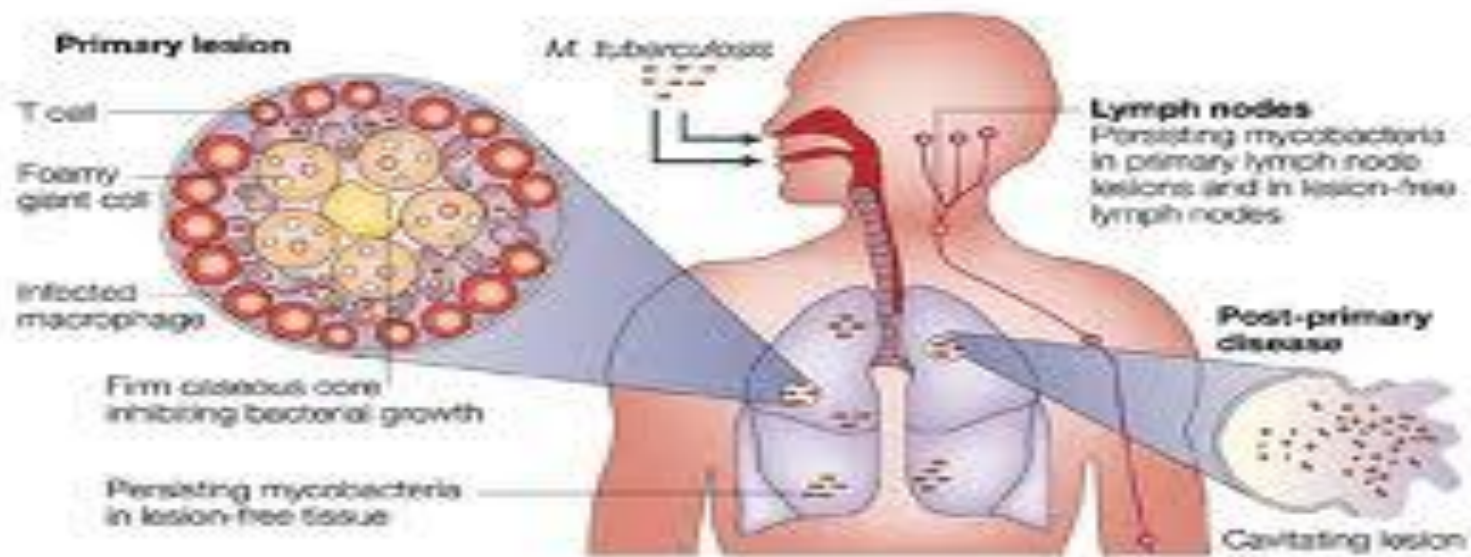
Nursing Interventions

- Enhancing Airway Clearance
- Obtain freshly expectorated sputum for gram stain and culture, preferably early morning specimen as directed. Instruct the patient as follows:
 - Rinse mouth with water to minimize contamination by normal flora.
 - Breathe deeply several times.
 - Cough deeply and expectorate raised sputum into sterile container.
- Encourage patient to cough; retained secretions interfere with gas exchange. Suction as necessary.
- Encourage increased fluid intake, unless contraindicated, to thin mucus and promote expectoration and replace fluid losses caused by fever, diaphoresis, dehydration, and dyspnea.
- Humidify air or oxygen therapy to loosen secretions and improve ventilation.
- Employ chest wall percussion and postural drainage when appropriate to loosen and mobilize secretions

Nursing Interventions

- Relieving Pleuritic Pain
- Place in a comfortable position (semi-Fowler's) for resting and breathing; encourage frequent change of position to prevent pooling of secretions in lungs.
- Demonstrate how to splint the chest while coughing.
- Avoid suppressing a productive cough.
- Administer prescribed analgesic agent to relieve pain. Avoid opioids in patients with a history of COPD.
- Apply heat and/or cold to chest as prescribed.
- Assist with intercostal nerve block for pain relief.
- Encourage modified bed rest during febrile period.

PULMONARY TUBERCULOSIS



TUBERCULOSIS

- TB is an infectious disease caused by bacteria (*Mycobacterium tuberculosis*) that are usually spread from person to person through the air. It usually infects the lung but can occur at virtually any site in the body. HIV-infected patients are especially at risk. Drug-resistant TB is of particular concern in certain parts of the United States.

Pathophysiology and Etiology

- Transmission
 1. The term Mycobacterium is descriptive of the organism, which is a bacterium that resembles a fungus. The organisms multiply at varying rates and are characterized as acid-fast aerobic organisms that can be killed by heat, sunshine, drying, and ultraviolet light.
 2. TB is an airborne disease transmitted by droplet nuclei, usually from within the respiratory tract of an infected person who exhales them during coughing, talking, sneezing, or singing.
 3. When an uninfected susceptible person inhales the droplet-containing air, the organism is carried into the lung to the pulmonary alveoli.
 4. Most people who become infected do not develop clinical illness, because the body's immune system brings the infection under control.

Clinical Manifestations

- Patient may be asymptomatic or may have insidious symptoms that may be ignored.
- Constitutional symptoms
 - Fatigue, anorexia, weight loss, low-grade fever, night sweats, indigestion.
 - Some patients have acute febrile illness, chills, and flu-like symptoms.
- Pulmonary signs and symptoms
 - Cough (insidious onset) progressing in frequency and producing mucoid or mucopurulent sputum.
 - Hemoptysis; chest pain; dyspnea (indicates extensive involvement).
- Extrapulmonary TB: pain, inflammation, and dysfunction in any of the tissues infected.

Diagnostic Evaluation

1. Sputum smear "detection of acid-fast bacilli in stained smears is the first bacteriologic clue of TB. Obtain first morning sputum on 3 consecutive days.
2. Sputum culture "a positive culture for *M. tuberculosis* confirms a diagnosis of TB.
3. Chest X-ray to determine presence and extent of disease.
4. Tuberculin skin test (purified protein derivative [PPD] or Mantoux test) "inoculation of tubercle bacillus extract (tuberculin) into the intradermal layer of the inner aspect of the forearm

Management

- Current recommended regimen of uncomplicated, previously untreated pulmonary TB is an initial phase of 2 months of bactericidal drugs, including
 1. isoniazid (INH),
 2. rifampin (Rifadin),
 3. pyrazinamide (PZA),
 4. and ethambutol (EMB).
- This regimen should be followed until the results of drug susceptibility studies are available, unless there is little possibility of drug resistance.

Nursing Diagnoses

Ineffective Breathing Pattern related to pulmonary infection and potential for long-term scarring with decreased lung capacity

Risk for Infection related to nature of the disease and patient's symptoms

Imbalanced Nutrition: Less Than Body Requirements related to poor appetite, fatigue, and productive cough

Noncompliance related to lack of motivation and long-term treatment

Nursing Interventions

- **Improving Breathing Pattern**

- Administer and teach self-administration of medications as ordered.
- Encourage rest and avoidance of exertion.
- Monitor breath sounds, respiratory rate, sputum production, and dyspnea.
- Provide supplemental oxygen as ordered.

- **Preventing Transmission of Infection**

- Be aware that TB is transmitted by respiratory droplets or secretions.
- Provide care for hospitalized patient in a negative-pressure room to prevent respiratory droplets from escaping when door is opened.
- Enforce rule that all staff and visitors use well-fitted standard dust/mist/fume masks (Class C) for contact with patient.
- Use high-efficiency particulate masks, such as HEPA filter masks, for high-risk procedures, including suctioning, bronchoscopy,
- Use standard precautions for additional protection: gowns and gloves for direct contact with patient, linens or articles in room, meticulous hand washing.
- Educate the patient to control spread of infection through secretions.

Nursing Interventions

- **Improving Nutritional Status**

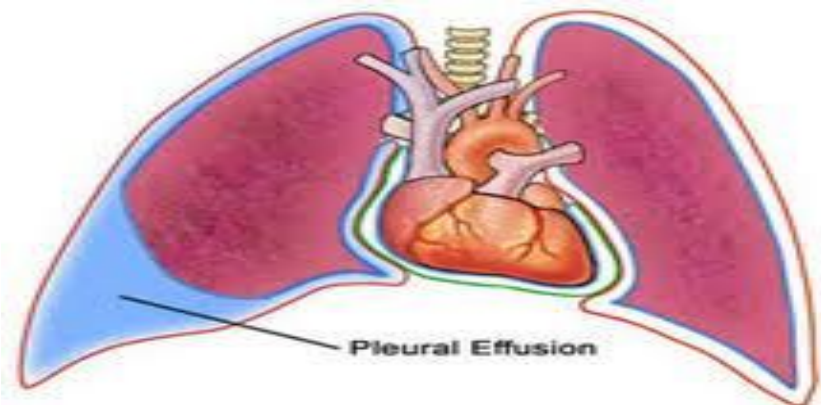
- Explain the importance of eating a nutritious diet to promote healing and improve defense against infection.
- Provide small, frequent meals and liquid supplements during symptomatic period.
- Monitor weight.
- Administer vitamin supplements, as ordered, particularly pyridoxine (vitamin B₆) to prevent peripheral neuropathy in patients taking isoniazid.

- **Improving Compliance**

- Educate the patient about the etiology, transmission, and effects of TB. Stress the importance of continuing to take medicine for the prescribed time because bacilli multiply slowly and thus can only be eradicated over a long period.
- Review adverse effects of the drug therapy (see Table 11-2). Question the patient specifically about common toxicities of drugs being used, and emphasize immediate reporting should these occur.
- Participate in observation of medication taking, weekly pill counts, or other programs designed to increase compliance with treatment for TB.

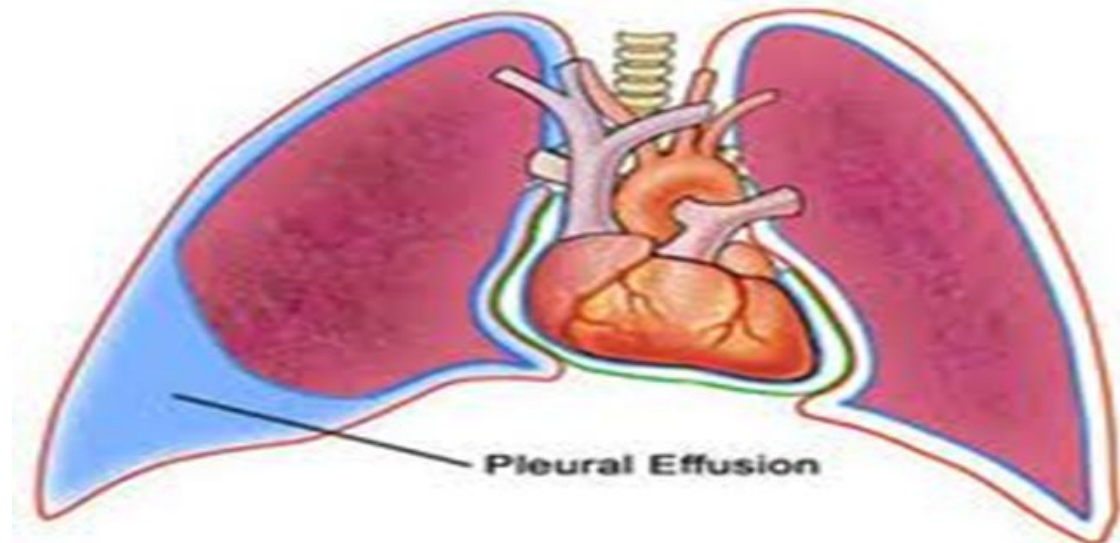
Pleural effusion

- **Pleural effusion**, a collection of fluid in the pleural space, is rarely a primary disease process but is usually secondary to other diseases.
- Normally, the pleural space contains a small amount of fluid (5 to 15 mL), which acts as a lubricant that allows the pleural surfaces to move without friction .



PLEURAL EFFUSION

- Pleural effusion refers to a collection of fluid in the pleural space. It is almost always secondary to other diseases.



Pathophysiology and Etiology

- May be either transudative or exudative.
- Transudative effusions occur primarily in noninflammatory conditions; is an accumulation of low-protein, low cell count fluid.
- Exudative effusions occur in an area of inflammation; is an accumulation of high-protein fluid.
- Occurs as a complication of:
 - Disseminated cancer (particularly lung and breast), lymphoma.
 - Pleuropulmonary infections (pneumonia).
 - Heart failure, cirrhosis, nephrosis.
 - Other conditions€”sarcoidosis, systemic lupus erythematosus (SLE), peritoneal dialysis

- **Clinical Manifestations**

- Dyspnea, pleuritic chest pain, cough.
- Dullness or flatness to percussion (over areas of fluid) with decreased or absent breath sounds

- **Diagnostic Evaluation**

- Chest X-ray or ultrasound detects presence of fluid.
- Thoracentesis €”biochemical, bacteriologic, and cytologic studies of pleural fluid indicates cause.

- **Management**

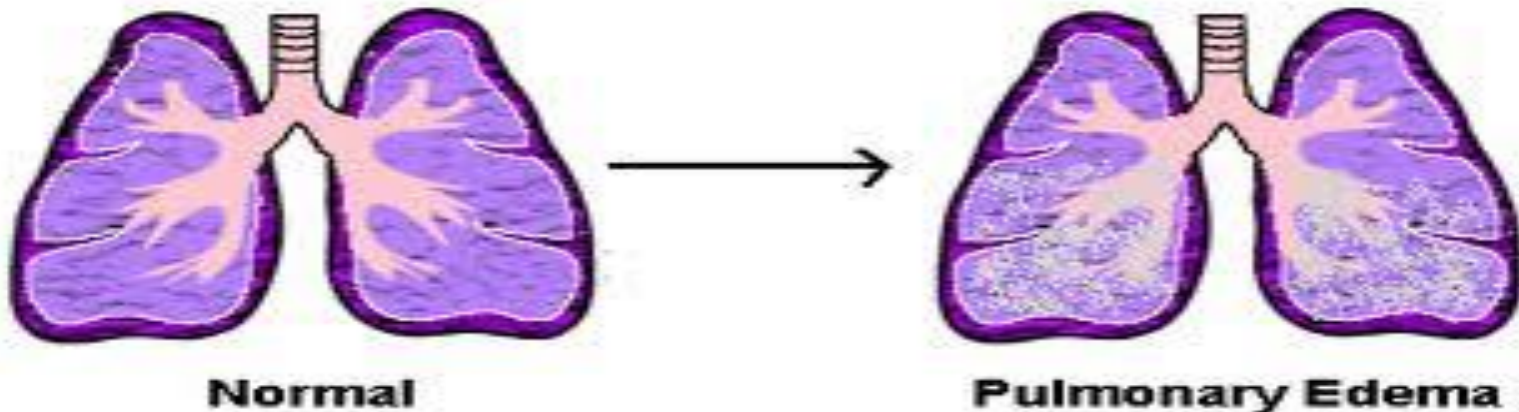
- General
- Treatment is aimed at underlying cause (heart disease, infection).
- Thoracentesis is done to remove fluid, collect a specimen, and relieve dyspnea.

Nursing Diagnosis

- Ineffective Breathing Pattern related to collection of fluid in pleural space
- **Nursing Interventions**
- Maintaining Normal Breathing Pattern
- Institute treatments to resolve the underlying cause as ordered.
- Assist with thoracentesis if indicated
- Maintain chest drainage as needed .

Pulmonary edema

- **Pulmonary edema** is defined as abnormal accumulation of fluid in the lung tissue and/or alveolar space. It is a severe, life-threatening condition.



Causes of pulmonary edema

- Inadequate left ventricular function
- Hypervolemia
- Sudden increase in the intravascular pressure in the lung.

Clinical manifestations

- Respiratory distress, characterized by dyspnea, and central cyanosis.
- The patient is very anxious and often agitated.
- The patient coughs up blood-tinged secretions.

Assessment and Diagnostic Findings

- Auscultation reveals crackles in the lung bases.
- Chest x-ray
- Pulse oximetry
- Arterial blood gas analysis

Medical management

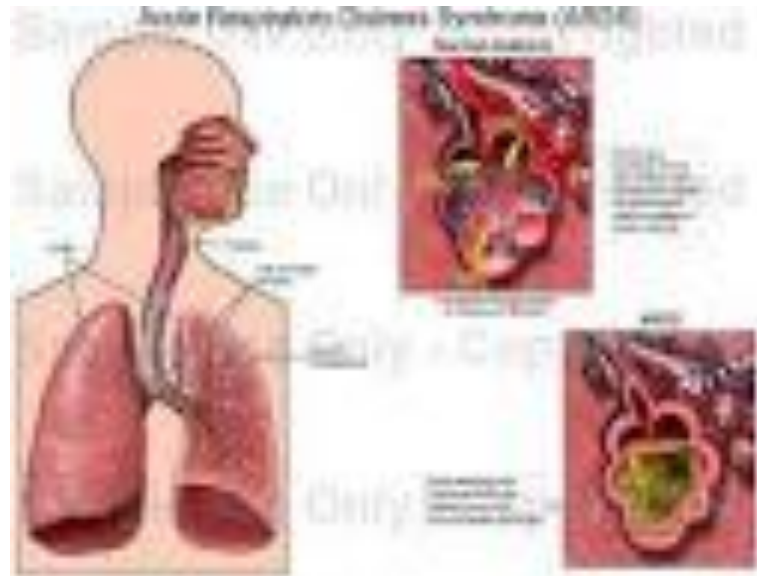
- Management focuses on correcting the underlying disorder.
- Oxygen is administered to correct hypoxemia

Nursing management

- Assisting with administration of oxygen and intubation and mechanical ventilation if respiratory failure occurs.
- The nurse also administers medications as prescribed.

Acute Respiratory Failure

- **Acute respiratory failure** (ARF) is defined as a fall in arterial oxygen tension (PaO_2) to less than 50 mm Hg (hypoxemia) and a rise in arterial carbon dioxide tension (PaCO_2) to greater than 50 mm Hg (hypercapnia), with an arterial pH of less than 7.35.



RESPIRATORY FAILURE

- Respiratory failure is an alteration in the function of the respiratory system that causes the partial pressure of arterial oxygen (P_{aO_2}) to fall below 50 mm Hg (hypoxemia) and/or the partial pressure of arterial carbon dioxide (P_{aCO_2}) to rise above 50 mm Hg (hypercapnia), as determined by arterial blood gas (ABG) analysis. Respiratory failure is classified as acute, chronic, or combined acute and chronic.

Classification

- Acute Respiratory Failure
- Characterized by hypoxemia (P_{aO_2} less than 50 mm Hg) and/or hypercapnia (P_{aCO_2} greater than 50 mm Hg) and acidemia (pH less than 7.35).
- Occurs rapidly, usually in minutes to hours or days.
- Chronic Respiratory Failure
- Characterized by hypoxemia (decreased P_{aO_2}) and/or hypercapnia (increased P_{aCO_2}) with a normal pH (7.35 to 7.45).
- Occurs over a period of months to years€”allows for activation of compensatory mechanisms.

Acute and Chronic Respiratory Failure

- Characterized by an abrupt increase in the degree of hypoxemia or hypercapnia in patients with preexisting chronic respiratory failure.
- May occur after an acute upper respiratory infection or pneumonia, or without obvious cause.
- Extent of deterioration is best assessed by comparing the patient's present ABG levels with previous ABG levels.

Pathophysiology and Etiology

- Oxygenation Failure
- Characterized by a decrease in P_{aO_2} and normal or decreased P_{aCO_2} .
- Primary problem is inability to adequately oxygenate the blood, resulting in hypoxemia.
- Hypoxemia occurs because damage to the alveolar-capillary membrane causes leakage of fluid into the interstitial space or into the alveoli and slows or prevents movement of oxygen from the alveoli to the pulmonary capillary blood.
- Hypocapnia results from hypoxemia and decreased pulmonary compliance. Fluid within the lungs makes the lung less compliant or stiffer.

Clinical Manifestations

1. Hypoxemia €"restlessness, agitation, dyspnea, disorientation, confusion, delirium, loss of consciousness.
2. Hypercapnia €"headache, somnolence, dizziness, confusion.
3. Tachypnea initially; then when no longer able to compensate, bradypnea
4. Accessory muscle use
5. Asynchronous respirations

NURSING ALERT

- Obtain ABG levels whenever the history or signs and symptoms suggest the patient is at risk for developing respiratory failure. Initial and subsequent values should be recorded so comparisons can be made over time. Need for ABG analysis can be decreased by using an oximeter to continuously monitor oxygen saturation (SaO_2). Correlate oximeter values with ABG values and then use oximeter for trending.

Diagnostic Evaluation

- ABG analysis €"show changes in P_{aO_2} , P_{aCO_2} , and pH from patient's normal; or P_{aO_2} less than 50 mm Hg, P_{aCO_2} greater than 50 mm Hg, pH less than 7.35.
- Pulse oximetry €"decreasing S_{aO_2} .
- End tidal CO_2 monitoring €"elevated.
- Complete blood count, serum electrolytes, chest X-ray, urinalysis, electrocardiogram (ECG), blood and sputum cultures €"to determine underlying cause and patient's condition.
- **Management**
- Oxygen therapy to correct the hypoxemia.
- Chest physical therapy and hydration to mobilize secretions.
- Bronchodilators and possibly corticosteroids to reduce bronchospasm and inflammation.
- Diuretics for pulmonary congestion.
- Mechanical ventilation as indicated. Noninvasive positive-pressure ventilation using a face mask may be a successful option for short-term support of ventilation

NURSING ALERT

- Avoid administration of oxygen at F_{iO_2} of 100% for COPD patients because you may depress the respiratory center drive. For COPD patients, the drive to breathe may be hypoxemia.

Nursing Diagnoses

- Impaired Gas Exchange related to inadequate respiratory center activity or chest wall movement, airway obstruction, and/or fluid in lungs
- Ineffective Airway Clearance related to increased or tenacious secretions

- **Nursing Interventions**
- **Improving Gas Exchange**
- Administer antibiotics, cardiac medications, and diuretics as ordered for underlying disorder.
- Administer oxygen to maintain Pao_2 of 60 mm Hg or $Sao_2 > 90\%$ using devices that provide increased oxygen concentrations (aerosol mask, partial rebreathing mask, nonrebreathing mask).
- Monitor fluid balance by intake and output measurement, urine specific gravity, daily weight, and direct measurement of pulmonary capillary wedge pressure to detect presence of hypovolemia or hypervolemia.
- Provide measures to prevent atelectasis and promote chest expansion and secretion clearance, as ordered (incentive spirometer, nebulization, head of bed elevated 30 degrees, turn frequently, out of bed).
- Monitor adequacy of alveolar ventilation by frequent measurement of respiratory rate, VC, inspiratory force, and ABG levels.
- Compare monitored values with criteria indicating need for mechanical ventilation (see section titled "Nursing Assessment"). Report and prepare to assist with noninvasive ventilation or intubation and initiation of mechanical ventilation, if indicated.

Pulmonary arterial hypertension

- **Pulmonary hypertension** exists when the systolic pulmonary artery pressure exceeds 25 mm Hg.
- These pressures measured during right-sided heart catheterization.

Pulmonary arterial hypertension

- In the absence of these measurements, clinical recognition becomes the only indicator for the presence of pulmonary hypertension.
- *There are two forms of pulmonary hypertension:* primary (or idiopathic) and secondary.

Causes of pulmonary arterial hypertension

- Collagen vascular diseases
- Portal hypertension
- Altered immune mechanisms
- Chronic thrombotic or embolic disease

Causes of pulmonary arterial hypertension

- Pulmonary venous hypertension
- Pulmonary vasoconstriction due to hypoxemia
- Chronic obstructive pulmonary disease.
- Compression of pulmonary vessels

Clinical manifestations

- **Dyspnea** is the main symptom of pulmonary hypertension, occurring at first with exertion and eventually at rest.
- Sub-sternal chest pain.
- Weakness, fatigue, syncope.
- Occasional hemoptysis, and signs of right-sided heart failure (peripheral edema, ascites, distended neck veins, liver engorgement)

Assessment and diagnosis

- History
- Physical examination
- Chest x-ray
- Pulmonary function studies
- Electrocardiogram (ECG), echocardiogram
- cardiac catheterization.

Medical management

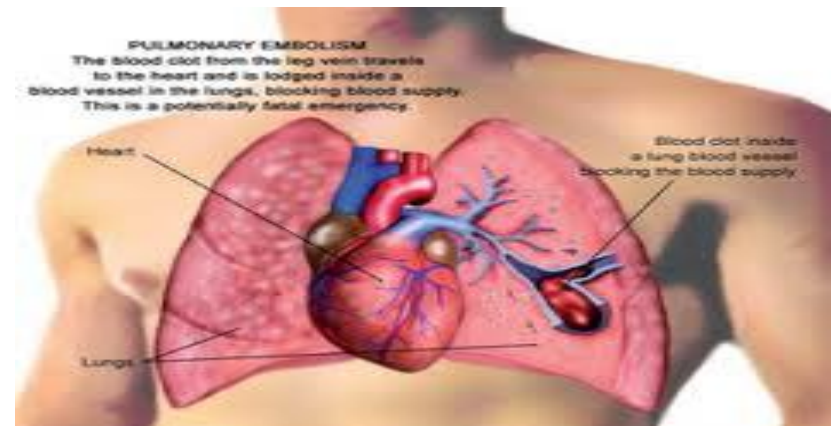
- **Management of the underlying cardiac or pulmonary condition:**
- Anticoagulation
- Diuretics and oxygen
- Vasodilators as calcium channel blockers

Nursing management

- The nurse also must be alert for signs and symptoms of pulmonary hypertension
- Administer oxygen therapy appropriately, and instruct patients and their families about the use of home oxygen supplementation.

Pulmonary embolism

- **Pulmonary embolism (PE)** 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 or in the right side of the heart.



PULMONARY EMBOLISM

- Pulmonary embolism refers to the obstruction of one or more pulmonary arteries by a thrombus (or thrombi) originating usually in the deep veins of the legs, the right side of the heart or, rarely, an upper extremity, which becomes dislodged and is carried to the pulmonary vasculature.
- Pulmonary infarction refers to necrosis of lung tissue that can result from interference with blood supply.

Pathophysiology and Etiology

- Obstruction, either partial or full, of pulmonary arteries, which causes decrease or absent blood flow; therefore, there is ventilation but no perfusion (\dot{V}/\dot{Q} mismatch).
- Hemodynamic consequences:
 - Increased pulmonary vascular resistance
 - Increased pulmonary artery pressure (PAP)
 - Increased right ventricular workload to maintain pulmonary blood flow
 - Right ventricular failure
 - Decreased cardiac output
 - Decreased blood pressure
 - Shock
- Pulmonary emboli can vary in size and seriousness of consequences

Predisposing factors include:

- Stasis, prolonged immobilization.
- Concurrent phlebitis.
- Previous heart (heart failure, myocardial infarction [MI]) or lung disease.
- Injury to vessel wall.
- Coagulation disorders.
- Metabolic, endocrine, vascular, or collagen disorders.
- Malignancy.
- Advancing age, estrogen therapy.

NURSING ALERT

- Be aware of high-risk patients for pulmonary embolism
€”immobilization, trauma to pelvis (especially surgical) and lower extremities (especially hip fracture), obesity, history of thromboembolic disease, varicose veins, pregnancy, heart failure, MI, malignant disease, postoperative patients, elderly patients.

Clinical Manifestations

- Dyspnea, pleuritic pain, tachypnea, apprehension.
- Chest pain with apprehension and a sense of impending doom occurs when most of the pulmonary artery is obstructed.
- Cyanosis, tachyarrhythmia's, syncope, circulatory collapse and, possibly, death encountered in patients with massive pulmonary embolism
- Subtle deterioration in patient's condition with no explainable cause
- Pleural friction rub

Diagnostic Evaluation

- ABG levels €"decreased P_{aO_2} is usually found, due to perfusion abnormality of the lung.
- Chest X-ray €"normal or possible wedge-shaped infiltrate.
- $[V \text{ with dot above}]/[Q \text{ with dot above}]$ lung scans €"perfusion scan investigates regional blood flow to determine presence of perfusion defects; ventilation scan may be done in patient with large perfusion defects.
- Pulmonary angiogram (most definitive)

Emergency Management

1. Oxygen is administered to relieve hypoxemia, respiratory distress, and cyanosis.
2. An infusion is started to open an I.V. route for drugs and fluids.
3. Vasopressors, inotropic agents such as dopamine (Intropin), and antidysrhythmic agents may be indicated to support circulation if the patient is unstable.
4. ECG is monitored continuously for right-sided heart failure, which may have a rapid onset.
5. Small doses of I.V. morphine are given to relieve anxiety, alleviate chest discomfort (which improves ventilation), and ease adaptation to mechanical ventilator, if this is necessary.
6. Pulmonary angiography, hemodynamic measurements, ABG analysis, and other studies are carried out.

- Subsequent Management €”Anticoagulation and Thrombolysis
 1. I.V. heparin €”stops further thrombus formation and extends the clotting time of the blood; it is an anticoagulant and antithrombotic.
 2. Oral anticoagulation with warfarin (Coumadin) is usually used for follow-up anticoagulant therapy after heparin therapy has been established; interrupts the coagulation mechanism by interfering with the vitamin K-dependent synthesis of prothrombin and factors VII, IX, and X.
 3. Thrombolytic agents, such as streptokinase (Streptase), may be used in patients with massive pulmonary embolism.

Nursing Diagnoses

Ineffective Breathing Pattern related to acute increase in alveolar dead airspace and possible changes in lung mechanics from embolism

Ineffective Tissue Perfusion (Pulmonary) related to decreased blood circulation

Acute Pain (pleuritic) related to congestion, possible pleural effusion, possible lung infarction

Anxiety related to dyspnea, pain, and seriousness of condition

Risk for Injury related to altered hemodynamic factors and anticoagulant therapy

Nursing Interventions

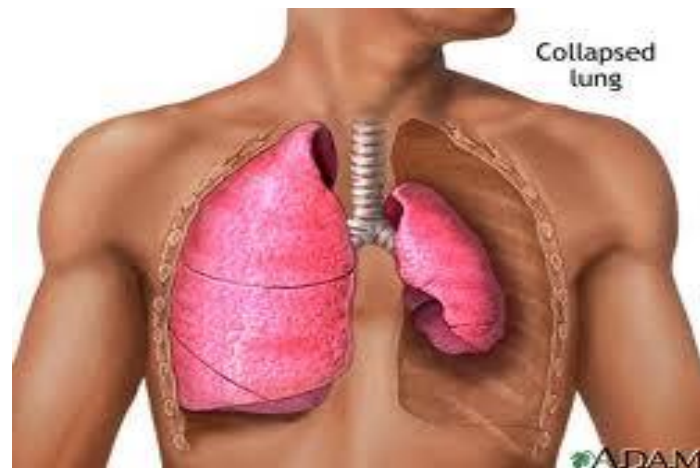
- Correcting Breathing Pattern
- Assess for hypoxia, headache, restlessness, apprehension, pallor, cyanosis, behavioral changes.
- Monitor vital signs, ECG, oximetry, and ABG levels for adequacy of oxygenation.
- Monitor patient's response to I.V. fluids/vasopressors.
- Monitor oxygen therapy used to relieve hypoxemia.
- Prepare patient for assisted ventilation when hypoxemia is due to local areas of pneumoconstriction and abnormalities of \dot{V}/\dot{Q} ratios.

- Improving Tissue Perfusion
- Closely monitor for shock €”decreasing blood pressure, tachycardia, cool, clammy skin.
- Monitor prescribed medications given to preserve right ventricular filling pressure and increase blood pressure.
- Maintain patient on bed rest to reduce oxygen demands and risk of bleeding.
- Monitor urinary output hourly, because there may be reduced renal perfusion and decreased glomerular filtration.
- Relieving Pain
- Watch patient for signs of discomfort and pain.
- Ascertain if pain worsens with deep breathing and coughing; auscultate for friction rub.
- Give prescribed morphine (Duramorph), and monitor for pain relief and signs of respiratory depression.
- Position with head of bed slightly elevated (unless contraindicated by shock) and with chest splinted for deep breathing and coughing.

- **Patient Education and Health Maintenance**
- Advise patient of the possible need to continue taking anticoagulant therapy for 6 weeks up to an indefinite period.
- Teach about signs of bleeding, especially of gums, nose, bruising, blood in urine and stools.
- For patients on anticoagulants, instruct to use soft toothbrush, avoid shaving with blade razor (use electric razor instead), and avoid aspirin-containing products. Notify health care provider of bleeding or increased bruising.
- Warn against taking medications unless approved by health care provider, because many drugs interact with anticoagulants.
- Instruct patient to tell dentist about taking an anticoagulant.
- Warn against inactivity for prolonged periods or sitting with legs crossed to prevent recurrence.
- Warn against sports/activities that may cause injury to legs and predispose to a thrombus.
- Encourage wearing a MedicAlert bracelet identifying patient as anticoagulant user.

PNEUMOTHORAX

- **Pneumothorax** occurs when the parietal or visceral pleura is breached and the pleural space is exposed to positive atmospheric pressure.
- When either pleura is breached, air enters the pleural space, and the lung or a portion of it collapses.



TRAUMATIC DISORDERS

PNEUMOTHORAX

- Air in the pleural space occurring spontaneously or from trauma (see Figure 11-4). In patients with chest trauma, it is usually the result of a laceration to the lung parenchyma, tracheobronchial tree, or esophagus. The patient's clinical status depends on the rate of air leakage and size of wound.

- **Spontaneous pneumothorax** €”sudden onset of air in the pleural space with deflation of the affected lung in the absence of trauma.
- **Open pneumothorax** (sucking wound of chest) €”implies an opening in the chest wall large enough to allow air to pass freely in and out of thoracic cavity with each attempted respiration.
- **Tension pneumothorax** €”buildup of air under pressure in the pleural space resulting in interference with filling of both the heart and lungs.

Pathophysiology and Etiology

- When there is a large open hole in the chest wall.
- A portion of the tidal volume will move back and forth through the hole in the chest wall, rather than the trachea as it normally does.

Clinical Manifestations

1. Hyperresonance; diminished breath sounds.
2. Reduced mobility of affected half of thorax.
3. Tracheal deviation away from affected side in tension pneumothorax
4. Clinical picture of open or tension pneumothorax is one of air hunger, agitation, hypotension, and cyanosis
5. Mild to moderate dyspnea and chest discomfort may be present with spontaneous pneumothorax

Diagnostic Evaluation

- Chest X-ray confirms presence of air in pleural space.
- 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 reexpansion of collapsed lung if greater than 50% 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 reexpansion of the lung.
- Surgical intervention may be necessary to repair trauma.

Nursing Diagnoses

- Ineffective Breathing Pattern related to air in the pleural space
- Impaired Gas Exchange related to atelectasis and collapse of lung
- Nursing Interventions
- Achieving Effective Breathing Pattern
- Provide emergency care as indicated.
 - Apply petroleum gauze to sucking chest wound
 - Assist with emergency thoracentesis or thoracotomy.
 - Be prepared to perform cardiopulmonary resuscitation or administer medications if cardiovascular collapse occurs.
- Maintain patent airway; suction as needed.
- Position patient upright if condition permits to allow greater chest expansion.

Resolving Impaired Gas Exchange

- Encourage patient in the use of incentive spirometer.
- Monitor oximetry and ABG levels to determine oxygenation.
- Provide oxygen as needed.
- **Patient Education and Health Maintenance**
- Instruct patient to continue use of the incentive spirometer at home.
- For patients with spontaneous pneumothorax, there is an increased risk for repeat occurrence; therefore, encourage these patients to report sudden dyspnea immediately.

- 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

Hemothorax

- Assist with thoracentesis to aspirate blood from pleural space, if being done before a chest tube insertion.
- 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.