Chapter 23
Management of Patients with Chest and Lower Respiratory Tract Disorders

Atelectasis
The collapse or airless condition of the alveoli caused by hypoventilation, obstruction to the airways, or compression.

- Causes include bronchial obstruction by secretions due to impaired cough mechanism or conditions that restrict normal lung expansion on inspiration.
- Postoperative patients are at high risk for atelectasis.
- Symptoms are insidious and include cough, sputum production, and a low-grade fever.
- If severe, physical assessment findings may include a tracheal shift toward the side of the atelectasis, decreased tactile fremitus, dull percussion over affected area, and decreased chest movement toward the involved side.
- Respiratory distress, anxiety, and symptoms of hypoxia occur if large areas of the lung are affected.
Atelectasis

- Clinical picture:
  - Dyspnea, tachycardia, tachypnea, pleural pain, central cyanosis, decreased breath sounds, difficulty breathing in supine position, anxiety, and crackles over the affected area. (usually insidious)
  - Patchy infiltrates on x-ray.

Nursing Management

- Prevention
  - Frequent turning and early mobilization
  - Strategies to improve ventilation: deep-breathing exercises at least every 2 hours, incentive spirometer
  - Strategies to remove secretions: coughing exercises, suctioning, aerosol therapy, and chest physiotherapy

- Treatment
  - Strategies to improve ventilation and remove secretions (as above)
  - Treatments may include PEEP (positive end-expiratory pressure) and IPPB (intermittent positive-pressure breathing). Bronchoscopy may also be used to remove obstruction.
  - May require thoracentesis if due to compression and pleural effusion.

Respiratory Infections

- Influenza
- Acute tracheobronchitis
- Pneumonia
- Pulmonary Tuberculosis
**Diagnostic Tests**
- Chest x-ray
- Sputum examination

**Influenza**
- An acute viral infection of the respiratory tract
- Usually occurs seasonally in epidemic form
- Young children, older adults, people living in institutional settings, people with chronic disease, and health care personnel are most at risk
- Identified as types A, B, or C with A being the most prevalent and most serious
- Manifestations-fever, muscle pain, and cough
- Predisposes to complications such as viral bronchitis or pneumonia, bacterial pneumonia, and super infections

**Influenza**
- The flu differs from a common cold primarily in its sudden onset and widespread occurrence within the population. Colds have a slower onset of manifestations, usually do not cause fever, have malaise as a major manifestation, and commonly cause nasal manifestations.
- Interventions are based on manifestations as they arise
- Newer drugs such as Zanamivir, Oseltamivir, and Rimantadine must be taken within 24-48 hours of onset and do not replace the need for immunization
- NO immunization for clients allergic to eggs or who have a history of Guillain-Barre syndrome
- Spread by droplet infection
- Encourage frequent handwashing and covering the nose and mouth when sneezing or coughing
Pneumonia

• An inflammatory process with an increase in interstitial and alveolar fluid.

• The second most common nosocomial infection with the highest mortality rate

• Seventh leading cause of death in the United States

• Classified as:
  – Community-acquired (CAP)
  – Hospital-acquired (HAP)
  – Pneumonia in the immunocompromised pt,
  – Aspiration Pneumonia

• May be bronchial or lobar

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Pneumonia

• Pathophysiology
  – Pneumonia is an inflammatory response to the offending organism or agent
  – Disruption of the mechanical defenses of cough and ciliary motility leads to colonization of the lungs and subsequent infection, thus inflamed and fluid-filled alveolar sacs do not exchange oxygen and carbon dioxide effectively.

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Pneumonia

• Etiology and Risk Factors
  – Causes include bacteria, viruses, mycoplasmas, fungal agents, protozoa, aspiration
  – Risk factors include advanced age, history of smoking, URI, intubation, immobility, immunosuppressive therapy, a nonfunctional immune system, malnutrition, dehydration, chronic disease states, exposure to air pollution, altered consciousness, inhalation of toxic substances, aspiration, and residence in an institutional setting where transmission of disease is likely.
Pneumonia

- Manifestations
  - Fever, chills, sweats, pleuritic chest pain, cough, sputum production, hemoptysis, dyspnea, orthopnea, headache, poor appetite, diaphoretic, malaise, bronchial breath sounds over areas of consolidation, crackles, whispered pectoriloquy, increased tactile fremitus, dulled percussion sounds, unequal chest expansion, and fatigue. Older clients may have altered mental status and dehydration.

- Diagnosis
  - History, physical exam.
  - Usually through sputum culture
  - Chest xray may help with location and extent of pneumonia
  - Blood culture may reveal blood stream invasion.

Medical Management

- Specific antibiotic therapy for the identified organism
- Not if a viral pneumonia. Only supportive therapy in this case.
- Respiratory support as needed (O2, CPT, IS, et.)
- Nutritional support as needed
- Fluid and electrolyte management

Medical Treatment of Pneumonia

- Supportive treatment includes fluids, oxygen for hypoxia, antipyretics, antitussives, decongestants, and antihistamines.
- Administration of antibiotic therapy is determined by Gram stain results.
- If the etiologic agent is not identified, use empiric antibiotic therapy.
- Antibiotics are not indicated for viral infections but are used for secondary bacterial infection.
Nursing Process: The Care of the Patient with Pneumonia: Assessment

- Changes in temperature and pulse
- Secretions
- Cough
- Tachypnea and shortness of breath
- Changes in physical assessment, especially inspection and auscultation of the chest
- Changes in CXR
- Changes in mental status, fatigue, dehydration, and concomitant heart failure, especially in elderly patients

Pneumonia

- Nursing Diagnoses
  - Ineffective Airway Clearance
  - Ineffective Breathing Pattern
  - Activity Intolerance
  - Deficient Fluid Volume
  - Imbalanced Nutrition: Less than Body Requirements
  - Pain

Nursing Process: The Care of the Patient with Pneumonia: Planning

- Improved airway clearance
- Maintenance of proper fluid volume
- Maintenance of adequate nutrition
- Patient understanding of treatment and prevention
- Absence of complications
**Improving Airway Clearance**

- Encourage hydration; 2-3 L a day, unless contraindicated
- Humidification may be used to loosen secretions; by face mask or with oxygen
- Coughing techniques
- Chest physiotherapy
- Position changes
- Oxygen therapy administered to patient needs

**Other Interventions**

- Promoting rest
  - Encourage rest and avoidance of overexertion.
  - Positioning to promote rest and breathing (semi-Fowler’s)
- Promoting fluid intake
  - Encourage fluid intake to at least 2 L a day.
- Maintaining nutrition
  - Provide nutritionally enriched foods and fluids.
- Patient teaching

**Collaborative Problems**

- Continuing symptoms after initiation of therapy
- Shock
- Respiratory failure
- Atelectasis
- Pleural effusion
- Confusion
- Superinfection
Tuberculosis

A communicable disease caused by M. tuberculosis, an aerobic, acid-fast bacillus.
- An airborne infection
- Acquired by inhalation of a particle small enough to reach the alveolus.
- Droplets are emitted during coughing, talking, laughing, sneezing, or singing.
- Brief exposure usually does not result in disease, but after repeated close contact with an infected person.
- Also, active disease may occur with reinfection and activation of dormant bacteria.
- 8 million new cases a year with approximately 3 million dying
- The initial infection usually occurs 2 to 10 weeks after exposure.

Tuberculosis

- Categorized as primary or secondary infection
  - Primary infection-first time the patient is infected
  - These primary infections cause the body to develop an allergic reaction to the bacilli and form an acquired immunity that normally inhibits further growth of the bacilli or re-infection.
  - Secondary infection-the active form of the disease from re-infection.
  - Detection and diagnosis is based on subjective findings and objective test results. Calcified lesions on chest radiograph and positive skin test reaction are indications of primary TB.

Clinical Manifestations: usually insidious

- Nonproductive or productive cough
- Fatigue
- Anorexia and weight loss
- Low-grade fever
- Chills and sweats
- Dyspnea
- Hemoptysis
- Chest pain
- Chest tightness
- crackles
Tuberculosis Dx

• History and physical exam
• TB skin test—see guidelines on page 645-646
  – For clients with positive Mantoux results (both induration and erythema), the AFB sputum smear and chest xray are done (as a next step)
  – A negative test may not exclude infection or disease in the immunocompromised
• Chest xray
• AFB smear
• Sputum culture

Treatment

• Treatment is a long term process that should be started immediately upon suspicion of infection.
• Clients with active TB are started on a minimum of four medications to ensure elimination of resistant organisms.
  – Primarily chemotherapy agents for 6-12 months.
  – Usually INH, rifampin, pyrazinamide, and ethambutol
• At least two medications (never just one) are added to a failing TB medication regimen.
• Treatment is measured by number of doses, not time frame.
• Individuals are considered noninfectious after 2-3 weeks of continuous med therapy.

• Other considerations:
  – INH may be used as a prophylactic measure for people at risk for significant disease. See this list on pg 648.
  – Involves daily doses for 6-12 months.
  – Liver enzymes, BUN, and creatinine levels must be monitored monthly.
Nursing Considerations
• High-risk clients and clients with clinical manifestations should be immediately isolated until results are obtained
• Negative pressure rooms
• PPE
• Semi-annual testing for high risk population
• IPT (Isoniazid preventive therapy) daily for 6-12 months for preventive therapy for those with dormant disease.

Pleural Conditions
• Pleurisy: an inflammation of both layers of the pleurae
  – Inflamed surfaces rub together with respirations and cause sharp pain that is intensified with inspiration.
  – Pleural effusion: a collection of fluid in the pleural space, usually secondary to another disease process
    – Large effusions impair lung expansion and cause dyspnea.
    – Decreased/absent breath sounds, decreased tactile fremitus, dull/flat sounds on perc.
    – Treat the cause and remove with thoracentesis or chest tube.
• Empyema: accumulation of thick, purulent fluid in the pleural space
  – Patient is usually acutely ill. Fluid, fibrin development, and loculation (walled off area) will impair lung expansion. Resolution is a prolonged process.
  – Tx is drainage and prolonged antibiotics.

Pleural Effusion
Causative Factors for Pulmonary Disease

- Cigarette smoking
- Air pollution

Pulmonary Edema

- The accumulation of fluid in the lung tissue, alveolar space, or both.
- Usually a result of poor heart function which cause blood to back up in the heart and lungs, increasing pressure and eventually leaking into the interstitial space and alveoli.
- Severe, life-threatening condition.
- Manifestations: respiratory distress, dyspnea, central cyanosis, anxiety, agitation, frothy, blood-tinged secretions, crackles, tachycardia,

Pulmonary Edema

- Tx the underlying cause (heart failure, fluid overload, etc.), administer O2 as needed, meds to control pain and anxiety.
- Medical Management
  - Correct hypoxemia
  - Reduce preload
    - Place client in upright position
    - Diuretics for fluid excretion
  - Reduce afterload
    - Antihypertensives and Morphine
  - Support Perfusion
    - Inotropic meds such as dobutamine
    - Monitor I/O
### Pulmonary Hypertension

- May be idiopathic or of known cause (usually heart or lung disease)
  - Idiopathic is very rare.
- The pulmonary vascular bed cannot handle the blood volume delivered by the right ventricle, therefore causing increased pressure and ultimately leading to right sided heart failure.
- Manifestations:
  - Dysnea with first exertion and then at rest, substernal chest pain, weakness, fatigue, syncope, hemoptysis, and signs of right sided heart failure (peripheral edema, ascites, distended neck veins, crackles, and a heart murmur).

### Nursing Management
- Quick, thorough assessment
- Help reduce anxiety
- Baseline weight and lung assessment
- Frequently monitor VS
- Administer O2 as needed
- Legs in dependent position
- Frequent repositioning
- Frequent oral care
- Medications as ordered

### Diagnosis
- By history and exam, CXR, PFTs, ECG, echo, V-Q scan, etc.

### Management
- Tx the underlying condition
- O2 as needed
- Meds such as diuretics, Digoxin, anticoagulants, and Calcium-channel blockers.
Respiratory Failure

- When one or more of the needed systems or organs fail to maintain optimal functioning.
- If this occurs so rapidly that compensatory mechanisms cannot accommodate, acute respiratory failure develops.
- ARF-PaO₂ of 50 mm Hg or less on room air or PaCO₂ of 50 mmHg or more (Ph < 7.35)
- Classified as acute or chronic failure, hypoxemic or ventilatory

Respiratory Failure

- Hypoxemic
  - Clients have normal lungs, but the respiratory status is impaired by drugs or diseases that affect respiration
- Ventilatory
  - Clients have intrinsic lung diseases such as COPD or pneumonia with significant lung damage that increases the amount of nonfunctional lung tissue for ventilation.

Acute Respiratory Failure

- Manifestations
  - Restlessness, fatigue, HA, dyspnea, tachycardia, increased blood pressure, confusion, lethargy, tachypnea, cyanosis, diaphoresis, use of accessory muscles, decreased breath sounds, etc.
- Tx. the underlying cause, intubate if necessary
Chronic Respiratory Failure

- May be d/t disease state or prolonged ARF
- Can have ARF exacerbations

Pulmonary Emboli

- The obstruction of a pulmonary artery or branch by blood clot, air, fat, amniotic fluid, or septic thrombus. Most thrombi are blood clots from the veins of the legs.
- The obstructed area has diminished or absent blood flow. Although this area is ventilated, no gas exchange takes place.
- Inflammatory process causes regional blood vessels and bronchioles to constrict, which further increases pulmonary vascular resistance, pulmonary arterial pressure, and right ventricular workload.
- Ventilation-perfusion imbalance, right ventricular failure, and shock occur.

Risk Factors for Pulmonary Emboli

- See Chart 23-7
- Venous stasis
- Hypercoagulability
- Venous endothelial disease
- Certain disease states: heart disease, trauma, postoperative/postpartum, diabetes mellitus, COPD
- Other conditions: pregnancy, obesity, oral contraceptive use, constrictive clothing
- Previous history of thrombophlebitis
Pulmonary Emboli

- Manifestations
  - Dyspnea and tachypnea, sudden/pleuritic chest pain, anxiety, fever, tachycardia, cough, diaphoresis, syncope
  - Development is often associated with Deep Vein Thrombosis (DVT) so be aware of these s/s as well.

Prevention and Treatment of Pulmonary Emboli

- Prevention
  See Chart 23-8
  - Exercises to avoid venous stasis
  - Early ambulation
  - Anticoagulant therapy
  - Sequential compression devices (SCDs)
- Diagnosis: CXR, ECG, Peripheral vascular studies, ABG, VQ scan.
- Treatment
  - Measures to improve respiratory and CV status
  - Anticoagulation and thrombolytic therapy
  - See emergency measures on page 664.
  - Death commonly occurs within 1 hour if left untreated.

Chest Trauma

- Frequently produces life-threatening disruptions.
- Can restrict the heart’s ability to pump and the lungs’ ability to ventilate and perfuse.
- Major dangers associated with injuries are internal bleeding and punctured organs.
- Injuries may be penetrating or blunt
- Always ABCs and then C-spine immobilization.
- Monitor for shock and internal/external bleeding
- Fluid replacement as necessary
- Analgesics for pain

Chest Trauma
- Blunt trauma
- Sternal and rib fractures
- Flail chest
- Pulmonary contusion
- Penetrating trauma
- Pneumothorax
- Aspiration

Trauma
- Blunt Trauma
  - MVAs, falls, Bicycles accidents, etc.
  - Extent of the damage is often vague d/t the inability to visualize internal injuries.
  - Work-up may include chest x-ray, CT, CBC, clotting studies, Type and cross-match, Electrolytes, O2 sat, ABC, and ECG.
  - Tx injuries and support respirations and circulation aggressively.
Trauma

- Flail Chest
  - 3 or more adjacent ribs are fractured at two or more sites, resulting in free-floating rib segments.
  - This results in severe respiratory impairment and distress.
  - Management:
    • Ventilatory support, clearing secretions, and controlling pain*.
    • Monitored by serial chest x-rays, ABGs, pulse ox, and PFTs.

Flail Chest

PNEUMOTHORAX

- THE PRESENCE OF AIR IN THE PLEURAL SPACE THAT PROHIBITS COMPLETE LUNG EXPANSION
- Lung expansion occurs when there is negative pressure in the pleural space.
- If this is lost, the lung collapses and results in a pneumothorax
- May be open or closed, spontaneous or traumatic
Pneumothorax

- Clinical Manifestations
  - Moderate: tachypnea, dyspnea, sudden sharp pain on the affected side with chest movement, breathing, or coughing, asymmetrical chest expansion, diminished or absent breath sounds on affected side, hyperresonance to percussion on the affected side, restlessness, anxiety, and tachycardia

- Severe
  - All of these plus distended neck veins, shift of the PMI, subcutaneous emphysema, decreased tactile fremitus, tracheal deviation to unaffected side, and progressive cyanosis.

- Management
  - Insertion of a chest tube at the fourth intercostal space midaxillary or anterior axillary line connected to closed drainage system
  - Possibly exploratory thoracotomy

Open Pneumothorax and Tension Pneumothorax
Aspiration

- Risk factors
  See Chart 23-10
- Pathophysiology—stomach contents enter the lungs and results in inflammation of the lung tissue, chemical burns of the tracheobronchial tree and lung tissue, and can result in pneumonia.
- Prevention:
  - Elevate HOB.
  - Turn patient to the side when vomiting.
  - Prevention of stimulation of gag reflex with suctioning or other procedures
  - Assessment and proper administration of tube feeding
  - Rehabilitation therapy for swallowing
  - Assurance of functioning feeding tubes.