

LUCENT NCLEX REVIEW

RESPIRATORY SYSTEM

Nasal cavity

Air passing over the mucous membrane of the nasal cavity is moistened, warmed, and filtered.

Pharynx

The pharynx, or throat, is located where passages from the nose and mouth come together.

Epiglottis

The epiglottis is a flap of elastic tissue that forms a lid over the opening to the trachea.

Larynx

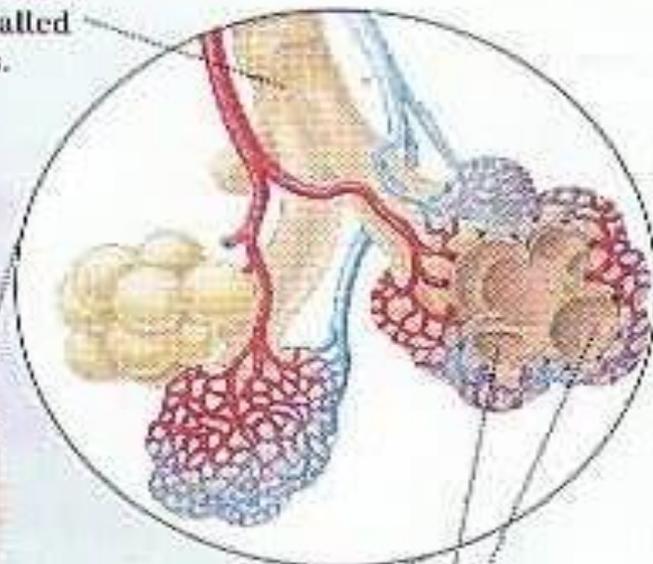
The larynx, or voice box, is located between the pharynx and the trachea. It contains two ligaments—the vocal cords—that produce sound when air moves through them.

Lungs

If one lobe is injured or diseased, the other lobes may be able to function normally.

Bronchiole

Inside the lungs, the bronchi branch into smaller tubes called the bronchioles.



Alveoli

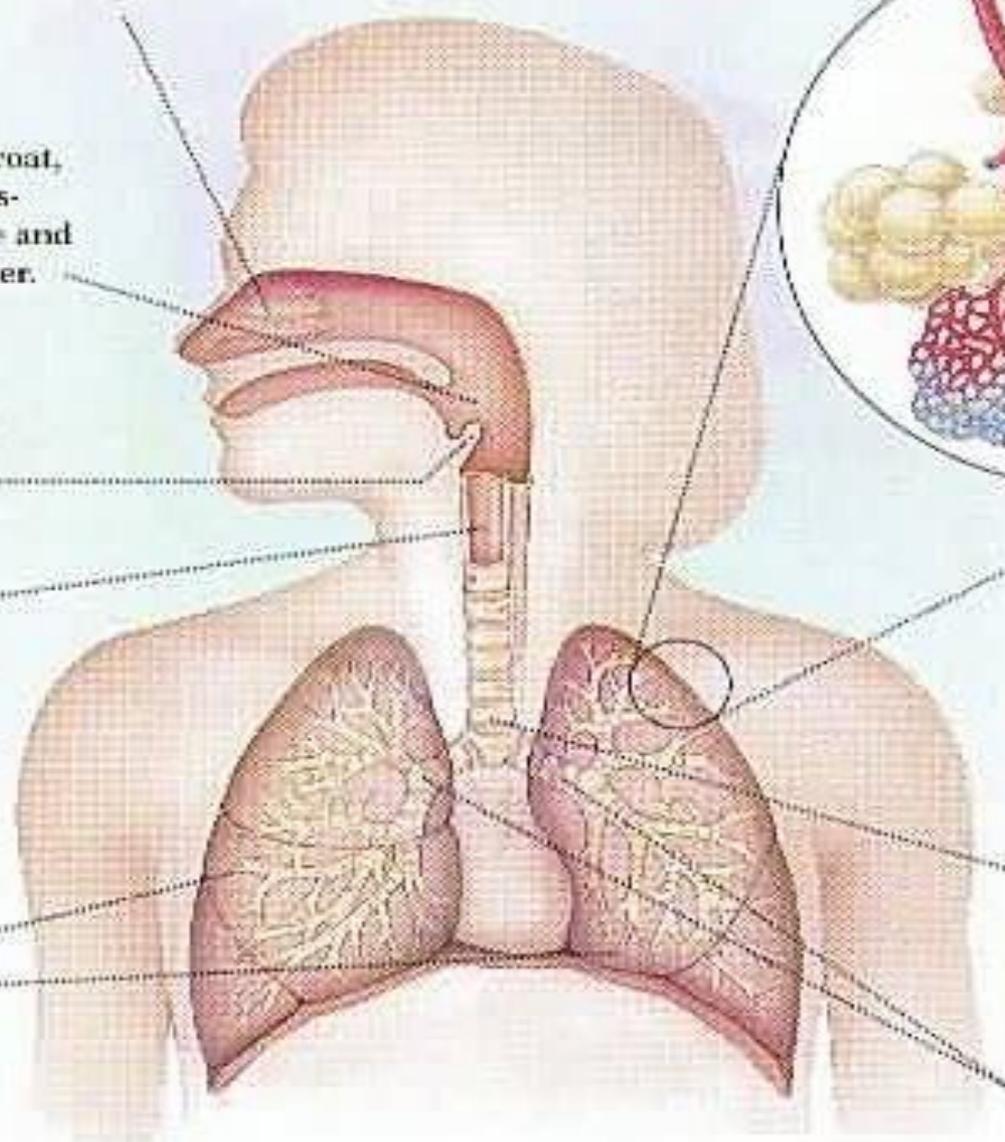
At the ends of the bronchioles are bunches of alveoli, air sacs, arranged like grapes on a stem.

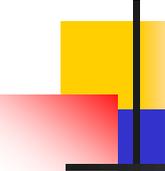
Trachea

From the larynx, air enters the trachea, or windpipe, which leads toward the lungs.

Bronchi

The trachea divides into two tubes called bronchi.





Respiratory Assessment

Health History
(allergies, occupation, lifestyle, health habits)

Inspection
(client's color, level of consciousness, emotional state)
(Rate, depth, quality, rhythm, effort relating to respiration)

Palpation and Percussion

Auscultation
(Listening for Normal and Adventitious Breath Sounds)

Physical Assessment:

Inadequate O₂

- Take vital signs
 - Auscultate all lung fields
 - Monitor O₂ sat
 - Check recent Hgb, Hct, ABGs
 - Assess cognition
 - Assess use of accessory muscles
 - Assess presence of thick or excessive secretions
 - Assess ability to cough and clear airway



Intervention: Inadequate Oxygenation

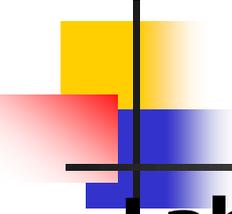
- Apply O₂ & assess response
- Elevate HOB 30 degrees
- Suction if needed
- Notify MD
- Prioritize & pace activities to prevent fatigue



Abnormal breath sounds

- **Crackles:** fine bubbling sound of fluid in alveoli (“Rice Krispies”: snap, crackle and pop) Alveoli popping open.
- **Rhonchi:** fluid in larger airways, obstructing object in the bronchus
- **Wheezes:** high pitched whistling, air through narrowed airways
- **Pleural friction rub** (creaking, grating...)
- **Stridor** (crowing...croup, foreign body obstruction, large airway tumor)
- **SILENCE IS BAD NEWS**

Diagnosing Respiratory Disorders



Laboratory Tests

- Hemoglobin
- Arterial blood gases
- Pulmonary Function Tests
- Sputum Analysis

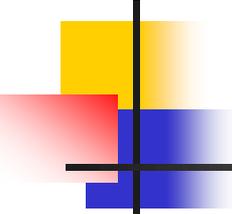
Other Tests

- Bronchoscopy
- Thoracentesis

Radiologic Studies

- Chest X-ray
- Ventilation-perfusion scan
- CAT scan
- Pulmonary angiography
- MRI

Diagnostic tests: Sputum studies



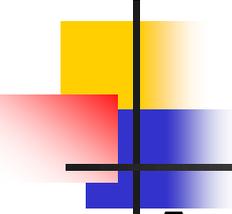
- **Culture and sensitivity**

- Done to diagnose bacterial infections, identify most effective antibiotic, and evaluate treatment

- **Acid-fast smear and culture**

- sputum is examined for the presence of acid-fast bacillus, specifically TB. Series of three early morning sputum specimens are collected

- **Cytology**



Diagnostic tests

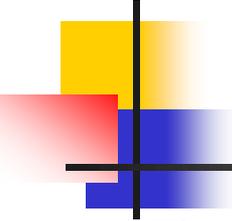
- **Arterial blood gases (ABGs)**

- Test arterial blood to assess for acid-base imbalance caused by respiratory/metabolic disorder or both.

- Know the normal values of pH, PaCO₂, HCO₃, PaO₂.

- **Nursing care**

- Do not collect blood from the same arm used for an IV infusion.



Diagnostic tests

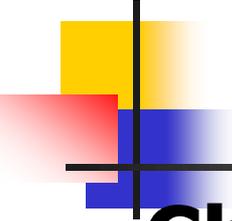
- **Pulse oximetry**

- used to monitor oxygen saturation of the blood

- normal values : 90% - 100%

- **Nursing care:**

- Assess for factors that may alter readings, including faulty placement, movement, nail polishes.



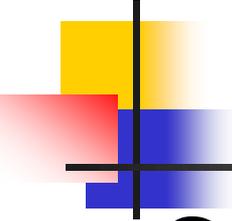
Diagnostic tests

■ **Chest X-ray**

- used to identify abnormalities in chest structure and lung tissue for diagnosis of diseases and injuries of the lungs and also to monitor treatment

□ **Nursing care**

- make sure patient has MD orders
- no special prep is needed



Diagnostic test

- **Computed Tomography (CT)**

- used as an alternate to xrays when certain structures do not show well on xrays.
- used to differentiate tumors, abscesses, and aortic aneurysms)
- identifies lymph nodes and pleural effusions, etc.

- **Nursing care**

- make sure patient has a peripheral line, preferably a 20-G needle.



Diagnostic test

- **Magnetic Resonance Imaging (MRI)**

- used to diagnose conditions that are difficult to visualize on CT or Xray

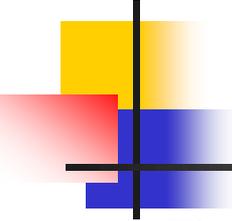
- **Nursing care**

- make sure pt has MD orders

- make sure check list is completed

- assess patient for any metallic implants such as pacemakers, wires, shrapnels, etc

- Notify MD and MRI if patient has an implanted wire or device.



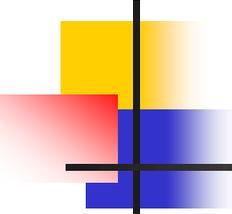
Diagnostic test

- **Pulmonary Angiography**

- This test is done to identify pulmonary emboli, tumors, aneurysms, and vascular changes.

- **Nursing care**

- Monitor injection site and pulses distal to the site after the test
 - continue cardiac monitoring



Diagnostic test

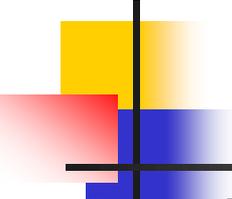
- **Pulmonary Function Test**

- This procedure is done in the pulmonary function laboratory to assess the pulmonary status of the patient

- ***values measured are:*** Total lung capacity, Total Volume, Inspiratory Reserve Volume, Expiratory Reserve Volume, Residual Volume, Vital Capacity, Minute Volume, Tidal Volume, etc

- **Nursing care**

- make sure patient has MD orders.



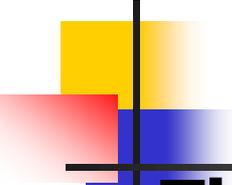
Diagnostic test

Bronchoscopy

- Direct visualization of the larynx, trachea, and bronchi through a bronchoscope to identify lesions, foreign bodies, secretions, and obtain tissue for biopsy.

Nursing care

- Obtain informed consent
- Keep nothing by mouth (NPO) for 6 to 8 hours before procedure
- Administer prescribed preprocedure medications to produce sedation and decrease anxiety
- Inform to expect some soreness, dysphagia, and hemoptysis after procedure
- Advise to avoid coughing or clearing throat
- Observe for signs of hemorrhage and/or respiratory distress; keep head of bed elevated
- Monitor vital signs until stable
- Do not allow fluids until gag reflex returns; protect airway until local anesthetic dissipates



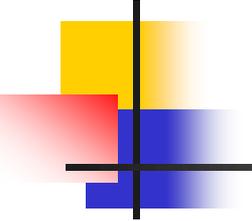
Diagnostic test

■ Thoracentesis

- Done to obtain a specimen of pleural fluid for diagnosis. A large bore needle is inserted through the chest wall and into the pleural space.
- chest xray is taken to check for pneumothorax

■ Nursing care

- Verify a signed informed consent for the procedure
- Obtain a thoracentesis tray, sterile gloves, lidocaine, povidone-iodine, dressing supplies
- **position the client upright, leaning forward** with arms and head supported on a table.



.....after procedure

- Monitor pulse, color, oxygen saturation,
- Apply a dressing over the puncture site, and position the patient on the unaffected site for 1 hour.
- Label obtained specimen with name, date, source, and diagnosis. Send specimen to the lab.
- Obtain chest xray to detect possible pneumothorax

Acute Respiratory Distress Syndrome

- In ARDS, fluid builds up in the lungs and causes them to stiffen. This impairs breathing, thereby reducing the amount of O₂ in the capillaries that supply the lungs.

ARDS- causes

- Aspiration
- Decreased surfactant production
- Fat emboli
- Fluid overload
- Neurologic injuries
- O₂ toxicity
- Respiratory infection
- Pulmonary embolism



ARDS – Assessment finding

- Hypertension or hypotension
- Cool, clammy skin
- Fatigue
- Anxiety, restlessness
- Cough
- Crackles, rhonchi, decreased breath sounds
- Cyanosis
- Dyspnea, tachypnea
- Tachycardia
- Agitation and confusion



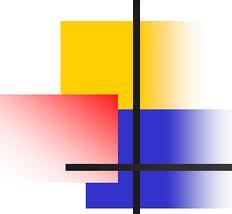
ARDS

- **Diagnostic Test Results**
- **ABG** levels show respiratory acidosis, metabolic acidosis, and hypoxemia that doesn't respond to increased fraction of inspired oxygen (FIO₂).
- **Blood culture** shows infectious organism.
- **Chest X-ray** shows bilateral infiltrates (in early stages) and lung fields with a ground-glass appearance and, with irreversible hypoxemia, massive consolidation of both lung fields (in later stages).
- **Pulse oximetry** readings are decreased.
- **Sputum study** reveals the infectious organism



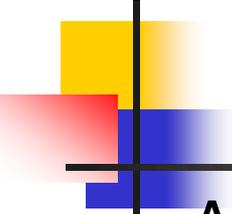
ARDS -Treatment

- Bed rest with prone positioning, if possible; passive range-of-motion exercises
- Chest physiotherapy, postural drainage, and suction
- Dietary changes, including restricting fluid intake or, if intubated, nothing by mouth
- Extracorporeal membrane oxygenation, if available
- O₂ therapy: intubation and mechanical ventilation using positive end-expiratory pressure (PEEP) or pressure-controlled inverse ratio ventilation
- Respiratory treatments



ARDS - Drugs

- **Neuromuscular blocking agents:** pancuronium, vecuronium
- **Steroids:** hydrocortisone (Solu-Cortef), methylprednisolone (Solu-Medrol)
- **Bronchodilator:** albuterol (Ventolin HFA)
- **Antacid:** aluminum hydroxide gel
- **Antibiotics:** according to infectious organism sensitivity
- **Morphine**
- **Exogenous surfactant** (Survanta)
- **Anticoagulants:** heparin, enoxaparin (Lovenox), warfarin (Coumadin)



ARDS - Interventions

- Assess respiratory, cardiovascular, and neurologic status to detect evidence of hypoxemia, such as tachycardia, tachypnea, and irritability.
- Maintain bed rest, with prone positioning, if possible, to promote oxygenation.
- Provide chest physiotherapy to promote drainage and keep airways clear.
- Avoid exposure to chemical irritants and pollutants
- Monitor laboratory studies. *A drop in Hb and HCT affects the oxygen-carrying capacity of the blood. An increase in WBC count suggests an infection such as pneumonia.*



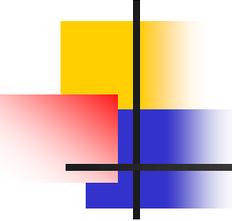
Acute Respiratory Failure

- In acute respiratory failure, the respiratory system can't adequately supply the body with the O₂ it needs or adequately remove CO₂.
- A client is considered to be in respiratory failure when PaO₂ is less than or equal to 50 mm Hg or the partial pressure of arterial carbon dioxide (PaCO₂) is greater than or equal to 50 mm Hg with a pH of less than or equal to 7.25.



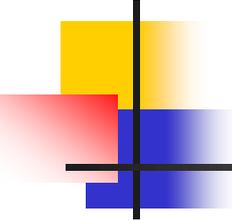
ARF - Causes

- Muscular dystrophy
- Myasthenia gravis
- Pleural effusion
- Pneumonia
- ARDS
- Anesthesia
- Atelectasis
- Brain tumors
- Chronic obstructive pulmonary disease (COPD)
- Drug overdose
- Stroke
- Drug overdose



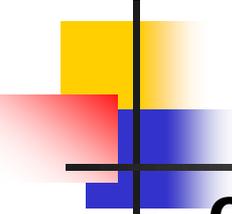
ARF – Assessment findings

- Decreased respiratory excursion, accessory muscle use, retractions
- Difficulty breathing, shortness of breath, dyspnea, tachypnea, orthopnea
- Fatigue
- Adventitious breath sounds (crackles, rhonchi, wheezing, and pleural friction rub)
- Change in mentation, anxiety
- Chest pain
- Cough, sputum production, hemoptysis
- Cyanosis, diaphoresis



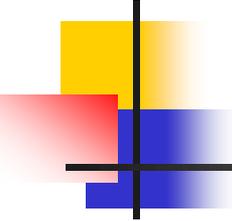
ARF – Diagnostic Test Results

- ABG levels show hypoxemia, acidosis, alkalosis, and hypercapnia.
- Chest X-ray shows pulmonary infiltrates, interstitial edema, and atelectasis.
- Hematology reveals increased WBC count and ESR.
- Lung scan shows V/Q ratio mismatches.
- Sputum study identifies organism.



ARF - Treatment

- **O2 therapy**, intubation, and mechanical ventilation (possibly with PEEP)
- **Chest physiotherapy**, postural drainage (position the client prone or supine with the foot of the bed elevated higher than the head for postural drainage), incentive spirometry
- **Dietary changes**, a high-calorie, high-protein diet, and restricting or encouraging fluids.
- **Bronchodilators**: terbutaline, aminophylline, theophylline (Theochron); via nebulizer: albuterol (Proventil-HFA), ipratropium (Atrovent)
- **Steroids**: hydrocortisone (Solu-Cortef), methylprednisolone (Solu-Medrol)
- **Histamine-2 blockers**: famotidine (Pepcid), ranitidine (Zantac), nizatidine (Axid)



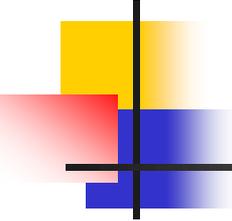
ARF - Interventions

- Assess respiratory status to detect early signs of compromise and hypoxemia.
- Administer O₂ to reduce hypoxemia and relieve respiratory distress.
- Monitor and record vital signs. Tachycardia and tachypnea may indicate hypoxemia.
- Monitor and record color, consistency, and amount of sputum to determine hydration status, effectiveness of therapy, and presence of infection.
- During steroid therapy, monitor blood glucose level every 6 to 12 hours.



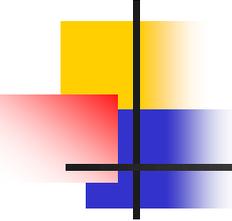
Asthma

- Asthma is a form of chronic obstructive airway disease in which the bronchial linings overreact to various stimuli, causing epi-sodic spasms and inflammation that severely restrict the airways. Symptoms range from mild wheezing and labored breathing to life-threatening respiratory failure



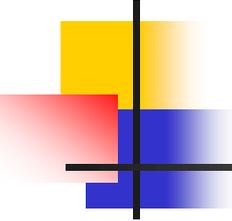
Asthma - causes

- ***Mostly Extrinsic asthma***
 - Allergens (pollen, dander, dust, sulfite food additives)
- ***Intrinsic asthma***
 - Endocrine changes
 - Respiratory infection
 - Stress
 - Temperature and humidity



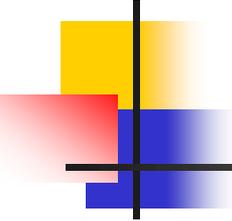
Asthma – assessment findings

- Wheezing, primarily on expiration but sometimes on inspiration
- Absent or diminished breath sounds during severe obstruction
- Chest tightness
- Dyspnea
- Lack of symptoms between attacks (usually)
- Productive cough with thick mucus
- Prolonged expiration
- Tachypnea, tachycardia
- Use of accessory muscles



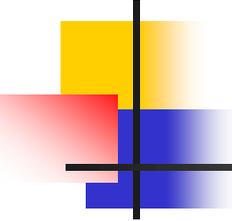
Asthma – Diagnostics Test

- PFTs during attacks show decreased forced expiratory volumes that improve with therapy and increased residual volume and total lung capacity.
- ABG studies in acute severe asthma show decreased PaO₂ and decreased, normal, or increased PaCO₂ .
- Blood tests: Serum immunoglobulin E may increase from an allergic reaction; complete blood count (CBC) may reveal increased eosinophil count.
- Pulse oximetry readings are decreased.



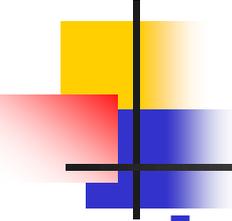
Asthma - Treatment

- Desensitization to allergens
- Fluids to 3 qt (3 L)/day unless contraindicated
- Intubation and mechanical ventilation if respiratory status worsens
- Oxygen therapy at 2 L/minute
- Antacid: aluminum hydroxide gel
- Antibiotics: according to sensitivity of infective organism
- Antileukotrienes: zafirlukast (Accolate), montelukast (Singular)



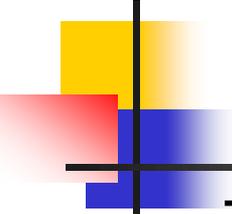
Asthma - Treatment

- **Beta-adrenergic drugs:** epinephrine, salmeterol (Serevent)
- **Bronchodilators:** terbutaline, aminophylline, theophylline (Theochron); via metered dose inhaler: albuterol (Proventil-HFA), ipratropium (Atrovent)
- **Mast cell stabilizer:** cromolyn (Intal)
- **Steroids:** hydrocortisone (Solu-Cortef), methylprednisolone (Solu-Medrol)
- **Steroids** (via metered dose inhaler): beclomethasone (Beconase AQ), triamcinolone (Azmacort)
- **Mucolytics:** acetylcysteine, guaifenesin



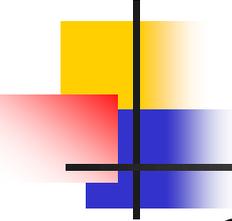
Asthma - Interventions

- Administer low-flow humidified O₂ to reduce inflammation of the airways, ease breathing, and increase SaO₂.
- Keep the client in high Fowler's position *to improve ventilation*.
- Maintain the client's diet and administer small, frequent feedings
- Monitor laboratory studies. An increase in WBC count may signal infection. Eosinophilia may indicate an allergic response. Drug levels may reveal toxicity.
- During steroid therapy, monitor blood glucose level every 6 to 12 hours
- Assess respiratory status to determine the effectiveness of therapy, such as clear breath sounds and improved airflow, PFTs, SaO₂, and ease of breathing.



Asthma - Interventions

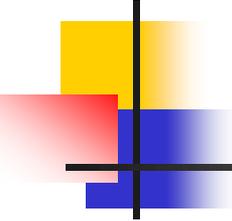
- Taking medications properly and using a metered dose inhaler
- Performing pursed-lip, diaphragmatic breathing and coughing and deep-breathing exercises
- Avoiding exposure to chemical irritants and pollutants
- Avoiding gas-producing foods, spicy foods, and extremely hot or cold foods
- Smoking cessation
- Increasing fluid intake to 3 qt (3 L)/day unless contraindicated



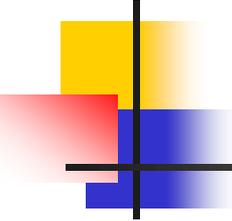
Chronic Bronchitis

- **Chronic bronchitis**, a form of COPD, results from irritants and infections that increase mucus production, impair airway clearance, and cause irreversible narrowing of the small airways. This causes a severe V/Q imbalance, leading to hypoxemia and CO₂ retention.
- **Causes**
 - Airborne irritants and pollutants
 - Chronic respiratory infections
 - Smoking

Chronic Bronchitis – Assessment Findings

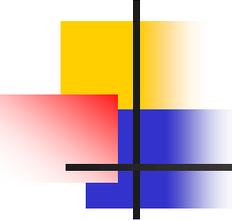


- Dyspnea
- Finger clubbing, later in the disease
- Increased sputum production
- Productive cough
- Prolonged expiration
- Rhonchi, wheezes
- Use of accessory muscles
- Weight gain, edema, jugular vein distention
- Reddish-blue skin color (later in the disease)



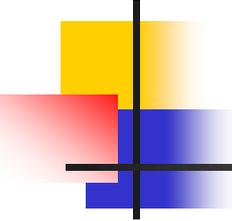
Diagnostic Tests

- ABG studies show decreased PaO₂ and normal or increased PaCO₂.
- Chest X-ray shows hyperinflation and increased bronchovascular markings.
- Electrocardiogram (ECG) shows atrial arrhythmias, peaked P waves
- PFTs may reveal increased residual volume, decreased vital capacity and forced expiratory volumes.
- Sputum culture may reveal many microorganisms and neutrophils.



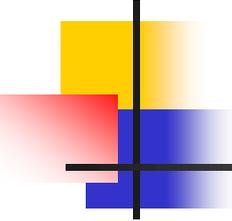
Chronic Bronchitis - Treatment

- Chest physiotherapy, postural drainage, and incentive spirometry
- Dietary changes, including establishing a diet high in protein, vitamin C, calories, and nitrogen, and avoiding milk
- Fluid intake up to 3 qt (3 L)/day, if not contraindicated
- Endotracheal intubation and mechanical ventilation, if respiratory status deteriorates
- O₂ therapy at 2 to 3 L/minute



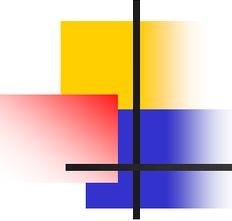
Chronic Bronchitis - Treatment

- **Antacid:** aluminum hydroxide gel
- **Antibiotics:** according to sensitivity of infective organism
- **Bronchodilators:** terbutaline, aminophylline, theophylline (Theochron); via nebulizer or metered dose inhaler: albuterol (Proventil- HFA), ipratropium (Atrovent)
- **Diuretic:** furosemide (Lasix) for edema
- **Expectorant:** guaifenesin
- **Influenza and Pneumovax** vaccines
- **Steroids:** hydrocortisone (Solu-Cortef), methylprednisolone (Solu-Medrol)
- **Steroids (via nebulizer or metered dose inhaler):** beclomethasone (Beconase AQ), triamcinolone (Azmacort)



Chronic Bronchitis - Interventions

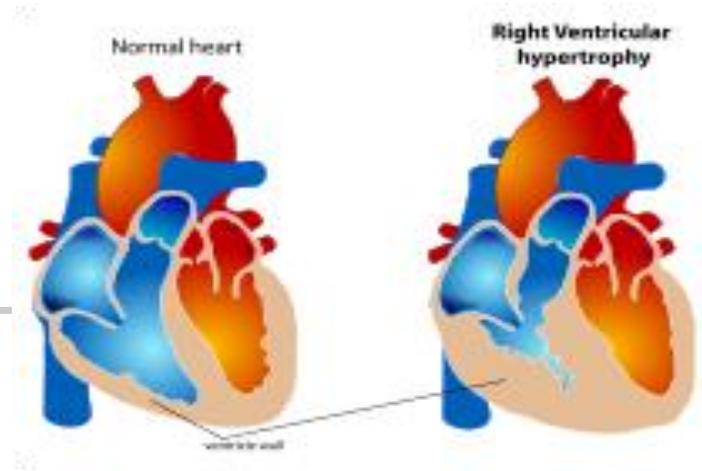
- Assess respiratory status, ABG levels, and pulse oximetry to detect respiratory compromise, severe hypoxemia, and hypercapnia.
- Monitor and record the color, amount, and consistency of sputum. *Changes in sputum characteristics may signal a respiratory infection.*
- Provide chest physiotherapy, postural drainage, incentive spirometry, and suction *to aid in removal of secretions.*
- Assist with diaphragmatic and pursed-lip breathing *to strengthen respiratory muscles.*



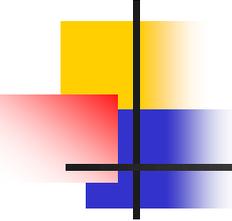
Chronic Bronchitis - Interventions

- Monitor and record cardiovascular status and vital signs. Edema, jugular venous distention, tachycardia, and elevated CVP suggest right-sided heart failure. Tachycardia and tachypnea may indicate hypoxemia.
- Monitor intake and output and daily weights *to detect fluid overload associated with right-sided heart failure. Dehydration impairs the removal of secretions*
- Avoiding exposure to chemical irritants and pollutants
- Avoiding gas-producing foods, spicy foods, and extremely hot or cold foods
- Smoking cessation

Cor pulmonale

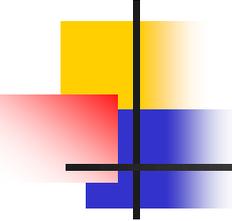


- A chronic heart condition, **cor pulmonale is hypertrophy (enlargement) of the heart's right ventricle that results from diseases affecting the function or the structure of the lungs.** To compensate for the extra work needed to force blood through the lungs, the right ventricle dilates and enlarges.
- Because cor pulmonale generally occurs late during the course of COPD and other irreversible diseases, the prognosis is generally poor



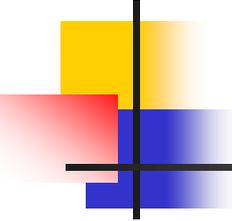
Cor pulmonale - causes

- COPD (about 25% of clients with COPD eventually develop cor pulmonale)
- Living at high altitudes
- Loss of lung tissue after extensive lung surgery
- Obesity-hypoventilation syndrome and upper airway obstruction
- Obstructive lung diseases such as bronchiectasis and cystic fibrosis



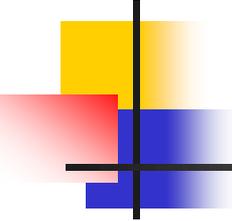
Cor pulmonale – assessment findings

- Chronic productive cough
- Dyspnea on exertion
- Edema
- Fatigue
- Orthopnea
- Tachypnea
- Weakness
- Wheezing respirations



Cor pulmonale – Diagnostics

- ABG analysis shows decreased PaO₂ (< 70 mm Hg).
- Blood tests show HCT greater than 50%.
- Chest X-ray shows large central pulmonary arteries and suggests right ventricular enlargement.
- ECG commonly shows arrhythmias
- PAP measurements show increased right ventricular pressure as a result of increased pulmonary vascular resistance.
- PFTs show results consistent with the underlying pulmonary disease.

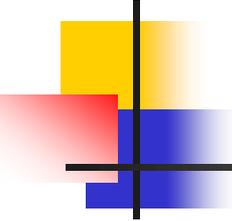


Cor pulmonale - Treatment

- Diet: low salt, with restricted fluid intake
- O₂ therapy by mask or cannula in concentrations ranging from 24% to 40%, depending on PaO₂ as necessary and, in acute cases, endotracheal intubation and mechanical ventilation

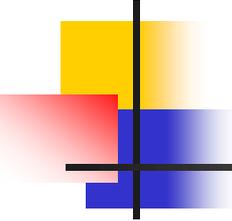
Drug therapy

- Angiotensin-converting enzyme inhibitor: captopril (Capoten)
- Antibiotics (when respiratory infection is present)
- Anticoagulant: heparin



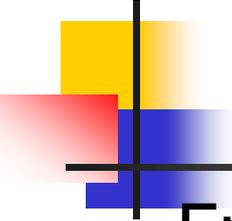
Cor pulmonale - Treatment

- Calcium channel blocker: diltiazem (Cardizem)
- Cardiac glycoside: digoxin (Lanoxin)
- Diuretic: furosemide (Lasix)
- Vasodilators: diazoxide, hydralazine, nitroprusside (Nitropress), prostaglandins (in primary pulmonary hypertension)



Cor pulmonale - interventions

- Cor pulmonale clients with underlying COPD shouldn't receive high concentrations of oxygen. It could lead to subsequent respiratory depression.
- Limit the client's fluid intake to 1 to 2 qt (1 to 2 L)/day, and provide a low-sodium diet *to prevent fluid retention.*
- Reposition the client every 2 hours *to prevent atelectasis and to avoid skin breakdown.*
- Provide meticulous respiratory care, including O₂ therapy and, for clients with COPD, pursed-lip breathing exercises, *to improve oxygenation*

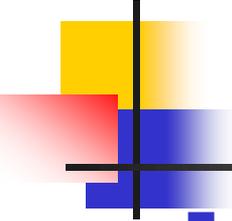


Emphysema

- Emphysema is a form of COPD in which recurrent pulmonary inflammation damages and eventually destroys the alveolar walls, creating large air spaces. This breakdown leaves the alveoli unable to recoil normally after expanding, and, upon expiration, results in bronchiolar collapse. This traps air in the lungs, leading to overdistention and reduced gas exchange.

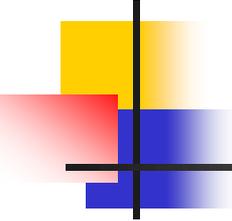
Causes

- Deficiency of alpha1-antitrypsin
- Smoking



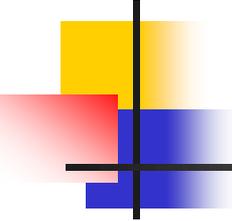
Emphysema – Assessment findings

- Anorexia, weight loss
- Barrel chest
- Decreased breath sounds
- Dyspnea
- Finger clubbing (late in the disease)
- Hyper-resonance (with percussion over lung fields)
- Prolonged expiration
- Pursed-lip breathing
- Use of accessory muscles for breathing



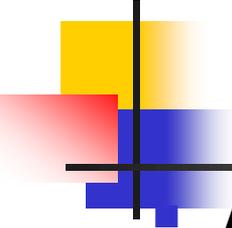
Emphysema - Diagnostics

- ABG studies show reduced PaO₂, with normal PaCO₂ until late in the disease.
- Chest X-ray in advanced disease reveals a flattened diaphragm, reduced vascular markings in the lung periphery, enlarged anteroposterior chest diameter, and a vertical heart.
- PFTs show increased residual volume, total lung capacity, and compliance as well as decreased vital capacity, diffusing capacity, and expiratory volumes.



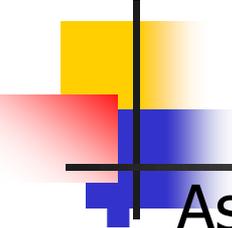
Emphysema - Treatment

- Chest physiotherapy, postural drainage, and incentive spirometry
- Dietary changes, including establishing a diet high in protein, vitamin C, calories, and nitrogen
- Fluid intake up to 3 qt (3 L)/day, if not contraindicated
- Endotracheal intubation and mechanical ventilation, if respiratory status deteriorates
- O₂ therapy at 2 to 3 L/minute; transtracheal therapy for home O₂ therapy



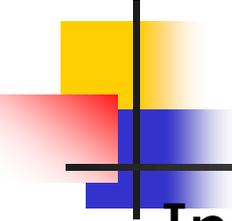
Emphysema - Treatment

- **Alpha1-antitrypsin** therapy
- **Antibiotics:** according to sensitivity of infective organism
- **Bronchodilators:** terbutaline, aminophylline, theophylline (Theocron); via nebulizer: albuterol (Proventil-HFA), ipratropium (Atrovent)
- **Expectorant:** guaifenesin
- **Influenza and Pneumovax** vaccines
- **Steroids:** hydrocortisone (Solu-Cortef), methylprednisolone (Solu-Medrol)
- **Steroids (via nebulizer):** beclomethasone (Beconase AQ), triamcinolone (Azmacort)



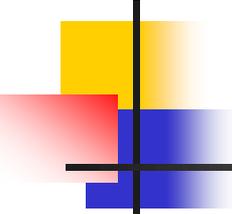
Emphysema- interventions

- Assess respiratory status, ABG levels, and pulse oximetry *to detect respiratory compromise, severe hypoxemia, and hypercapnia.*
- Monitor and record the color, amount, and consistency of sputum.
- Assist with turning, coughing, and deep breathing, and encourage use of incentive spirometry *to mobilize secretions and facilitate removal.*
- Assist with diaphragmatic and pursed-lip breathing *to strengthen respiratory muscles.*
- Provide chest physiotherapy and postural drainage and suction *to help remove secretions.*



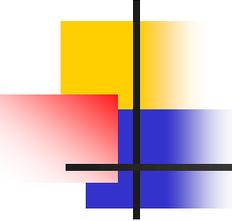
Lung Cancer

- In lung cancer, unregulated cell growth and uncontrolled cell division result in the development of a neoplasm.
- Cancer may also affect the lungs as a result of metastasis from other organs, mainly the liver, brain, bone, kidneys, and adrenal glands.
- **CAUSES**
 - Tobacco use
 - Exposure to environmental pollutants
 - Exposure to occupational pollutants



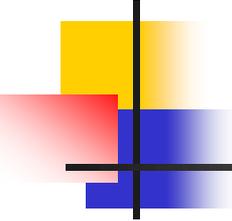
Lung Cancer – 3 Types

- **squamous cell** (epidermoid), a slow- growing cancer that originates from bronchial epithelium. It metastasizes late to the surrounding area, but may cause bronchial obstruction.
- **adenocarcinoma**, a moderately growing cancer located in peripheral areas of the lung. It metastasizes through the bloodstream to other organs.
- **small-cell (oat cell cancer)**, a very in a client with lung cancer, a very fast-growing cancer that metastasizes very early through lymph vessels and the blood- stream to other organs.



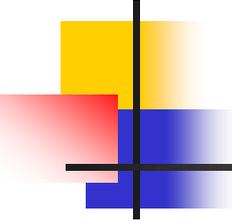
Lung Cancer – Assessment

- Hypoxemia
- Hypotension
- Chest pain
- Chills, fever
- Cough, hemoptysis
- Dyspnea, wheezing
- Weakness, fatigue
- Weight loss, anorexia



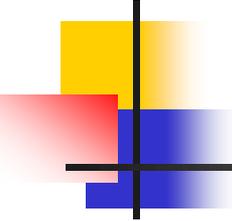
Lung Cancer - Diagnostics

- Bronchoscopy reveals a positive biopsy.
- Chest X-ray shows a lesion or mass.
- Lung scan shows a mass.
- Open lung biopsy reveals a positive biopsy.
- Sputum study reveals positive cytology for cancer cells.



Lung Cancer - Treatment

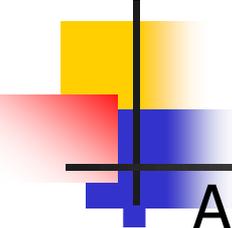
- Dietary changes, a high-protein, high-calorie diet and providing small, frequent meals
- Incentive spirometry
- Laser photocoagulation
- O2 therapy, intubation and, if the condition deteriorates, mechanical ventilation
- Radiation therapy
- Resection of the affected lobe (lobectomy) or lung (pneumonectomy)



Lung Cancer - Treatment

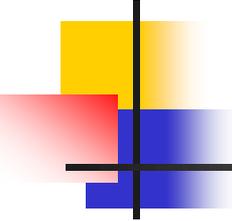
Drug therapy

- Analgesics: morphine, fentanyl (Sublimaze)
- Antiemetics: prochlorperazine, ondansetron (Zofran)
- Antineoplastics: cyclophosphamide, doxorubicin (Doxil), cisplatin (Platinol), vincristine
- Diuretics: furosemide (Lasix), ethacrynic acid (Edecrin)



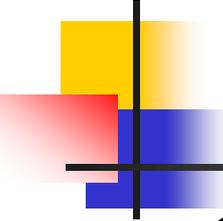
Lung Cancer - Intervention

- Assess respiratory status to detect respiratory complications. *Cyanosis may suggest respiratory failure, whereas an increase in sputum production may suggest an infection.*
- Assess the client's pain level and administer analgesics, as prescribed, *to control pain.*
- Monitor and record intake and output *to assess fluid status.*
- Monitor pulse oximetry values and report a drop in O2 saturation, *which suggests hypoxemia.*
- Administer O2 *to maintain tissue oxygenation.*
- Encourage fluids and administer I.V. fluids



Pleural Effusion & Empyema

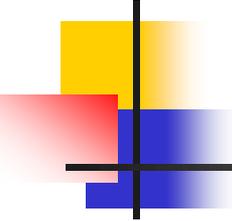
- Pleural effusion is an excess of fluid in the pleural space (the thin space between the lung tissue and the membranous sac that protects it)
- Empyema is the accumulation of pus and necrotic tissue in the pleural space. Blood (hemothorax) and chyle (chylothorax) may also collect in this space.



Pleural Effusion & Empyema

■ CAUSES

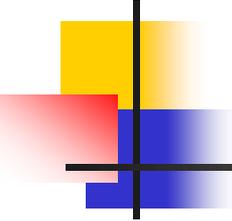
- Bacterial or fungal pneumonitis or empyema
- Chest trauma
- Collagen disease (lupus erythematosus and rheumatoid arthritis)
- Heart failure
- Hepatic disease with ascites
- Infection in the pleural space
- Pancreatitis
- Subphrenic abscess
- TB



Pleural Effusion & Empyema

- **ASSESSMENT FINDINGS**

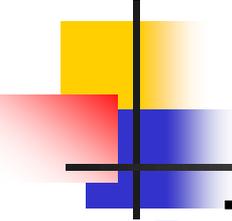
- Decreased breath sounds
- Dyspnea
- Fever
- Malaise
- Pleuritic chest pain
- If fluid is removed too quickly during thoracentesis, the client may suffer bradycardia, hypotension, pain, pulmonary edema, or even cardiac arrest



Pleural Effusion & Empyema

■ **DIAGNOSTIC TEST RESULTS**

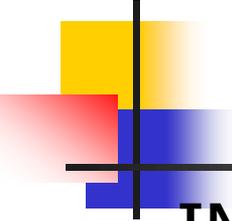
- Chest X-ray shows radiopaque fluid in dependent regions.
- Thoracentesis shows lactate dehydrogenase (LD) levels less than 200 international units and protein levels less than 3 g/dl (in transudative effusions).
 - Tuberculin skin test rules out TB as the cause.



Pleural Effusion & Empyema

■ **TREATMENT**

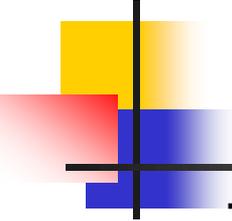
- Thoracentesis (to remove fluid) with chest tube insertion if necessary
- Thoracotomy if thoracentesis isn't effective
- O2 therapy
- ***Drug therapy***
 - Antibiotics for empyema: according to sensitivity of causative organism
 - Antipyretic: acetaminophen (Tylenol)
 - Analgesic: acetaminophen with oxycodone (Percocet)



Pleural Effusion & Empyema

■ INTERVENTIONS AND RATIONALES

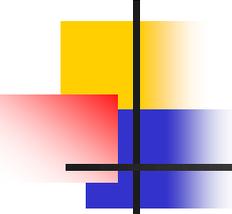
- Explain thoracentesis to the client. Before the procedure.
- Administer O₂ *to improve oxygenation.*
- Administer antibiotics *to treat empyema.*
- Provide meticulous chest tube care, and use sterile technique for changing dressings around the tube insertion site in empyema *to prevent infection at the insertion site.*



Pleural Effusion & Empyema

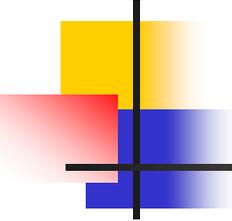
■ INTERVENTIONS AND RATIONALES

- Ensure chest tube patency by watching for bubbles in the underwater seal chamber *to prevent respiratory distress resulting from chest tube obstruction.*
- Record the amount, color, and consistency of chest tube drainage *to monitor the effectiveness of treatment.*
- Encourage the client to do deep-breathing exercises *to promote lung expansion* and use of an incentive spirometer *to promote deep breathing.*



Pneumonia

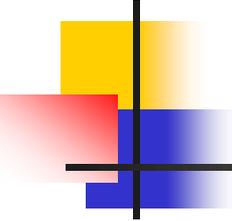
- Pneumonia refers to a bacterial, viral, parasitic, or fungal infection that causes inflammation of the alveolar spaces.
- In pneumonia, microorganisms enter alveolar spaces through droplet inhalation, resulting in inflammation and an increase in alveolar fluid. Ventilation decreases as secretions thicken.
- **CAUSES**
 - Aspiration; Chemical irritants
 - Organisms such as *Escherichia coli*, *Haemophilus influenzae*, *Staphy aureus*, *Pneumocystis jiroveci*, *Streptococcus pneumoniae*, and *Pseudomonas*



Pneumonia

■ **ASSESSMENT FINDINGS**

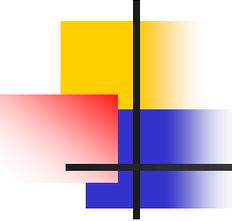
- Chills, fever, Cough, Crackles, rhonchi, pleural friction rub on auscultation
- Malaise, Pleuritic pain, Restlessness, confusion, Shortness of breath, dyspnea, tachypnea, accessory muscle use
- Sputum production that's rusty, green, or bloody with pneumococcal pneumonia and yellow-green with bronchopneumonia



Pneumonia

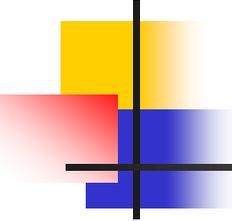
■ **DIAGNOSTIC TEST RESULTS**

- ABG levels show hypoxemia and respiratory alkalosis.
- Chest X-ray shows pulmonary infiltrates.
- Hematology study shows increased WBC count and ESR.
- Sputum study identifies organism.
- Pulse oximetry levels are decreased.



Pneumonia - Treatment

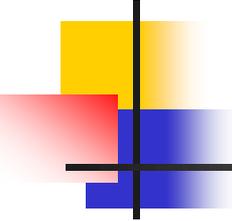
- Chest physiotherapy and respiratory treatments
- Dietary changes, including establishing a high-calorie, high-protein diet and forcing fluids
- Intubation and mechanical ventilation if condition deteriorates
- O₂ therapy
- Nutritional support, including enteral nutrition if client requires intubation



Pneumonia - Treatment

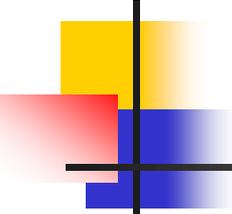
Drug therapy

- Antibiotics: according to organism sensitivity
- Antipyretics: aspirin, acetaminophen (Tylenol)
- Bronchodilator: albuterol (Proventil-HFA)



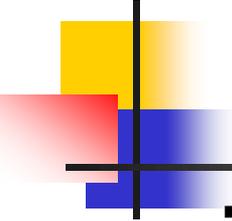
Pneumonia - Interventions

- Monitor and record intake and output..
- Monitor laboratory studies. *An elevated WBC count suggests infection. Blood and sputum cultures may identify the causative agent.*
- Encourage fluid intake of 3 qt (3 L)/day, unless contraindicated, and administer I.V. fluids *to help liquefy secretions to aid in their removal.*
- Monitor and record color, consistency, and amount of sputum.



Pneumothorax & Hemothorax

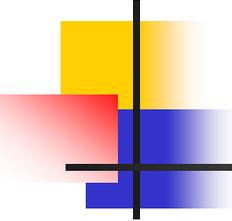
- **In pneumothorax**, loss of negative intrapleural pressure results in the collapse of the lung. *Pneumothorax may be described as spontaneous, open, or tension.*
- **In hemothorax**, blood accumulates in the pleural space when a rib lacerates lung tissue or an intercostal artery. This compresses the lung and limits respiratory capacity. Hemothorax can also result from rupture of large or small pulmonary vessels.



Pneumothorax & Hemothorax

- **Types of pneumothorax**

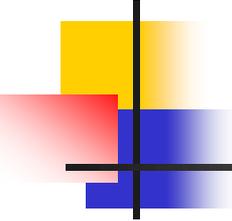
- **Spontaneous pneumothorax** results from the rupture of a bleb.
- **Open pneumothorax** occurs when an opening through the chest wall allows air to flow between the pleural space and the outside of the body.
- **Tension pneumothorax** results from a buildup of air in the pleural space that can't escape.



Pneumothorax & Hemothorax

■ **CAUSES**

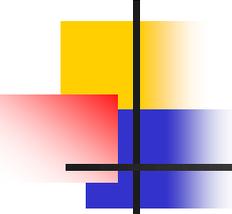
- Blunt chest trauma
- Central venous catheter insertion
- Penetrating chest injuries
- Rupture of a bleb
- Thoracentesis
- Thoracic surgeries
- Barotrauma.



Pneumothorax & Hemothorax

■ **ASSESSMENT FINDINGS**

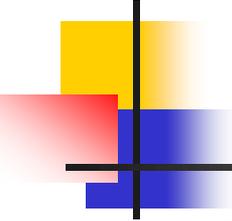
- Anxiety, Diaphoresis, pallor
- Diminished or absent breath sounds unilaterally
- Dullness on chest percussion (in the case of hemothorax and tension pneumothorax)
- Dyspnea, tachypnea, subcutaneous emphysema, cough
- Hypotension (in the case of hemothorax)
- Sharp pain that increases with exertion
- Tachycardia
- Tracheal shift, decreased chest expansion unilaterally



Pneumothorax & Hemothorax

DIAGNOSTIC TEST RESULTS

- ABG levels show respiratory and hypoxemia.
- Chest X-ray reveals pneumothorax or hemothorax.
- Lung scan shows V/Q ratio mismatches.
- Pulse oximetry levels are decreased.



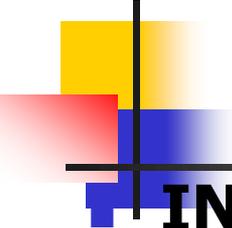
Pneumothorax & Hemothorax

■ **TREATMENT**

- Chest tube to water-seal drainage, or continuous suction (see *Checking in on chest tubes*)
- Incentive spirometry
- Occlusive dressing (for open pneumothorax)
- O₂ therapy

■ ***Drug therapy***

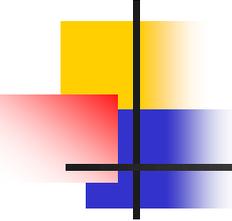
- Analgesic: morphine I.V.



Pneumothorax & Hemothorax

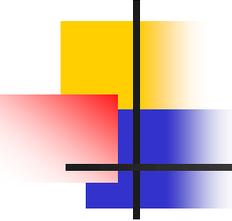
INTERVENTIONS AND RATIONALES

- **Monitor chest tube function and drainage.** An increase in the amount of bloody drainage suggests new bleeding or an increase in bleeding. Check tubing for kinks if there's a sudden reduction in drainage.
- Assess cardiovascular status. Tachycardia, hypotension, and jugular venous distention suggest tension pneumothorax
- Keep the client in high Fowler's position *to enhance chest expansion.*



Pulmonary Edema

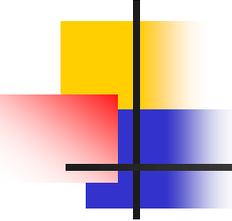
- Pulmonary edema is a complication of left-sided heart failure.
- It occurs when pulmonary capillary pressure exceeds intravascular osmotic pressure and results in increased pressure in the capillaries of the lungs and acute transudation of fluid. This leads to impaired oxygenation and hypoxia.



Pulmonary Edema

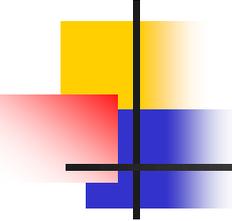
■ **CAUSES**

- ARDS, Atherosclerosis
- Drug overdose: heroin, barbiturates, morphine sulfate
- **Heart failure**
- Hypertension
- Myocardial infarction
- Overload of I.V. fluids
- Smoke inhalation
- Valvular disease



Pulmonary Edema

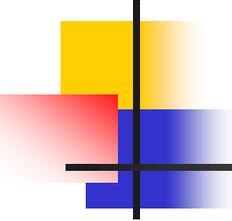
- **ASSESSMENT FINDINGS**
 - Agitation, restlessness, intense fear
 - Blood-tinged, frothy sputum
 - Productive cough (frothy, bloody sputum)
 - Cold, clammy skin
 - Crackles over lung fields
 - Dyspnea, orthopnea, tachypnea
 - Jugular vein distention
 - Syncope
 - Tachycardia, S3 and S4, chest pain



Pulmonary Edema

■ **DIAGNOSTIC TEST RESULTS**

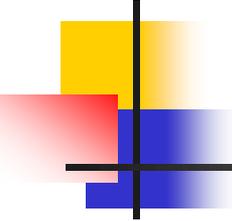
- ABGs show respiratory alkalosis or acidosis and hypoxemia.
- Chest X-ray shows diffuse haziness of the lung fields and, commonly, cardiomegaly and pleural effusions.
- ECG reveals tachycardia and ventricular enlargement.
- Hemodynamic monitoring shows increases in PAP, pulmonary artery wedge pressure, and CVP as well as decreased cardiac output.
- Pulse oximetry reveals hypoxia.



Pulmonary Edema

■ TREATMENT

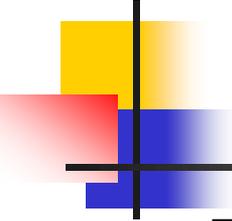
- O₂ therapy: possibly intubation and mechanical ventilation
- Activity changes: maintaining bed rest and implementing range-of-motion and isometric exercises
- Dietary changes: establishing a low-sodium diet and limiting oral fluids
- Hemodialysis and ultrafiltration, if available



Pulmonary Edema

■ ***Drug therapy***

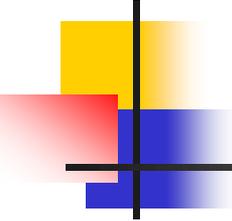
- Diuretics: furosemide (Lasix), bumetanide (Bumex), metolazone (Zaroxolyn)
- Nitrates: isosorbide (Isordil), nitroglycerin
- Analgesic: morphine sulfate I.V.
- Cardiac glycoside: digoxin (Lanoxin)
- Inotropic agents: dobutamine, inamrinone (Amrinone), milrinone
- Vasodilator: nitroprusside (Nitropress)



Pulmonary Edema

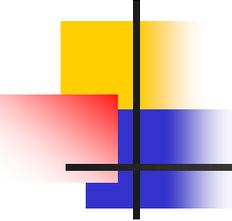
■ **INTERVENTIONS AND RATIONALES**

- Administer oxygen, as prescribed
- Monitor and record intake and output. *Intake greater than output and elevated specific gravity suggest fluid retention.*
- Weigh the client daily to detect fluid retention.
- Keep the client in high Fowler's position if blood pressure tolerates; if hypotensive, maintain in a semi-Fowler's position if tolerated.
- Eating foods high in potassium
- Note the color, amount, and consistency of sputum.



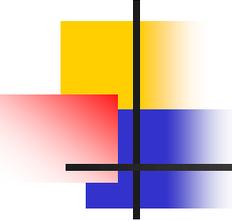
Tuberculosis

- TB is an **airborne**, infectious, communicable disease that can occur acutely or chronically.
- In TB, alveoli become the focus of infection from inhaled droplets containing bacteria.
- **CAUSES**
- *Mycobacterium tuberculosis*



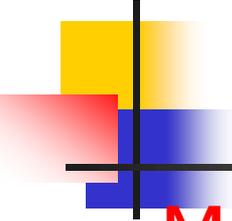
Assessment Findings

- Anorexia, weight loss
- Cough, yellow and mucoid sputum, hemoptysis
- Crackles
- Dyspnea
- Fatigue, malaise, irritability
- Low-grade fever
- Night sweats, Tachycardia



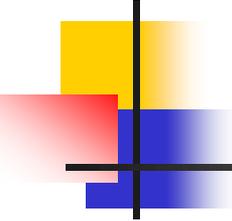
Nursing Diagnosis

- Ineffective airway clearance
- Fatigue
- Social isolation
- Anxiety
- Imbalanced nutrition: Less than body requirements
- Impaired gas exchange



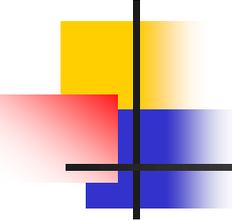
Diagnostic Test Results

- Mantoux skin test is positive.
- Stains and cultures of sputum, cerebrospinal fluid, urine, abscess drainage, or pleural fluid show heat-sensitive, aerobic, and acid-fast bacilli.
- Hematology shows increased WBC count and ESR
- Chest X-ray shows active or calcified lesions.



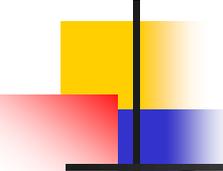
Treatment

- Chest physiotherapy, postural drainage, and incentive spirometry
- Dietary changes, including establishing a diet high in carbohydrates, protein, vitamins B6 and C, and calories
- **Standard and airborne precautions**



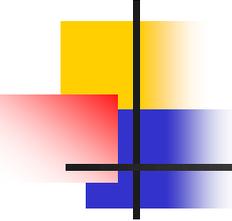
Drug Therapy

- **Antibiotic:** streptomycin
- **Antituberculars:**
 - Isoniazid (INH),
 - ethambutol (Myambutol),
 - rifampin (Rifadin),
 - pyrazinamide



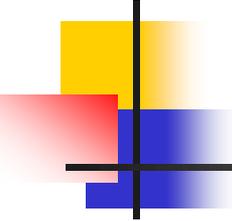
Side Effects

- **Streptomycin:** ototoxicity (direct auditory [eighth cranial] nerve toxic effect); nephrotoxicity
- **Ethambutol:** visual disturbances (direct optic [second cranial] nerve toxic effect)
- **Rifampin:** orange-red discoloration of all body fluids; increases metabolism of corticosteroids, opioids, warfarin (Coumadin), oral contraceptives, and hypoglycemics
- **INH:** inhibits phenytoin metabolism; peripheral neuritis. INH: administer *pyridoxine* as prescribed to prevent neuritis



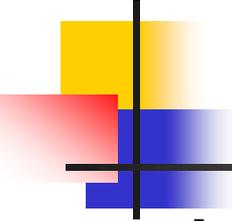
Interventions

- Assess respiratory status *to detect respiratory complications such as pleural effusion.*
- Monitor and record vital signs and laboratory studies
- Provide a well-balanced, high-calorie diet and small, frequent meals *to increase caloric intake.*
- Perform chest physiotherapy and postural drainage *to facilitate mobilization of secretions.*



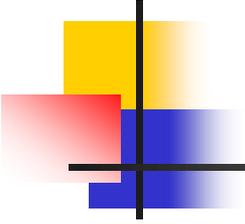
Interventions

- Maintain infection-control precautions *to reduce the spread of infectious organisms.*
- Instruct the client to cover his nose and mouth when sneezing *to reduce transmission by droplet.*
- Encourage fluids *to liquefy secretions.*
- Provide frequent oral hygiene *to promote comfort and improve appetite.*



Interventions

- Assist with turning, coughing, and deep-breathing
- Provide a negative pressure room *to prevent the spread of infection.*
- Monitor and record intake and output *to assess hydration. Adequate hydration is necessary to facilitate removal of secretions.*
- Provide O₂ therapy *to improve oxygenation.*



- **LUCENT NCLEX REVIEWS**