• Overview of Anatomy and Physiology

• External respiration
  ▪ Exchange of oxygen and carbon dioxide between the lung and the environment

• Internal respiration
  ▪ Exchange of oxygen and carbon dioxide at the cellular level

• Overview of Anatomy and Physiology

• Upper respiratory tract
  ▪ Nose
  ▪ Pharynx
  ▪ Larynx
  ▪ Trachea

• Lower respiratory tract
  ▪ Bronchial tree
    ▪ Bronchioles, alveolar ducts, alveoli

• Overview of Anatomy and Physiology

• Mechanics of breathing
  ▪ Thoracic cavity
    ▪ Lungs
      ▪ Visceral pleura and parietal pleura
    ▪ Respiratory movements and ranges
      ▪ Rhythmic movements of the chest walls, ribs, and muscles allow air to be inhaled and exhaled

• Regulation of respiration
  ▪ Nervous control—medulla oblongata and pons of the brain; chemoreceptors—in the carotid and aorta

• Assessment of the Respiratory System

• Subjective data
- Shortness of breath, dyspnea, cough
- Objective data
  - Expression, chest movement, and respirations
  - Respiratory distress, wheezes, or orthopnea
  - Adventitious breath sounds
    - Sibilant wheezes
    - Sonorous wheezes
    - Crackles
    - Pleural friction rubs
- Laboratory and Diagnostic Examinations
  - Chest roentgenogram
  - Computed tomography (CT)
  - Pulmonary function testing
  - Mediastinoscopy
  - Laryngoscopy
  - Bronchoscopy
  - Sputum specimen
  - Cytological studies
  - Thoracentesis
  - Arterial blood gases
  - Pulse oximetry
- Figure 49-7
- Figure 49-8
Disorders of the Upper Airway

Epistaxis

- Etiology/pathophysiology
  - Bleeding from the nose
  - Congestion of the nasal membranes leading to capillary rupture
  - Primary or secondary
- Clinical manifestations/assessment
  - Bright red bleeding from one or both nostrils
  - Can lose as much as 1 liter per hour

Medical management/nursing interventions

- Sitting position, leaning forward
- Direct pressure by pinching nose
- Ice compresses to nose
- Nasal packing
- Cautery
- Balloon tamponade

Disorders of the Upper Airway

Deviated septum and nasal polyps

- Etiology/pathophysiology
  - Congenital abnormality
  - Injury
  - Nasal septum deviates from the midline and can cause a partial obstruction
  - Nasal polyps are tissue growths usually due to prolonged inflammation
• Disorders of the Upper Airway

• Deviated septum and nasal polyps (continued)
  - Clinical manifestations/assessment
    - Stertorous respirations (snoring)
    - Dyspnea
    - Postnasal drip
  - Medical management/nursing interventions
    - Pharmacological management
      - Corticosteroids, antihistamines, antibiotics, analgesics
    - Nasoseptoplasty
    - Nasal polypectomy

• Disorders of the Upper Airway

• Allergic rhinitis and allergic conjunctivitis (hay fever)
  - Etiology/pathophysiology
    - Antigen/antibody reactions in the nasal membranes, nasopharynx, and conjunctiva due to allergens
  - Diagnostic testing

• Disorders of the Upper Airway

• Allergic rhinitis and allergic conjunctivitis (continued)
  - Clinical manifestations/assessment
    - Edema
    - Photophobia
    - Excessive tearing
    - Blurring of vision
    - Pruritus
    - Excessive nasal secretions and/or congestion
    - Sneezing
• Cough
• Headache

Disorders of the Upper Airway

Allergic rhinitis and allergic conjunctivitis (continued)

- Diagnostic testing
- Medical management/nursing interventions
  - Pharmacological management
    - Antihistamines
    - Decongestants
    - Corticosteroids
    - Analgesics
  - Avoid allergen
  - Hot packs over facial sinuses

Figure 49-3

Disorders of the Upper Airway

Obstructive sleep apnea (OSA)
  - Etiology and pathophysiology
    - Characterized by partial or complete upper airway obstruction during sleep
    - Apnea refers to the cessation of spontaneous respirations
    - Hypopnea is the presence of unusually shallow or slow respirations

Disorders of the Upper Airway

Obstructive sleep apnea (OSA)
  - Clinical manifestations
    - Frequent awakening at night
    - Insomnia
    - Excessive daytime fatigue
    - Witnessed apneic episodes
- Loud snoring
- Hypercapnia
- Personality changes
- Irritability

- Disorders of the Upper Airway

- Obstructive sleep apnea (continued)
  - Complications
  - Diagnostic tests
  - Medical management/nursing interventions
    - Avoid sedatives
    - Avoid alcoholic beverages
    - Support groups
    - Oral appliances
    - nCPAP
    - Surgery

- Disorders of the Upper Airway

- Upper airway obstruction
  - Etiology and pathophysiology
    - Precipitated by a recent respiratory event
    - Common airway obstructions
      - Choking on food
      - Dentures
      - Aspiration of vomitus or secretions
      - The tongue

- Disorders of the Upper Airway

- Upper airway obstruction (continued)
  - Clinical manifestations/assessment
    - Stertorous respirations
• Altered respiratory rate and character; apneic periods
• Hypoxia; cyanosis
• Wheezing; stridor
■ Medical management/nursing interventions
  • Open the airway
  • Remove obstruction
  • Artificial airway; tracheostomy

• Disorders of the Upper Airway

• Cancer of the larynx
  ■ Etiology/pathophysiology
    • Squamous cell carcinoma
    • Heavy smoking and alcohol use
    • Chronic laryngitis
    • Vocal abuse
    • Family history

• Disorders of the Upper Airway

• Cancer of the larynx (continued)
  ■ Clinical manifestations/assessment
    • Progressive or persistent hoarseness
    • Pain radiating to the ear
    • Difficulty swallowing
    • Hemoptysis
  ■ Medical management/nursing interventions
    • Radiation
    • Surgery
      ▪ Partial or total laryngectomy
      ▪ Radical neck dissection
• Respiratory Infections

• Acute rhinitis (common cold)
  ▪ Etiology/pathophysiology
    • Inflammation of the mucous membranes of the nose and accessory sinuses
    • Virus(es)
  ▪ Clinical manifestations/assessment
    • Thin, serous nasal exudate
    • Productive cough
    • Sore throat
    • Fever

• Respiratory Infections

• Acute rhinitis (common cold) (continued)
  ▪ Medical management/nursing interventions
    • Pharmacological management
      ▪ Analgesic
      ▪ Antipyretic
      ▪ Cough suppressant
      ▪ Expectorant
      ▪ Antibiotic (if infection present)
    • No specific treatment
    • Encourage fluids

• Respiratory Infections

• Acute follicular tonsillitis
  ▪ Etiology/pathophysiology
    • Inflammation of the tonsils
    • Bacterial or viral infection
  ▪ Clinical manifestations/assessment
    • Enlarged, tender, cervical lymph nodes
• Sore throat
• Fever; chills
• Enlarged, purulent tonsils
• Elevated WBC

• Respiratory Infections

• Acute follicular tonsillitis (continued)
  ▪ Medical management/nursing interventions
    ▪ Pharmacological management
      ▪ Antibiotics; analgesics; antipyretics
    ▪ Warm saline gargles
  ▪ Tonsillectomy and adenoidectomy
    ▪ Postoperative
      o Assess for excessive bleeding
      o Ice-cold liquids—ice cream
      o Ice collar
      o Avoid coughing, sneezing, or vigorous nose blowing

• Respiratory Infections

• Laryngitis
  ▪ Etiology/pathophysiology
    ▪ Inflammation of the larynx due to virus or bacteria
    ▪ May cause severe respiratory distress in children under 5 years old
  ▪ Clinical manifestations/assessment
    ▪ Hoarseness
    ▪ Voice loss
    ▪ Scratchy and irritated throat
    ▪ Persistent cough

• Respiratory Infections

• Laryngitis (continued)
Medical management/nursing interventions

- Pharmacological management
  - Analgesics
  - Antipyretics
  - Antitussives
  - Antibiotics—bacterial
- Viral—no specific treatment, supportive care
- Warm or cool mist vaporizer
- Limit use of voice

Respiratory Infections

Pharyngitis

- Etiology/pathophysiology
  - Inflammation of the pharynx
  - Chronic or acute
  - Frequently accompanies the common cold
  - Viral, most common
  - Bacterial

Respiratory Infections

Pharyngitis (continued)

- Clinical manifestations/assessment
  - Dry cough
  - Tender tonsils
  - Enlarged cervical lymph glands
  - Red, sore throat
  - Fever
- Medical management/nursing interventions
  - Pharmacological management
    - Antibiotics; analgesics; antipyretics
  - Warm or cool mist vaporizer
Respiratory Infections

Sinusitis
  ▪ Etiology/pathophysiology
    • Inflammation of the sinuses
    • Usually begins with an upper respiratory infection; viral or bacterial
  ▪ Clinical manifestations/assessment
    • Constant, severe headache
    • Pain and tenderness in involved sinus region
    • Purulent exudate
    • Malaise
    • Fever

Sinusitis (continued)
  ▪ Medical management/nursing interventions
    • Pharmacological management
      ▪ Antibiotics
      ▪ Analgesics
      ▪ Antihistamines
    • Vasoconstrictor nasal spray (Afrin)
    • Warm mist vaporizer
    • Warm, moist packs
    • Nasal windows

Disorders of the Lower Airway

Acute bronchitis
  ▪ Etiology/pathophysiology
    • Inflammation of the trachea and bronchial tree
    • Usually secondary to upper respiratory infection
• Exposure to inhaled irritants
  • Clinical manifestations/assessment
    • Productive cough; wheezes
    • Dyspnea; chest pain
    • Low-grade fever
    • Malaise; headache

• Disorders of the Lower Airway

• Acute bronchitis (continued)
  • Medical management/nursing interventions
    • Pharmacological management
      • Cough suppressants
      • Antitussives
      • Antipyretics
      • Bronchodilators
      • Antibiotics
    • Vaporizer
    • Encourage fluids

• Disorders of the Lower Airway

• Legionnaires’ disease
  • Etiology/pathophysiology
    • *Legionella pneumophila*
    • Thrives in water reservoirs
    • Causes life-threatening pneumonia
    • Leads to respiratory failure, renal failure, bacteremic shock, and ultimately death

• Disorders of the Lower Airway

• Legionnaires’ disease (continued)
  • Clinical manifestations/assessment
• Elevated temperature
• Headache
• Nonproductive cough
• Difficult and rapid respirations
• Crackles or wheezes
• Tachycardia
• Signs of shock
• Hematuria

• Disorders of the Lower Airway

• Legionnaires’ disease (continued)
  • Medical management/nursing interventions
    • Pharmacological management
      • Antibiotics
      • Antipyretics
      • Vasopressors
    • Oxygen
    • Mechanical ventilation, if necessary
    • IV therapy

• Disorders of the Lower Airway

• Severe Acute Respiratory Syndrome (SARS)
  • Etiology/pathophysiology
    • Infection caused by coronavirus
    • Spread by close contact between people
    • Airborne
    • May be spread by touching contaminated objects
  • Clinical manifestations/assessment
    • Temperature
    • Headache
• Muscle aches
• Mild respiratory symptoms
  ▪ Dry cough and SOB

Disorders of the Lower Airway

Adult respiratory distress syndrome (continued)
  ▪ Diagnostic tests
    • Chest radiograph
    • Serum antibody testing
    • Nasopharyngeal and oropharyngeal swabs
  ▪ Medical management/nursing interventions
    • Pharmacological management
      ▪ Antibiotics
      ▪ Antiviral medications
    • Respiratory isolation
    • Oxygen

Disorders of the Lower Airway

Anthrax
  ▪ Etiology/pathophysiology
    • Bacillus anthracis
    • Spread by direct contact with bacteria or spores
    • Three types: Cutaneous, GI, inhalational
  ▪ Clinical manifestations/assessment
    • Cold or flu-like symptoms
    • Hemorrhage, tissue necrosis, and lymphedema
  ▪ Medical management
    • Antibiotics

Disorders of the Lower Airway
Tuberculosis

- Etiology/pathophysiology
  - Inhalation of tubercle bacillus (*Mycobacterium tuberculosis*)
  - Infection versus active disease
  - Presumptive diagnosis
    - Mantoux tuberculin skin test
    - Chest x-ray film
    - Acid-fast bacilli smear \(\times 3\)
  - Confirmed diagnosis
    - Sputum culture; positive for TB bacilli

Disorders of the Lower Airway

Tuberculosis (continued)

- Clinical manifestations/assessment
  - Fever
  - Weight loss; weakness
  - Productive cough; hemoptysis
  - Chills; night sweats
- Medical management/nursing interventions
  - Tuberculosis isolation (acid-fast bacilli [AFB])
  - Multiple medications to which the organisms are susceptible

Disorders of the Lower Airway

Pneumonia

- Etiology/pathophysiology
  - Inflammatory process of the bronchioles and the alveolar spaces due to infection
  - Bacteria, viruses, mycoplasma, fungi, and parasites
- Clinical manifestations/assessment
  - Productive cough
• Severe chills; elevated temperature
• Increased heart rate and respiratory rate
• Dyspnea

• Disorders of the Lower Airway

• Pneumonia (continued)
  ▪ Medical management/nursing interventions
    • Pharmacological management
      ▪ Antibiotics
      ▪ Analgesics
      ▪ Expectorants
      ▪ Bronchodilators
    • Oxygen
    • Chest percussion and postural drainage
    • Encourage to cough and deep-breathe
    • Humidifier or nebulizer

• Disorders of the Lower Airway

• Pleurisy
  ▪ Etiology/pathophysiology
    • Inflammation of the visceral and parietal pleura
    • Bacterial or viral
  ▪ Clinical manifestations/assessment
    • Sharp inspiratory pain
    • Dyspnea
    • Cough
    • Elevated temperature
    • Pleural friction rub

• Disorders of the Lower Airway
• **Pleurisy (continued)**  
  - Medical management/nursing interventions  
    - Pharmacological management  
      - Antibiotics  
      - Analgesics  
      - Antipyretics  
    - Oxygen  
    - Anesthetic block for intercostal nerves

• **Disorders of the Lower Airway**

• **Pleural effusion/empyema**  
  - Etiology/pathophysiology  
    - Pleural effusion  
    - Accumulation of fluid in the pleural space  
    - Empyema— infection  
  - Clinical manifestations/assessment  
    - Dyspnea  
    - Air hunger  
    - Respiratory distress  
    - Fever

• **Disorders of the Lower Airway**

• **Pleural effusion/empyema (continued)**  
  - Medical management/nursing interventions  
    - Thoracentesis  
    - Chest tube with closed water-seal drainage system  
    - Antibiotics  
    - Cough and deep-breathe

• **Disorders of the Lower Airway**
• Atelectasis
  ▪ Etiology/pathophysiology
    • Collapse of lung tissue due to occlusion of air to a portion of the lung
  ▪ Clinical manifestations/assessment
    • Dyspnea; tachypnea
    • Pleural friction rub; crackles
    • Restlessness
    • Elevated temperature
    • Decreased breath sounds

• Disorders of the Lower Airway

• Atelectasis (continued)
  ▪ Medical management/nursing interventions
    • Pharmacological management
      ▪ Bronchodilators
      ▪ Antibiotics
      ▪ Mucolytic agents
      ▪ Analgesics
    • Cough and deep-breathe
    • Early ambulation
    • Respiratory treatments
      ▪ Incentive spirometry; intermittent positive-pressure breathing (IPPB)
      ▪ Oxygen
      ▪ Chest percussion and postural drainage
    • Chest tube

• Disorders of the Lower Airway

• Pneumothorax
  ▪ Etiology/pathophysiology
    • A collection of air or gas in the pleural space, causing the lung to collapse
  ▪ Clinical manifestations/assessment
    • Decreased breath sounds
• Sudden, sharp chest pain with dyspnea
• Diaphoresis; tachycardia; tachypnea
• No chest movement on affected side
• Sucking chest wound

Figure 49-13

Disorders of the Lower Airway

Pneumothorax (continued)
  ▪ Medical management/nursing interventions
    • Chest tube to water-seal drainage system
    • Oxygen
    • Analgesics
    • Encourage fluids

Disorders of the Lower Airway

Lung cancer
  ▪ Etiology/pathophysiology
    • Primary tumor or metastasis
    • Small-cell, non–small-cell, squamous cell, and large-cell carcinoma
  ▪ Clinical manifestations/assessment
    • Hemoptysis
    • Dyspnea; wheezing
    • Fever; chills
    • Pleural effusion

Disorders of the Lower Airway

Lung cancer (continued)
  ▪ Medical management/nursing interventions
    • Surgery
Most are not diagnosed early enough for curative surgical intervention
- Segmental resection
- Lobectomy
- Pneumonectomy

- Radiation
- Chemotherapy

**Disorders of the Lower Airway**

**Pulmonary edema**
- **Etiology/pathophysiology**
  - Accumulation of serous fluid in interstitial tissue and alveoli
- **Clinical manifestations/assessment**
  - Dyspnea; cyanosis
  - Tachypnea; tachycardia
  - Pink or blood-tinged, frothy sputum
  - Restlessness; agitation
  - Wheezing; crackles
  - Decreased urinary output; sudden weight gain

**Disorders of the Lower Airway**

**Pulmonary edema (continued)**
- **Medical management/nursing interventions**
  - Pharmacological management
    - Diuretics
    - Narcotic analgesics
    - Nipride
  - Oxygen
  - Mechanical ventilation, if necessary
  - Strict I&O; daily weight
  - Low-sodium diet

**Disorders of the Lower Airway**
Pulmonary embolism

- Etiology/pathophysiology
  - Foreign substance in the pulmonary artery
    - Blood clot, fat, air, or amniotic fluid
  - Clinical manifestations/assessment
    - Sudden, unexplained dyspnea, tachypnea
    - Hemoptysis
    - Chest pain
    - Elevated temperature
    - Increased WBCs

Disorders of the Lower Airway

- Pulmonary embolism (continued)
  - Medical management/nursing interventions
    - Pharmacological management
      - Anticoagulants
      - Fibrinolytic agents
    - Oxygen
    - HOB up 30 degrees

Disorders of the Lower Airway

- Acute respiratory distress syndrome (ARDS)
  - Etiology and pathophysiology
    - Results from direct or indirect pulmonary injury
    - Alveolar capillary membranes are altered resulting increased permeability creating pulmonary edema and hypoxia

Disorders of the Lower Airway

- Acute respiratory distress syndrome (continued)
  - Clinical manifestations
- Respiratory distress
- Changes in level of consciousness
- Tachycardia
- Hypotension
- Decreased urinary output

Disorders of the Lower Airway

Acute respiratory distress syndrome (continued)

Medical management/nursing interventions (continued)

Pharmacological management
- Corticosteroids
- Antibiotics
- Vasodilators
- Bronchodilators
- Mucolytics
- Diuretics
- Morphine sulfate
- Neurologic blocking agents
- Cardiotonic glycosides (digoxin)

Disorders of the Lower Airway

Acute respiratory distress syndrome (continued)

Medical management/nursing interventions (continued)

- Oxygen
- Position changes
- Close assessment of vital signs

Chronic Obstructive Pulmonary Disease (COPD)

Emphysema
- Etiology/pathophysiology
  - The bronchi, bronchioles, and alveoli become inflamed as a result of chronic irritation
- Air becomes trapped in the alveoli during expiration, causing alveolar distention, rupture, and scar tissue

  ▪ Complication
  - Cor pulmonale
    ▪ Right-sided congestive heart failure due to pulmonary hypertension

- Figure 49-14

- Emphysema (continued)
  ▪ Clinical manifestations/assessment
    - Dyspnea on exertion
    - Sputum
    - Barrel chest
    - Chronic weight loss
    - Emaciation
    - Clubbing of fingers

- Figure 49-16

- Emphysema (continued)
  ▪ Medical management/nursing interventions
    - Pharmacological management
      ▪ Bronchodilators; corticosteroids; antibiotics; diuretics
    - Oxygen (low-flow)
    - Chest physiotherapy
    - Humidifier
    - Pursed-lip breathing
    - High-protein, high-calorie diet

- Chronic bronchitis
  ▪ Etiology/pathophysiology
    - Hypertrophy of mucous glands causes hypersecretion and alters cilia function
    - Increased airway resistance causes bronchospasm
Clinical manifestations/assessment
- Productive cough
- Dyspnea
- Use of accessory muscles to breathe
- Wheezing

Chronic bronchitis (continued)

Medical management/nursing interventions
- Pharmacological management
  - Bronchodilators
  - Mucolytics
  - Antibiotics
- Oxygen (low-flow)
- Pursed-lip breathing

Asthma

Etiology/pathophysiology
- Narrowing of the airways due to various stimuli
- Extrinsic or intrinsic factors
- Influenced by secondary factors
- Antigen-antibody reaction

Asthma (continued)

Clinical manifestations/assessment
- Mild asthma
  - Dyspnea on exertion
  - Wheezing
- Acute asthma attack
  - Tachypnea
  - Expiratory wheezing; productive cough
  - Use of accessory muscles; nasal flaring
  - Cyanosis

Asthma (continued)
• Medical management/nursing interventions
  • Maintenance therapy
    ▪ Serevent inhalant, prophylactic
    ▪ Corticosteroid inhalant
    ▪ Avoid allergens
  • Acute or rescue therapy
    ▪ Proventil inhalant; aminophylline IV
    ▪ Corticosteroid and epinephrine oral or subcutaneous
    ▪ Oxygen

• Bronchiectasis
  • Etiology/pathophysiology
    ▪ Gradual, irreversible process that involves chronic dilation of bronchi resulting in loss of elasticity
  • Clinical manifestations/assessment
    ▪ Dyspnea; coughing; wheezes and crackles
    ▪ Cyanosis; clubbing of fingers
    ▪ Fatigue; weakness
    ▪ Loss of appetite

• Bronchiectasis (continued)
  • Medical management/nursing interventions
    ▪ Pharmacological management
      ▪ Mucolytic agents
      ▪ Antibiotics
      ▪ Bronchodilators
    ▪ Oxygen (low-flow)
    ▪ Chest physiotherapy
    ▪ Hydration
    ▪ Cool mist vaporizer
    ▪ Surgery: Lobectomy

• Nursing Process
Nursing diagnoses
- Airway clearance, ineffective
- Breathing pattern, ineffective
- Gas exchange, impaired
- Anxiety
- Activity intolerance
- Nutrition, imbalanced: less than body requirements