PULMONARY NURSING(10HRS)

A. SAMBU

MODULE OUTCOMES.

- BY THE END OF THE MODULE THE LEARNER SHOULD:

1. MANAGE PATIENTS WITH RESTRICTIVE RESPIRATORY DISORDERS USING THE NURSING PROCESS.

2. MANAGE PATIENTS WITH OBTRUCTIVE RESPIRATORY DISORDERS USING THE NURSING PROCESS.

Intro.

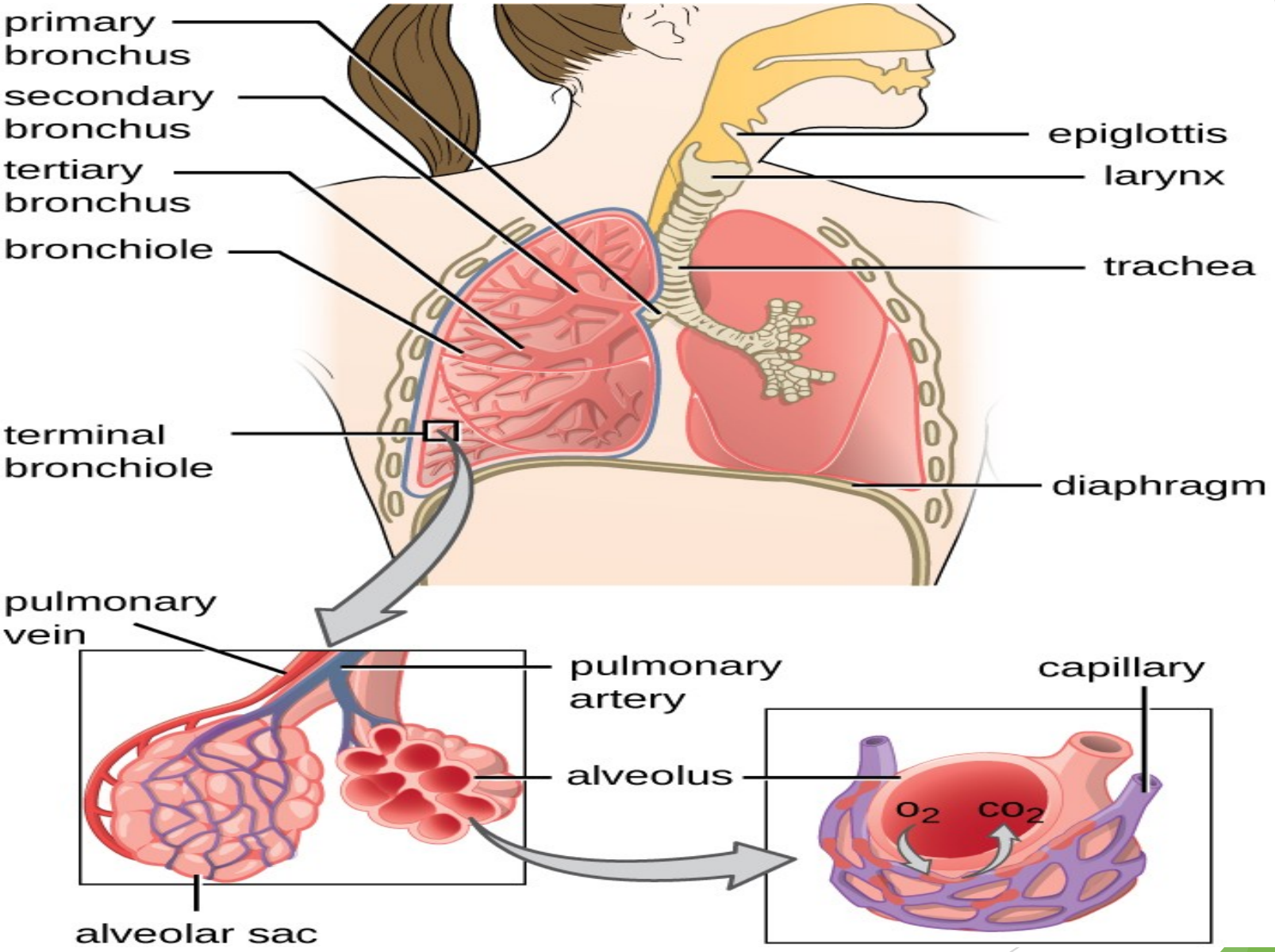
- The cells of the human body require a constant stream of oxygen to stay alive. The respiratory system provides oxygen to the body's cells while removing carbon dioxide, a waste product that can be lethal if allowed to accumulate.

Intro.

- There are 3 major parts of the respiratory system: **the airway, the lungs, and the muscles of respiration**. The airway, which includes the nose, mouth, pharynx, larynx, trachea, bronchi, and bronchioles, carries air between the lungs and the body's exterior.

Intro.

- The lungs act as the functional units of the respiratory system by passing oxygen into the body and carbon dioxide out of the body. Finally, the muscles of respiration, including the diaphragm and intercostal muscles, work together to act as a pump, pushing air into and out of the lungs during breathing.


primary bronchus
secondary bronchus
tertiary bronchus
bronchiole
terminal bronchiole
pulmonary vein
alveolar sac
pulmonary artery
alveolus
epiglottis
larynx
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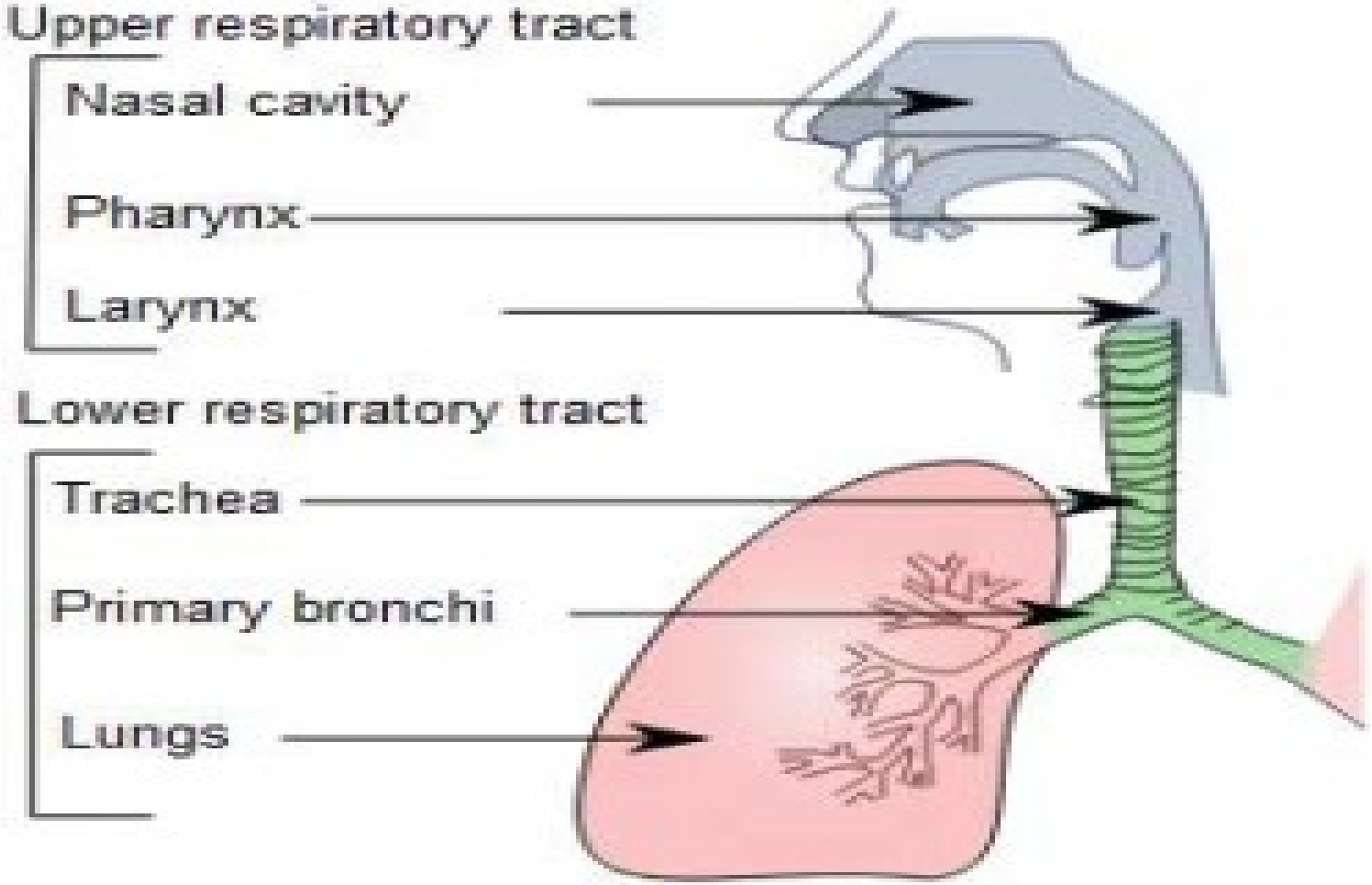
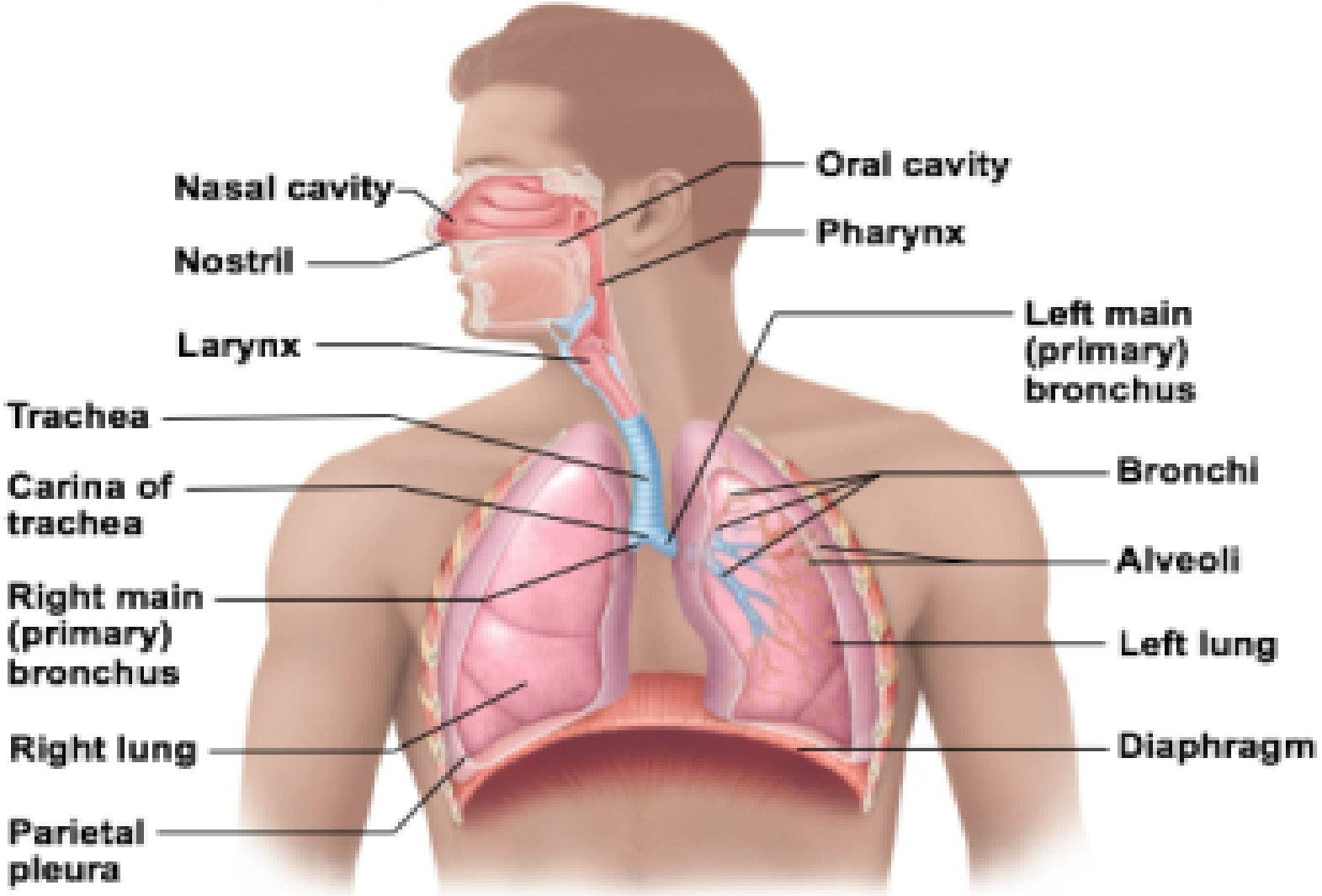
diaphragm
capillary
O_2
CO_2


Upper respiratory tract
Nasal cavity
Pharynx
Larynx
Lower respiratory tract
Trachea
Primary bronchi
Lungs

ure 22.1 The major respiratory organs.



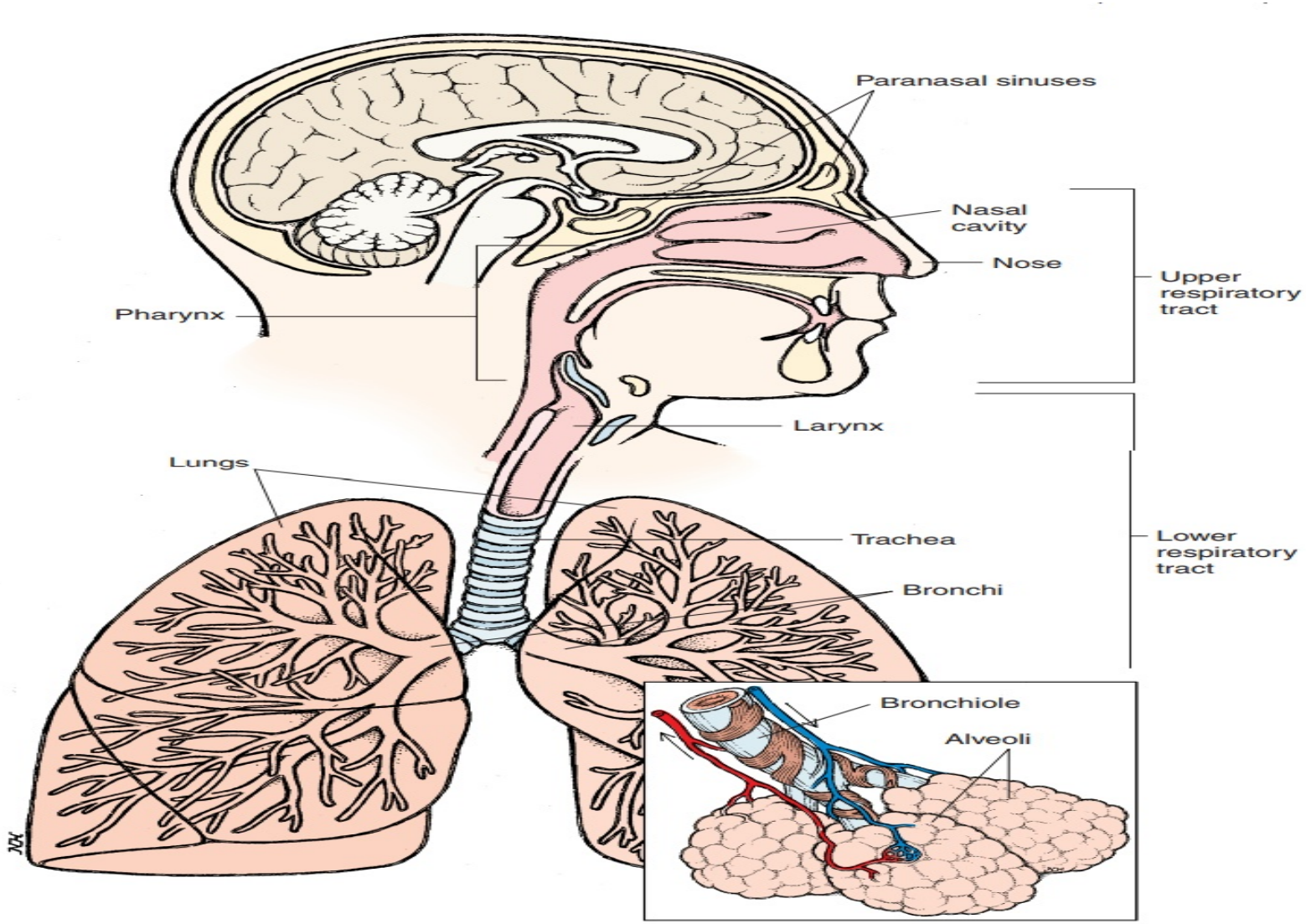


FIGURE The Structures of the Respiratory System (Anterior View)

PNEUMONIA.

- Pneumonia is an inflammation of the lung parenchyma caused by various microorganisms, including bacteria, mycobacteria, fungi, and viruses. Pneumonias are classified as community acquired pneumonia (CAP), hospital-acquired (nosocomial) pneumonia (HAP), pneumonia in the immunocompromised host, and aspiration pneumonia.

Cont.

- Those at risk for pneumonia often have chronic underlying disorders, severe acute illness, a suppressed immune system from disease or medications, immobility, and other factors that interfere with normal lung protective mechanisms. The elderly are also at high risk.

Pathophysiology

- An inflammatory reaction can occur in the alveoli, producing an exudate that interferes with the diffusion of oxygen and carbon dioxide; bronchospasm may also occur if the patient has reactive airway disease.

Cont.

- Bronchopneumonia, the most common form, is distributed in a patchy fashion extending from the bronchi to surrounding lung parenchyma. Lobar pneumonia is the term used if a substantial part of one or more lobes is involved.

Cont.

- Pneumonias are caused by a variety of microbial agents in the various settings. Common organisms include Pseudomonas aeruginosa and Klebsiella species; Staphylococcus aureus; Haemophilus influenzae; Staphylococcus pneumoniae; and enteric Gram-negative bacilli, fungi, and viruses (most common in children).

Clinical Manifestations

Clinical features vary depending on the causative organism and the patient's disease.

- Sudden chills and rapidly rising fever (38.5C to 40.5C [101F to 105F]).
- Pleuritic chest pain aggravated by respiration and coughing.
- Severely ill patient has marked tachypnea (25 to 45 breaths/min) and dyspnea; orthopnea when not propped up.

Cont.

- Pulse rapid and bounding; may increase 10 beats/ min per degree of temperature elevation (Celsius).
- A relative bradycardia for the amount of fever suggests viral infection, mycoplasma infection, or infection with a Legionella organism.

Cont.

- Other signs: upper respiratory tract infection, headache, low-grade fever, pleuritic pain, myalgia, rash, and pharyngitis; after a few days, mucoid or mucopurulent sputum is expectorated.
- Sputum purulent, rusty, blood-tinged, viscous, or green depending on etiologic agent.
- Appetite is poor, and the patient is diaphoretic and tires easily.

Diagnostic Methods

- Primarily history, physical examination
- Chest x-rays, blood and sputum cultures, Gram stain

Medical Management.

- • Antibiotics are prescribed on the basis of Gram stain results and antibiotic guidelines.
- Supportive treatment includes hydration, antipyretics, antitussive medications, antihistamines, or nasal decongestants.
- • Bed rest is recommended until infection shows signs of clearing.
- • Oxygen therapy is given for hypoxemia.

Cont.

- • Respiratory support includes high inspiratory oxygen concentrations, endotracheal intubation, and mechanical ventilation.
- • Treatment of atelectasis, pleural effusion, shock, respiratory failure, or superinfection is instituted, if needed.
- • For groups at high risk for CAP, pneumococcal vaccination is advised.

Possible nursing diagnoses.

- • Ineffective airway clearance related to copious tracheobronchial secretions
- • Activity intolerance related to impaired respiratory function
- • Risk for deficient fluid volume related to fever and a rapid respiratory rate
- • Imbalanced nutrition: less than body requirements
- • Deficient knowledge about treatment regimen and preventive health measures

Nursing Interventions

1. IMPROVING AIRWAY PATENCY

- • Encourage hydration: fluid intake (2 to 3 L/day) to loosen secretions.
- • Provide humidified air using high-humidity face mask.
- • Encourage patient to cough effectively, and provide correct positioning, chest physiotherapy, and incentive spirometry.

Cont.

- Provide nasotracheal suctioning if necessary.
- Provide appropriate method of oxygen therapy.
- Monitor effectiveness of oxygen therapy.

Cont.

2. PROMOTING REST AND CONSERVING ENERGY

- • Encourage the debilitated patient to rest and avoid overexertion and possible exacerbation of symptoms.
- • Patient should assume a comfortable position to promote rest and breathing (eg, semi-Fowler's position).

Cont.

- Instruct outpatients not to overexert themselves and to engage in only moderate activity during the initial phases of treatment.

3. PROMOTING FLUID INTAKE AND MAINTAINING NUTRITION

- • Encourage fluids (2 L/day minimum with electrolytes and calories).
- • Administer IV fluids and nutrients, if necessary.

Cont.

4. PROMOTING PATIENTS' KNOWLEDGE

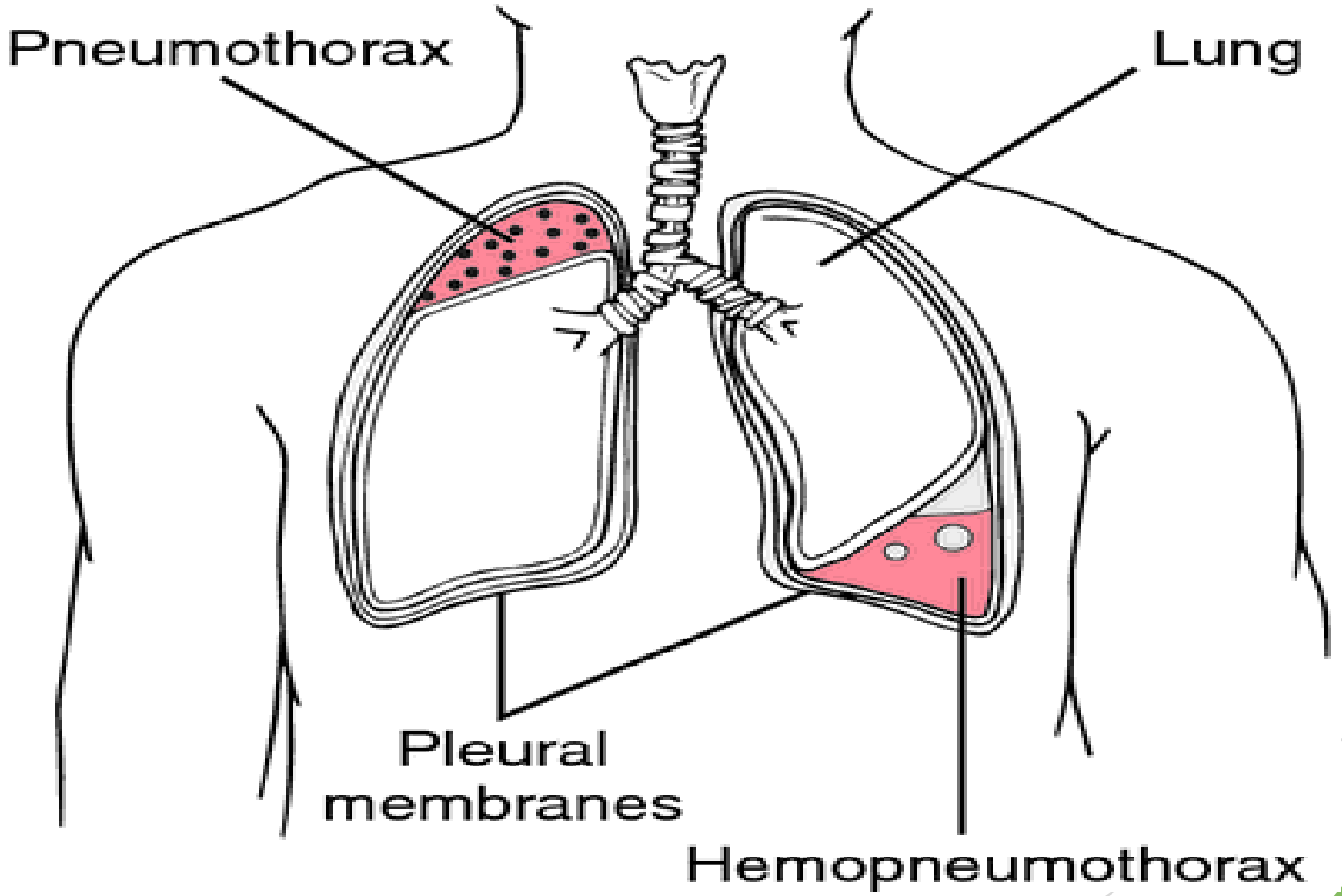
- • Instruct on cause of pneumonia, management of symptoms, signs and symptoms that should be reported to the physician or nurse, and the need for follow-up.
- • Explain treatments in simple manner and using appropriate language
- • Repeat instructions and explanations as needed.

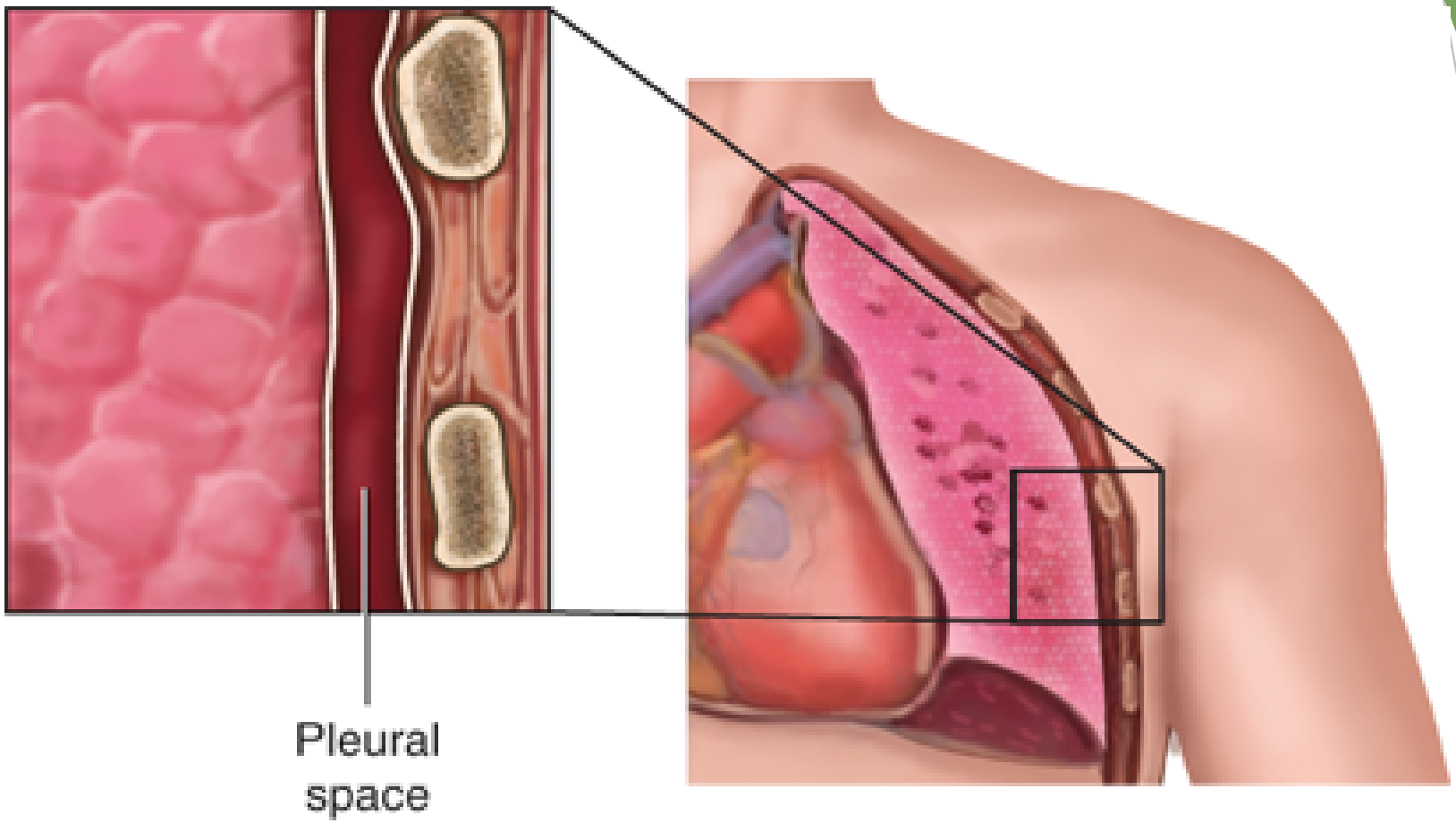
Cont.

Monitoring and Preventing Potential Complications: Shock

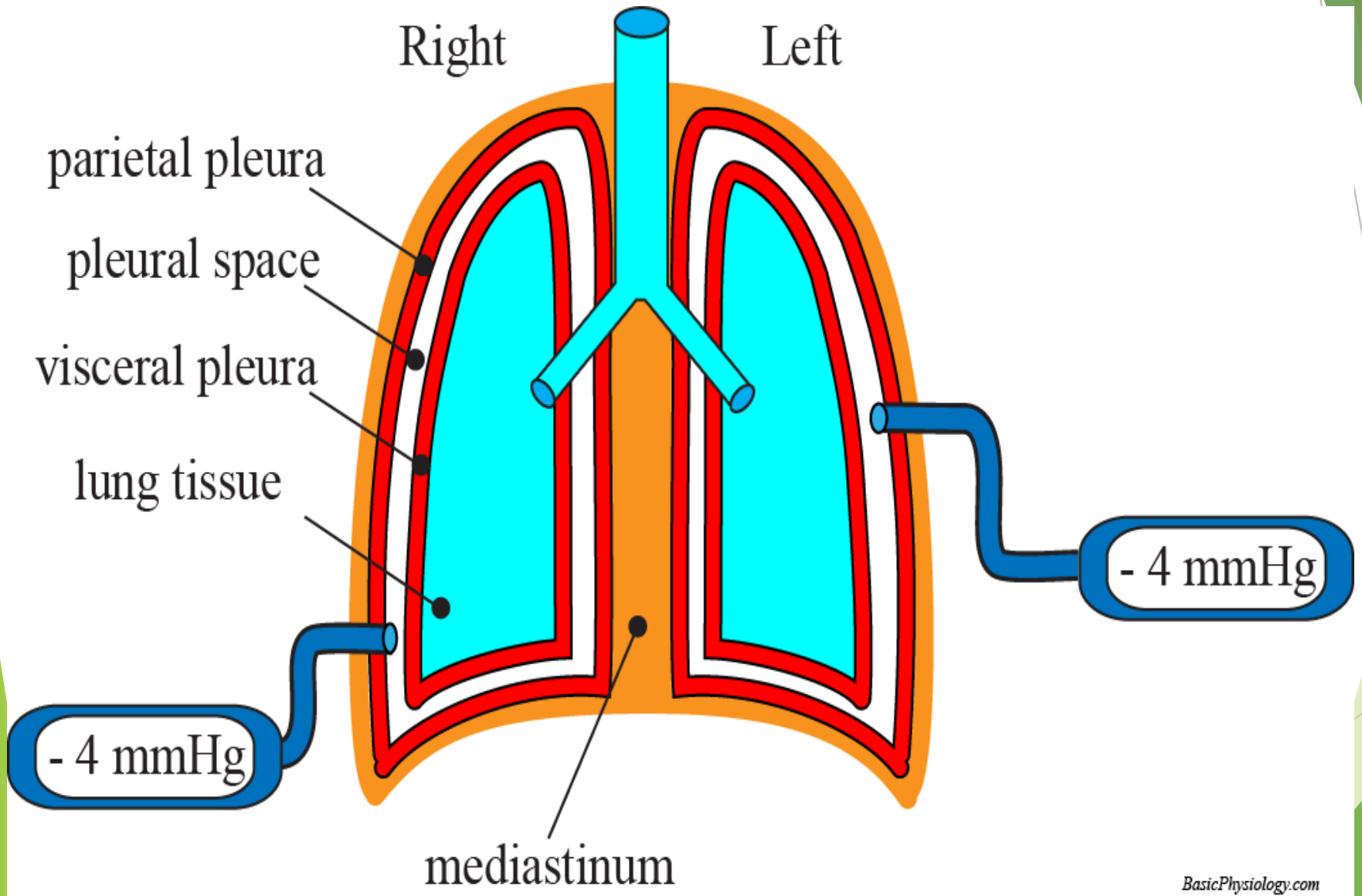
- Respiratory failure
- Atelectasis
- Pleural effusion

PNEUMOTHORAX AND HEMOTHORAX.





Source: Andrew J. Lechner, George M. Matuschak, David S. Brink: Respiratory: An Integrated Approach to Disease
www.accessmedicine.com


Right
Left
parietal pleura
pleural space
visceral pleura
lung tissue
- 4 mmHg
- 4 mmHg
mediastinum
BasicPhysiology.com

Cont.

- Pneumothorax occurs when the parietal or visceral pleura is breached and the pleural space is exposed to positive atmospheric pressure. Normally the pressure in the pleural space is negative or subatmospheric; this negative pressure is required to maintain lung inflation.

Cont.

- When either pleura is breached, air enters the pleural space, and the lung or a portion of it collapses. Hemothorax is the collection of blood in the chest cavity because of torn intercostal vessels or laceration of the lungs injured through trauma. Often both blood and air are found in the chest cavity (hemopneumothorax).

Types of Pneumothorax

Simple Pneumothorax

- A simple, or spontaneous, pneumothorax occurs when air enters the pleural space through a breach of either the parietal or visceral pleura. Most commonly this occurs as air enters the pleural space through the rupture of a bleb or a bronchopleural fistula.

Cont.

- A spontaneous pneumothorax may occur in an apparently healthy person in the absence of trauma due to rupture of an air-filled bleb, or blister, on the surface of the lung, allowing air from the airways to enter the pleural cavity. It may be associated with diffuse interstitial lung disease and severe emphysema.

Traumatic Pneumothorax

- A traumatic pneumothorax occurs when air escapes from a laceration in the lung itself and enters the pleural space or from a wound in the chest wall. It may result from blunt trauma (eg, rib fractures), penetrating chest or abdominal trauma (eg, stab wounds or gunshot wounds), or diaphragmatic tears.

Cont.

- Traumatic pneumothorax may occur during invasive thoracic procedures (ie, thoracentesis, transbronchial lung biopsy, insertion of a subclavian line) in which the pleura is inadvertently punctured, or with barotrauma from mechanical ventilation. A traumatic pneumothorax resulting from major injury to the chest is often accompanied by hemothorax.

Cont.

- Open pneumothorax is one form of traumatic pneumothorax. It occurs when a wound in the chest wall is large enough to allow air to pass freely in and out of the thoracic cavity with each attempted respiration.

Tension Pneumothorax

- A tension pneumothorax occurs when air is drawn into the pleural space and is trapped with each breath. Tension builds up in the pleural space, causing lung collapse. Mediastinal shift (shift of the heart and great vessels and trachea toward the unaffected side of the chest) is a life-threatening medical emergency. Both respiratory and circulatory functions are compromised.

Clinical Manifestations

- Signs and symptoms associated with pneumothorax depend on its size and cause:

- Pleuritic pain of sudden onset.
- Minimal respiratory distress with small pneumothorax; acute respiratory distress if large.
- Anxiety, dyspnea, air hunger, use of accessory muscles, and central cyanosis (with severe hypoxemia).

Cont.

- In a simple pneumothorax, the trachea is midline, expansion of the chest is decreased, breath sounds may be diminished, and percussion of the chest may reveal normal sounds or hyperresonance depending on the size of the pneumothorax.

Cont.

- In a tension pneumothorax, the trachea is shifted away from the affected side, chest expansion may be decreased or fixed in a hyperexpansion state, breath sounds are diminished or absent, and percussion to the affected side is hyperresonant. The clinical picture is one of air hunger, agitation, increasing hypoxemia, central cyanosis, hypotension, tachycardia, and profuse diaphoresis.

Medical Management

- The goal is evacuation of air or blood from the pleural space.
- A small chest tube is inserted near the second intercostal space for a pneumothorax.
- A large-diameter chest tube is inserted, usually in the fourth or fifth intercostal space, for hemothorax.
- Autotransfusion is begun if excessive bleeding from chest tube occurs.

Cont.

- Traumatic open pneumothorax is plugged (petroleum gauze); patient is asked to inhale and strain against a closed glottis to eject air from the thorax until the chest tube is inserted, with water-seal drainage.

Cont.

- Antibiotics are usually prescribed to combat infection from contamination.
- The chest wall is opened surgically (thoracotomy) if more than 1,500 mL of blood is aspirated initially by thoracentesis (or is the initial chest tube output) or if chest tube output continues at greater than 200 mL/h. Urgency is determined by the degree of respiratory compromise.

Cont.

- An emergency thoracotomy may also be performed in the emergency department if a cardiovascular injury secondary to chest or penetrating trauma is suspected.
- The patient with a possible tension pneumothorax should immediately be given a high concentration of supplemental oxygen to treat the hypoxemia, and pulse oximetry should be used to monitor oxygen saturation.

Cont.

- In an emergency situation, a tension pneumothorax can be decompressed or quickly converted to a simple pneumothorax by inserting a large-bore needle (14-gauge) at the second intercostal space, midclavicular line on the affected side. A chest tube is then inserted and connected to suction to remove the remaining air and fluid, reestablish the negative pressure, and reexpand the lung.

Nursing Management

- Promote early detection through assessment and identification of high-risk population; report symptoms.
- Assist in chest tube insertion; maintain chest drainage or water-seal.

Cont.

- Monitor respiratory status and re-expansion of lung, with interventions (pulmonary support) performed in collaboration with other health care professionals (e. g, physician, respiratory therapist, physical therapist).
- Provide information and emotional support to patient and family.

CHEST INJURY

- A **chest injury**, also known as **chest trauma**, is any form of physical injury to the chest including the ribs, heart and lungs. Chest injuries account for 25% of all deaths from traumatic injury. Typically chest injuries are caused by blunt mechanisms such as motor vehicle collisions or penetrating mechanisms such as stabbings

Cont.

- Chest injuries can be classified as blunt or penetrating. Blunt and penetrating injuries have different pathophysiologies and clinical courses.
- Specific types of injuries include:

Cont.

- Specific types of injuries include:

1. Injuries to the chest wall
   - Chest wall contusions or hematomas.
   - Rib fractures
   - Flail chest
   - Sternal fractures
   - Fractures of the shoulder girdle

Cont.

2.Pulmonary injury (injury to the lung) and injuries involving the pleural space

- Pulmonary contusion
- Pulmonary laceration
- Pneumothorax
- Hemothorax
- Hemopneumothorax

Cont.

3.Injury to the airways

- Tracheobronchial tear

4.Cardiac injury

- Pericardial tamponade
- Myocardial contusion
- Traumatic arrest
- Hemopericardium

Cont.

5.Blood vessel injuries

- Traumatic aortic rupture
- Thoracic aorta injury
- Aortic dissection

6.And injuries to other structures within the torso

- Esophageal injury (Boerhaave syndrome)
- Diaphragm injury

Clinical manifestations.

- The injured area is usually tender or painful. Pain is worse when people inhale. The chest may be bruised. Sometimes people are short of breath. If the injury is severe, they may feel very short of breath, drowsy, or confused, and the skin may be cold, sweaty, or blue. Such symptoms may develop when the lungs malfunction severely (respiratory failure) or people are in shock.

Cont.

- People in shock typically have dangerously low blood pressure and feel as if their heart is racing.
- Other symptoms depend on the specific chest injury. For example, sometimes air accumulates under the skin in people with pneumothorax. Affected skin feels crackly and makes a crackling sound when touched.

Cont.

- The veins in the neck are sometimes enlarged if blood or fluid accumulates in the sac around the heart and interferes with the heart's ability to pump blood (called cardiac tamponade) or if tension pneumothorax develops.

Diagnosis.

- Most blunt injuries are managed with relatively simple interventions like tracheal intubation and mechanical ventilation and chest tube insertion. Diagnosis of blunt injuries may be more difficult and require additional investigations such as CT scanning.

Cont.

- Penetrating injuries often require surgery, and complex investigations are usually not needed to come to a diagnosis. Patients with penetrating trauma may deteriorate rapidly, but may also recover much faster than patients with blunt injury.

Treatment.

The goal is to:

- Support of breathing and circulation
- Treatment of the specific injury

Injuries that are immediately life threatening are treated as quickly as possible. The specific treatment depends on the injury.

Cont.

- For all injuries, doctors take measures to support breathing and circulation if necessary. People may be given oxygen (for example, by nasal prongs, by face mask, or through a breathing tube) and intravenous fluids or sometimes blood transfusions. People with severe chest injuries are admitted to the hospital.

Cont.

- People may be given pain relievers (analgesics) to lessen pain.
- For some injuries, a tube must be inserted into the chest (thoracostomy, or chest tube insertion) to drain blood (in hemothorax) or air (in pneumothorax) from the chest. This procedure helps collapsed lungs reinflate. Insertion can usually be done using only local anesthesia.

CARCINOMA OF THE LUNGS.

- Lung cancers arise from a single transformed epithelial cell in the tracheobronchial airways. A carcinogen (cigarette smoke, radon gas, other occupational and environmental agents) damages the cell, causing abnormal growth and development into a malignant tumor.

Cont.

- Most lung cancers are classified into one of two major categories: small cell lung cancer (15% to 20% of tumors) and non–small cell lung cancer (NSCLC; approximately 80% of tumors).

Cont.

- Risk factors include tobacco smoke, second-hand (passive) smoke, environmental and occupational exposures, gender, genetics, and dietary deficits. Other factors that have been associated with lung cancer include genetic predisposition and underlying respiratory diseases, such as chronic obstructive pulmonary disease (COPD) and tuberculosis (TB).

Clinical Manifestations

- • Lung cancer often develops insidiously and is asymptomatic until late in its course.
- • Signs and symptoms depend on location, tumor size, degree of obstruction, and existence of metastases to regional or distant sites.
- • Most common symptom is cough or change in a chronic cough.

Cont.

- • Dyspnea may occur early in the disease.
- • Hemoptysis or blood-tinged sputum may be expectorated.
- • Chest pain or shoulder pain may indicate chest wall or pleural involvement. Pain is a late symptom and may be related to bone metastasis.
- • Recurring fever may be an early symptom.

Cont.

- Chest pain, tightness, hoarseness, dysphagia, head and neck edema, and symptoms of pleural or pericardial infusion exist if the tumor spreads to adjacent structures and lymph nodes.
- • Common sites of metastases are lymph nodes, bone, brain, contralateral lung, adrenal glands, and liver.
- • Weakness, anorexia, and weight loss may appear.

Assessment and Diagnostic Methods

- Chest x-ray, CT scans, bone scans, abdominal scans, PET scans, liver ultrasound, and MRI.
- • Sputum examinations, fiberoptic bronchoscopy, transthoracic fine-needle aspiration, endoscopy with esophageal ultrasound, mediastinoscopy or mediastinotomy, and biopsy.
- • Pulmonary function tests, ABG analysis scans, and exercise testing.

Medical Management

- The objective of management is to provide a cure if possible. Treatment depends on cell type, stage of the disease, and physiologic status.
- Treatment may involve surgery (preferred), radiation therapy, or chemotherapy—or a combination of these. Newer and more specific therapies to modulate the immune system (gene therapy, therapy with defined tumor antigens) are under study and show promise.

Assignment.

- Review nursing management of a cancer patient.

PLEURISY

- Pleurisy refers to inflammation of both the visceral and parietal pleurae. When inflamed, pleural membranes rub together, the result is severe, sharp, knifelike pain with breathing that is intensified on inspiration.

Cont.

- Pleurisy may develop in conjunction with pneumonia or an upper respiratory tract infection, TB, or collagen disease; after trauma to the chest, pulmonary infarction, or pulmonary embolism (PE); in patients with primary or metastatic cancer; and after thoracotomy.

Clinical Manifestations.

- Pain usually occurs on one side and worsens with deep breaths, coughing, or sneezing.
- Pain is decreased when the breath is held. Pain is localized or radiates to the shoulder or abdomen.
- As pleural fluid develops, pain lessens. A friction rub can be auscultated but disappears as fluid accumulates.

Assessment and Diagnostic Methods

- • Auscultation for pleural friction rub
- • Chest x-rays
- • Sputum culture
- • Thoracentesis for pleural fluid examination, pleural biopsy (less common)

Medical Management

Objectives of management are to discover the underlying condition causing the pleurisy and to relieve the pain.

- Patient is monitored for signs and symptoms of pleural effusion: shortness of breath, pain, assumption of a position that decreases pain, and decreased chest wall excursion.

Cont.

- • Prescribed analgesics, such as NSAIDs, are given to relieve pain and allow effective coughing.
- • Applications of heat or cold are provided for symptomatic relief.
- • An intercostal nerve block is done for severe pain.

Nursing Management

- • Enhance comfort by turning patient frequently on affected side to splint chest wall.
- • Teach patient to use hands or pillow to splint rib cage while coughing.
- See "Nursing Management" under "Pneumonia" for additional information.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE(COPD)

- COPD is a disease characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lung to noxious particles or gases, resulting in narrowing of airways, hypersecretion of mucus, and changes in the pulmonary vasculature.

Cont.

- Other diseases such as cystic fibrosis, bronchiectasis, and asthma that were previously classified as types of COPD are now classified as chronic pulmonary disorders, although symptoms may overlap with those of COPD. Cigarette smoking, air pollution, and occupational exposure (coal, cotton, grain) are important risk factors that contribute to COPD development, which may occur over a 20- to 30year span.

Cont.

- Complications of COPD vary but include respiratory insufficiency and failure (major complications) as well as pneumonia, atelectasis, and pneumothorax.

Clinical Manifestations

- • COPD is characterized by chronic cough, sputum production, and dyspnea on exertion; often worsen over time.
- • Weight loss is common.
- • Symptoms are specific to the disease. See "Clinical Manifestations" under "Asthma," "Bronchiectasis," "Bronchitis," and "Emphysema."

Medical Management

- • Smoking cessation, if appropriate.
- • Bronchodilators, corticosteroids, and other drugs (eg, alpha1-antitrypsin augmentation therapy, antibiotic agents, mucolytic agents, antitussive agents, vasodilators, narcotics). Vaccines may also be effective.
- • Oxygen therapy, including nighttime oxygen.

Cont.

- • Varied treatments specific to disease. See “Medical Management” under “Asthma,” “Bronchiectasis,” “Bronchitis,” and “Emphysema.”
- • Surgery: bullectomy to reduce dyspnea; lung volume reduction to improve lobar elasticity and function; lung transplantation.

Nursing management.

1. Achieving Airway Clearance

- • Monitor the patient for dyspnea and hypoxemia.
- • If bronchodilators or corticosteroids are prescribed, administer the medications properly and be alert for potential side effects.

Cont.

- Encourage patient to eliminate or reduce all pulmonary irritants, particularly cigarette smoking.
- • Instruct the patient in directed or controlled coughing.
- • Chest physiotherapy with postural drainage, intermittent positive-pressure breathing, increased fluid intake, and bland aerosol mists (with normal saline solution or water) may be useful for some patients with COPD.

2.Improving Breathing Patterns

- • Inspiratory muscle training and breathing retraining may help improve breathing patterns.
- • Training in diaphragmatic breathing reduces the respiratory rate, increases alveolar ventilation, and sometimes helps expel as much air as possible during expiration.

Cont.

- • Pursed-lip breathing helps slow expiration, prevent collapse of small airways, and control the rate and depth of respiration; it also promotes relaxation.

3.Improving Activity Tolerance

- • Evaluate the patient's activity tolerance and limitations and use teaching strategies to promote independent activities of daily living.
- • Determine if patient is a candidate for exercise training to strengthen the muscles of the upper and lower extremities and to improve exercise tolerance and endurance.

Cont.

- • Recommend use of walking aids, if appropriate, to improve activity levels and ambulation.
- • Consult with other health care professionals (rehabilitation therapist, occupational therapist, physical therapist) as needed.

4.Monitoring and Managing Complications

- • Assess patient for complications (respiratory insufficiency and failure, respiratory infection, and atelectasis).
- • Monitor for cognitive changes, increasing dyspnea, tachypnea, and tachycardia.
- • Monitor pulse oximetry values and administer oxygen as prescribed.

Cont.

- • Instruct patient and family about signs and symptoms of infection or other complications and to report changes in physical or cognitive status.
- • Encourage patient to be immunized against influenza and Streptococcus pneumonia.

Cont.

- • Caution patient to avoid going outdoors if the pollen count is high or if there is significant air pollution and to avoid exposure to high outdoor temperatures with high humidity.

Cont.

- • If a rapid onset of shortness of breath occurs, quickly evaluate the patient for potential pneumothorax by assessing the symmetry of chest movement, differences in breath sounds, and pulse oximetry.

BRONCHITIS, CHRONIC

- Chronic bronchitis, a disease of the airways, is defined as the presence of cough and sputum production for at least 3 months in each of two consecutive years. Although, chronic bronchitis is a clinically and epidemiologically useful term, it does not reflect the major impact of airflow limitation on morbidity and mortality in COPD.

Cont.

- In many cases, smoke or other environmental pollutants irritate the airways, resulting in inflammation and hypersecretion of mucus. Constant irritation causes the mucus-secreting glands and goblet cells to increase in number, leading to increased mucus production.

Cont.

- Mucus plugging of the airway reduces ciliary function. Bronchial walls also become thickened, further narrowing the bronchial lumen. Alveoli adjacent to the bronchioles may become damaged and fibrosed, resulting in altered function of the alveolar macrophages.

Cont.

- This is significant because the macrophages play an important role in destroying foreign particles, including bacteria. As a result, the patient becomes more susceptible to respiratory infection.

Cont.

- A wide range of viral, bacterial, and mycoplasmal infections can produce acute episodes of bronchitis. Exacerbations of chronic bronchitis are most likely to occur during the winter when viral and bacterial infections are more prevalent.

Nursing Management

- Management, see under management of COPD

EMPHYSEMA, PULMONARY

- In emphysema, impaired oxygen and carbon dioxide exchange results from destruction of the walls of over distended alveoli. “Emphysema” is a pathologic term that describes an abnormal distention of the air spaces beyond the terminal bronchioles and destruction of the walls of the alveoli.

Cont.

- This is the end stage of a process that progresses slowly for many years. As the walls of the alveoli are destroyed (a process accelerated by recurrent infections), the alveolar surface area in direct contact with the pulmonary capillaries continually decreases. This causes an increase in dead space (lung area where no gas exchange can occur) and impaired oxygen diffusion, which leads to hypoxemia.

Cont.

- In the later stages of disease, carbon dioxide elimination is impaired, resulting in increased carbon dioxide tension in arterial blood (hypercapnia) leading to respiratory acidosis. As the alveolar walls continue to break down, the pulmonary capillary bed is reduced in size. Consequently, resistance to pulmonary blood flow is increased, forcing the right ventricle to maintain a higher blood pressure in the pulmonary artery.

Cont.

- Hypoxemia may further increase pulmonary artery pressures. For this reason, right-sided heart failure (cor pulmonale) is one of the complications of emphysema. Congestion, dependent edema, distended neck veins, or pain in the region of the liver suggests the development of cardiac failure.

Cont.

- There are two main types of emphysema, based on the changes taking place in the lung. Both types may occur in the same patient. In the panlobular (panacinar) type of emphysema, there is destruction of the respiratory bronchiole, alveolar duct, and alveolus.

Cont.

- All air spaces within the lobule are essentially enlarged, but there is little inflammatory disease. A hyperinflated (hyperexpanded) chest, marked dyspnea on exertion, and weight loss typically occur. To move air into and out of the lungs, negative pressure is required during inspiration, and an adequate level of positive pressure must be attained and maintained during expiration.

Cont.

- Instead of being an involuntary passive act, expiration becomes active and requires muscular effort. In the centrilobular (centroacinar) form, pathologic changes take place mainly in the center of the secondary lobule, preserving the peripheral portions of the acinus.

Cont.

- Frequently, there is a derangement of ventilation–perfusion ratios, producing chronic hypoxemia, hypercapnia, polycythemia, and episodes of right-sided heart failure. This leads to central cyanosis and respiratory failure. The patient also develops peripheral edema, which is treated with diuretic therapy.

Nursing Management

- See "Nursing Management" under "Chronic Obstructive Pulmonary Disease" for additional information.

ASTHMA

- Asthma is a chronic inflammatory disease of the airways characterized by hyperresponsiveness, mucosal edema, and mucus production. This inflammation ultimately leads to recurrent episodes of asthma symptoms: cough, chest tightness, wheezing, and dyspnea.

Cont.

- Patients with asthma may experience symptom-free periods alternating with acute exacerbations that last from minutes to hours or days. Asthma, the most common chronic disease of childhood, can begin at any age.

Cont.

- Risk factors for asthma include family history, allergy (strongest factor), and chronic exposure to airway irritants or allergens (eg, grass, weed pollens, mold, dust, or animals). Common triggers for asthma symptoms and exacerbations include airway irritants (eg, pollutants, cold, heat, strong odors, smoke, perfumes),

Cont.

- exercise, stress or emotional upset, rhinosinusitis with postnasal drip, medications, viral respiratory tract infections, and gastroesophageal reflux.

Clinical Manifestations

- • Most common symptoms of asthma are cough (with or without mucus production), dyspnea, and wheezing (first on expiration, then possibly during inspiration as well).
- • Asthma attacks frequently occur at night or in the early morning.
- • An asthma exacerbation is frequently preceded by increasing symptoms over days, but it may begin abruptly.

Cont.

- • Chest tightness and dyspnea occur.
- • Expiration requires effort and becomes prolonged.
- • As exacerbation progresses, central cyanosis secondary to severe hypoxia may occur.
- • Additional symptoms, such as diaphoresis, tachycardia, and a widened pulse pressure, may occur.

Cont.

- • Exercise-induced asthma: maximal symptoms during exercise, absence of nocturnal symptoms, and sometimes only a description of a "choking" sensation during exercise.
- • A severe, continuous reaction, status asthmaticus, may occur. It is life-threatening.
- • Eczema, rashes, and temporary edema are allergic reactions that may be noted with asthma.

Assessment and Diagnostic Methods

- • Family, environment, and occupational history is essential.
- • During acute episodes, sputum and blood test, pulse oximetry, ABGs, hypocapnia and respiratory alkalosis, and pulmonary function (forced expiratory volume [FEV] and forced vital capacity [FVC] decreased) tests are performed.

Medical Management

Pharmacologic Therapy

- There are two classes of medications—long-acting control and quick-relief medications—as well as combination products.

Cont.

- • Short-acting beta2-adrenergic agonists-e.g salbutamol
- • Anticholinergics-e.g ipratropium (Atrovent), and atropine
- • Corticosteroids: metered-dose inhaler (MDI) e.g Prednisone and hydrocortisone

Cont.

- Leukotriene modifiers inhibitors/antileukotrienes
- Methylxanthines

Nursing Management

- The immediate nursing care of patients with asthma depends on the severity of symptoms. The patient and family are often frightened and anxious because of the patient's dyspnea. Therefore, a calm approach is an important aspect of care.

Cont.

- • Assess the patient's respiratory status by monitoring the severity of symptoms, breath sounds, peak flow, pulse oximetry, and vital signs.
- • Obtain a history of allergic reactions to medications before administering medications.

Cont.

- • Identify medications the patient is currently taking.
- • Administer medications as prescribed and monitor the patient's responses to those medications; medications may include an antibiotic if the patient has an underlying respiratory infection.

Cont.

- Administer fluids if the patient is dehydrated.
- Assist with intubation procedure, if required.

Cont.

- • Teach patient and family about asthma (chronic inflammatory), purpose and action of medications, triggers to avoid and how to do so, and proper inhalation technique.
- • Instruct patient and family about peak-flow monitoring.

Cont.

- • Refer patient to community support groups.
- • Remind patients and families about the importance of health promotion strategies and recommended health screening.

ASTHMA: STATUS ASTHMATICUS

- Status asthmaticus is severe and persistent asthma that does not respond to conventional therapy; attacks can occur with little or no warning and can progress rapidly to asphyxiation. Infection, anxiety, nebulizer abuse, dehydration, increased adrenergic blockage, and nonspecific irritants may contribute to these episodes.

Cont.

- An acute episode may be precipitated by hypersensitivity to aspirin. Two predominant pathologic problems occur: a decrease in bronchial diameter and a ventilation–perfusion abnormality.

Clinical Manifestations

- • Same as those in severe asthma.
- • No correlation between severity of attack and number of wheezes; with greater obstruction, wheezing may disappear, possibly signaling impending respiratory failure.

Assessment and Diagnostic Findings

- • Primarily pulmonary function studies and ABG analysis
- • Respiratory alkalosis most common finding

Medical Management

- • Initial treatment: beta2-adrenergic agonists, corticosteroids, supplemental oxygen and IV fluids to hydrate patient. Sedatives are contraindicated.
- • High-flow supplemental oxygen is best delivered using a partial or complete non-rebreather mask (PaO2 at a minimum of 92 mm Hg or O2 saturation greater than 95%).

Cont.

- • Magnesium sulfate, a calcium antagonist, may be administered to induce smooth muscle relaxation.
- • Hospitalization if no response to repeated treatments or if blood gas levels deteriorate or pulmonary function scores are low.
- • Mechanical ventilation if patient is tiring or in respiratory failure or if condition does not respond to treatment.

Nursing Management

- The main focus of nursing management is to actively assess the airway and the patient's response to treatment. The nurse should be prepared for the next intervention if the patient does not respond to treatment.

Cont.

- • Constantly monitor the patient for the first 12 to 24 hours, or until status asthmaticus is under control. Blood pressure and cardiac rhythm should be monitored continuously during the acute phase and until the patient stabilizes and responds to therapy.

Cont.

- • Assess the patient's skin turgor for signs of dehydration; fluid intake is essential to combat dehydration, to loosen secretions, and to facilitate expectoration.
- • Administer IV fluids as prescribed, up to 3 to 4 L/ day, unless contraindicated.

Cont.

- • Encourage the patient to conserve energy.
- • Ensure patient's room is quiet and free of respiratory irritants (eg, flowers, tobacco smoke, perfumes, or odors of cleaning agents); nonallergenic pillows should be used.

BRONCHIECTASIS

- Bronchiectasis is a condition where the bronchial tubes of your lungs are permanently damaged, widened, and thickened. These damaged air passages allow bacteria and mucus to build up and pool in your lungs. This results in frequent infections and blockages of the airways.

Cont.

- Bronchiectasis may be caused by a variety of conditions, including airway obstruction, diffuse airway injury, pulmonary infections and obstruction of the bronchus or complications of long-term pulmonary infections, genetic disorders (eg, cystic fibrosis), abnormal host defense (eg, ciliary dyskinesia or humoral immunodeficiency), and idiopathic causes.

Cont.

- Bronchiectasis is usually localized, affecting a segment or lobe of a lung, most frequently the lower lobes. People may be predisposed to bronchiectasis as a result of recurrent respiratory infections in early childhood, measles, influenza, tuberculosis, or immunodeficiency disorders.

Clinical Manifestations

- • Chronic cough and production of copious purulent sputum
- • Hemoptysis, clubbing of the fingers, and repeated episodes of pulmonary infection

Assessment and Diagnostic Findings

- • Definite diagnostic clue is prolonged history of productive cough, with sputum consistently negative for tubercle bacilli.
- • Diagnosis is established on the basis of CT scan.

Medical Management

- • Treatment objectives are to promote bronchial drainage to clear excessive secretions from the affected portion of the lungs and to prevent or control infection.
- • Chest physiotherapy with percussion; postural drainage, expectorants, or bronchoscopy to remove bronchial secretions.

Cont.

- • Antimicrobial therapy guided by sputum sensitivity studies.
- • Year-round regimen of antibiotics, alternating types of drugs at intervals.
- • Vaccination against influenza and pneumococcal pneumonia
- • Bronchodilators.
- • Smoking cessation.

Cont.

- • Surgical intervention (segmental resection of lobe or lung removal), used infrequently.
- • In preparation for surgery: vigorous postural drainage, suction through bronchoscope, and antibacterial therapy.

Nursing Management

- See "Nursing Management and Patient Education" under "Chronic Obstructive Pulmonary Disease" in Chapter C and "Preoperative and Postoperative Nursing Management" in Chapter P for additional information.

BRONCHIOLITIS

- Bronchiolitis is a common lung infection in young children and infants. It causes inflammation and congestion in the small airways (bronchioles) of the lung. Bronchiolitis is almost always caused by a virus. Typically, the peak time for bronchiolitis is during the winter months.

Cont.

- Bronchiolitis starts out with symptoms similar to those of a common cold but then progresses to coughing, wheezing and sometimes difficulty breathing. Symptoms of bronchiolitis can last for several days to weeks, even a month.
- Most children get better with care at home. A very small percentage of children require hospitalization.

Clinical manifestation

For the first few days, the signs and symptoms of bronchiolitis are similar to those of a cold:

- Runny nose
- Stuffy nose
- Cough
- Slight fever (not always present)

Cont.

- After this, there may be a week or more of difficulty breathing or a whistling noise when the child breathes out (wheezing).
- Many infants will also have an ear infection (otitis media).

Causes

- Bronchiolitis occurs when a virus infects the bronchioles, which are the smallest airways in your lungs. The infection makes the bronchioles swell and become inflamed. Mucus collects in these airways, which makes it difficult for air to flow freely in and out of the lungs.

Cont.

- Most cases of bronchiolitis are caused by the respiratory syncytial virus (RSV). RSV is a common virus that infects just about every child by the age of 2. Outbreaks of the RSV infection occur every winter. Bronchiolitis can also be caused by other viruses, including those that cause the flu or the common cold. Infants can be reinfected with RSV because at least two strains exist.

Diagnosis

- Tests and X-rays are not usually needed to diagnose bronchiolitis. The doctor can usually identify the problem by observing your child and listening to his or her lungs with a stethoscope. However, it may take more than one or two visits to distinguish the condition from a cold or the flu.

Cont.

If your child is at risk of severe bronchiolitis, if symptoms are worsening or if another problem is suspected, your doctor may order tests, including:

- **Chest X-ray.** Your doctor may request a chest X-ray to look for signs of pneumonia

Cont.

- **Viral testing**. Your doctor may collect a sample of mucus from your child to test for the virus causing bronchiolitis. This is done using a swab that's gently inserted into the nose.

Cont.

- **Blood tests**. Occasionally, blood tests might be used to check your child's white blood cell count. An increase in white blood cells is usually a sign that the body is fighting an infection. A blood test can also determine whether the level of oxygen has decreased in your child's bloodstream.

Treatment.

- Bronchiolitis typically lasts for two to three weeks. The majority of children with bronchiolitis can be cared for at home with supportive care. It's important to be alert for changes in breathing difficulty, such as struggling for each breath, being unable to speak or cry because of difficulty breathing, or making grunting noises with each breath.

Cont.

- Because viruses cause bronchiolitis, antibiotics – which are used to treat infections caused by bacteria – aren't effective against it. If your child has an associated bacterial infection, such as pneumonia, your doctor may prescribe an antibiotic for that.

Cont.

- Oral corticosteroid medications and pounding on the chest to loosen mucus (chest physiotherapy) have not been shown to be effective treatments for bronchiolitis and are not recommended.

Cont.

- A tiny percentage of children need hospital care to manage their condition. At the hospital, your child may receive humidified oxygen to maintain sufficient oxygen in the blood, and perhaps fluids through a vein (intravenously) to prevent dehydration.

Cont.

- **Maintain a smoke-free environment.** Smoke can aggravate symptoms of respiratory infections. If a family member smokes, ask him or her to smoke outside of the house and outside of the car.