

Bullet Point Nursing

Medical - Surgical / Adult Health Nursing – Respiratory system

Disclaimer: These notes are designed to provide the key points of each topic. These notes should be used with the associated lectures that expand upon each of the points. Every effort is made to ensure this content is up to date and accurate at the time of writing. No liability is assumed for the content or its relation to current standards and practices.

Anatomy and physiology pulmonology review:

- Primary function of the lungs is to inhale oxygen and exhale carbon dioxide (4 types of hypoxia)
 - Hypoxic Hypoxia: Low blood oxygen due to high altitudes, lung disease, or decreased respirations.
 - Anemic Hypoxia: Normal oxygen levels but insufficient hemoglobin (e.g., anemia, carbon monoxide poisoning).
 - Stagnant Hypoxia: Inadequate oxygen delivery due to poor blood flow (e.g., shock, heart failure).
 - Histotoxic Hypoxia: Cells unable to use oxygen despite delivery (e.g., cyanide poisoning).
- Secondary Lung Function: Maintain acid-base balance.
- The upper airway includes the mouth, nose, sinuses, epiglottis, and larynx.
- The lower airway includes the trachea, bronchi, bronchioles, and alveoli.
- The lungs are comprised of 5 lobes, 3 on the right and 2 on the left.
- Pleura:
 - Visceral Pleura: Lines the outside of the lungs.
 - Parietal Pleura: Lines the inside of the thoracic cavity.
 - Pleural Fluid: Prevents friction and provides lubrication.
- Control of Breathing:
 - Regulated by the brainstem based on CO₂ levels.
 - Can switch to hypoxic drive (O₂-based control) or voluntary control.
- Ventilation (breathing) is moving air in and out of the lungs.
 - The primary muscle of ventilation is the diaphragm.
- Oxygenation is the process of increasing the concentration of oxygen.

Respiratory Assessment:

- Work of Breathing: Assess effort and visible strain (e.g., nasal flaring, intercostal retractions).
- Lung sounds
 - Normal, stridor, wheezing, rhonchi, rales/crackles, diminished, absent
- Chest rise
 - Symmetrical, depth of inspiration, accessory muscle use
- Normal breathing: Eupnea
- Abnormal breathing:
 - Apnea: Absence of breathing
 - Bradypnea: Slow breathing
 - Tachypnea: Fast breathing
 - Dyspnea: Difficult or labored breathing
 - Orthopnea: Difficulty breathing while lying flat

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- Agonal: Gasping, ineffective respirations
- Kussmaul: Deep, labored breathing (often seen in metabolic acidosis)
- Cheyne-Stokes: Cyclical pattern of apnea and hyperventilation
- Biot: Irregular respirations with periods of apnea
- Features of breathing
 - Tripod, pursed lip breathing, cyanosis
- Pulse oximetry
 - Indicates the percentage of hemoglobin molecules bound with oxygen.
- Cough
 - Productive versus non-productive
 - Hemoptysis is coughing blood

Pulmonary Diagnostics:

- Pulmonary function test (PFT)
 - Assesses lung mechanics, including airflow, lung volumes, and gas exchange.
 - Results often repeated after administration of a bronchodilator.
 - Used in the diagnosis of diseases such as asthma and COPD.
- Sputum cultures
 - Best collected in the morning before eating or drinking.
 - Have the patient rinse their mouth to avoid contamination from oral flora.
 - Collect before initiating antibiotic therapy.
 - Used for identifying pathogens and selecting targeted antibiotics (C&S testing).
- Chest x-ray (CXR)
 - Commonly used to diagnose pneumonia, tuberculosis, pneumothorax, pleural effusion, and other pulmonary diseases.
 - Includes different views: AP (anteroposterior), PA (posteroanterior), and lateral.
 - Remove all metallic objects from the torso, including jewelry and ECG electrodes.
- Chest CT
 - Provides detailed cross-sectional imaging useful for identifying tumors, pulmonary embolisms, or complex lung pathologies.
 - Spiral CT offers faster and more detailed imaging. This is often used for conditions such as a suspected pulmonary embolism.
- D-dimer
 - Blood test used to detect indications of clot formation and helps rule out thromboembolic conditions like pulmonary embolism and deep vein thrombosis.
 - A positive result warrants further imaging (e.g., CT angiography).
- Egophony
 - Auscultatory exam of the thoracic cavity as the patient repeats the vowel “E”
 - Suggestive of consolidation if the “E” sounds like an “A”
- ABG
 - Measures oxygen (PaO_2), carbon dioxide (PaCO_2), pH, and bicarbonate (HCO_3^-) levels in arterial blood.
 - An Allen test evaluates collateral circulation to the hand by assessing the patency of the ulnar and radial arteries.

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- Assesses respiratory function and acid-base status.
 - Determines metabolic acidosis /alkalosis and respiratory acidosis / alkalosis
- Bronchoscopy
 - Direct visualization of the bronchi
 - Can be used for collection of specimens or inspecting physical findings
- Thoracentesis
 - Thoracentesis involves the insertion of a needle into the pleural space to remove fluid as diagnostic or therapeutic, commonly under local anesthetic and US guidance.

Pulmonology Notes:

- Head of bed (HOB)
 - Often elevated in patients with respiratory distress or pulmonary edema
- Rhinorrhea
 - Medical term for “runny nose”
- Pleurisy
 - Inflammation of the visceral and parietal pleura, often causing sharp chest pain that worsens with breathing or coughing.
- Incentive spirometry
 - Device designed to encourage deep breathing, improve lung expansion, and prevent atelectasis in patients post-surgery or with pulmonary disease.
- Oxygen
 - Discussed in its own lecture.
- Mechanical ventilation
 - Positive pressure ventilation (PPV)
 - Non-invasive positive pressure ventilation (NIPPV)
 - Continuous positive airway pressure (CPAP)
 - Bilevel positive airway pressure (BiPAP)
 - Weaning: Gradual reduction of ventilator support, allowing resumption of spontaneous breathing.
 - Ventilator-Associated Pneumonia (VAP): A type of pneumonia that develops in the intubated patient.
 - Barotrauma: Injury to lung tissue caused by excessive pressure during mechanical ventilation.
- Chest tube
 - Drains air, blood, or fluid from the pleural space, restoring lung expansion.
 - Used for hemothorax, pneumothorax, postoperative drainage, and effusions.
 - Ensure the drainage system is below chest level to prevent backflow.
 - Encourage deep breathing, coughing, and ambulation to promote recovery.
 - Monitor for complications such as air leaks, infection, or tube dislodgement.
- Encourage rest, fluids, disease transmission prevention as needed.

Pathophysiology and Nursing Practice:

- **Trauma – Rib fracture**
- **Trauma – Flail chest**

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- Patho: Multiple rib fractures cause a free-floating chest segment.
- Presentation: Paradoxical chest motion, respiratory distress, cyanosis, crepitus, and chest pain.
- Diagnosed with chest x-ray (CXR) or chest CT.
- Management: O2 therapy, pain control, mechanical ventilation, and potential surgical stabilization.
- **Pulmonary contusion**
 - Patho: Lung tissue bruising causes alveolar bleeding and edema.
 - Presentation: Hypoxia, dyspnea, hemoptysis, and worsening breathing over 24-48 hrs.
 - Diagnosed with chest x-ray (CXR) and follow up chest CT.
 - Management: Oxygen support, pain relief, and monitoring for complications like ARDS.
- **Pneumothorax / Hemothorax**
 - Patho: Air or blood collects in the pleural space, impairing lung inflation.
 - Presentation: Absent or diminished lung sounds in affected area, tachypnea
 - Diagnosed with chest x-ray (CXR) or chest CT.
 - Management: Corrected with a chest tube, emergently it may be corrected by needle/finger decompression
 - Chest hole (from trauma or tube placement) should be sealed with an airtight dressing
 - Can occur spontaneous or as a result of trauma
 - Tension pneumothorax: Air accumulation puts pressure on the heart / unaffected lung
 - A hemothorax is when blood fills up the pleural space
 - Can occur with or without a pneumothorax
 - Blood is drained out with a chest tube
- **Asthma**
 - Patho: Bronchoconstriction, inflammation, and increased secretions narrow the airway passages resulting in increased difficulty breathing.
 - Presentation: Wheezing, tachypnea, hypoxia, and respiratory distress.
 - Diagnosed using history, physical exam, and spirometry. Spirometry measures the forced expiratory volume (FEV1) and forced vital capacity (FVC).
 - Management: Oxygen, bronchodilators, corticosteroids, high fowlers, reduce stress and triggers.
 - Status asthmatics is a life-threatening asthma exacerbation that is refractory to typical asthma interventions
 - Asthma exacerbation is often caused by a trigger. Teach the patient avoidance.
- **COPD**
 - Patho: COPD includes two disease of chronic airway obstruction: emphysema and chronic bronchitis.
 - Chronic bronchitis: Inflammation and excess mucus in the bronchial tubes.
 - Emphysema: A disease of damage to the alveoli.
 - Presentation: Wheezing and/or rales, accessory muscle use, and cough.
 - Barrell chest for emphysema, and clubbed fingers for chronic bronchitis.
 - Diagnosed using history, physical exam, and spirometry. Spirometry measures the forced expiratory volume (FEV1) and forced vital capacity (FVC).

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- Management: Oxygen (including at home), bronchodilators, corticosteroids, and breathing techniques.
- Nearly all patients with emphysema have a history of cigarette smoking.
- Hypoxic drive can be a concern.
- **Pneumonia**
 - Patho: Infection of one or more lobes of the lungs.
 - Presentation: Tachycardia, adventitious sounds, over the affected lobe(s), productive cough, fever, tachypnea, elevated WBC, fatigue
 - Diagnosed with consolidation findings in one or more lobes on chest x-ray (CXR)
 - Community-acquired pneumonia (CAP): Occurs outside of healthcare settings.
 - Hospital-acquired pneumonia (HAP): Develops ≥48 hours after hospital admission.
 - Ventilator-associated pneumonia (VAP): Develops ≥48 hours after endotracheal intubation.
 - Management: Antibiotics, encourage cough and/or deep breathing, OTC for symptom relief
 - Encourage vaccination for prevention (pneumonia and influenza)
- **Bronchitis**
 - Patho: Inflammation of the bronchi, most commonly due to viral infection
 - Presentation: Primary symptom is a cough
 - Diagnosed based on history and exam findings
 - Management: Supportive care, OTC for symptom relief
 - Often lasts 2-3 weeks.
 - Commonly follows an upper respiratory infection
- **Influenza**
 - Patho: Viral infection causing inflammation and destruction of respiratory epithelium.
 - Presentation: Fever, chills, rhinorrhea, cough, sore throat, aches, fatigue
 - Diagnosed by nasal or throat swab testing
 - Management: Supportive measures, antivirals if appropriate, transmission prevention
 - Promote influenza vaccination annually
 - Maintain droplet precautions
 - Covid-19:
 - Strain of influenza
 - Can include the symptoms of loss of taste or smell
- **Pulmonary embolism**
 - Patho: Blood clot in the pulmonary artery leading to impaired gas exchange
 - Presentation: Sudden onset chest pain, hypoxia, tachypnea, tachycardia
 - Diagnostics used include an ABG, D-dimer, spiral CT or chest CT with angiography
 - Management: Oxygen, anticoagulant therapy
 - Provide close hemodynamic monitoring
- **Pleural effusion**
 - Patho: Fluid buildup in the pleural space (can be from infection, cancer, trauma, etc)
 - Presentation: Sharp pain timed to respirations, decreased breath sounds over affected area, dyspnea

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- Diagnosed by imaging (chest x-ray (CXR), CT, US)
- Management: Encourage deep breathing, position in high fowlers, anticipate thoracentesis, manage underlying conditions.
- Empyema is an infectious fluid buildup in the pleural space.
- **Tuberculosis**
 - Patho: Slow onset bacterial infection most common in the upper lobes of the lungs.
 - Presentation: Weight loss, night sweats, persistent cough (hemoptysis), low grade fever.
 - Diagnosed with chest X-ray (CXR) or CT scan, sputum culture, acid-fast bacillus (AFB) smear, and tests such as the TB skin test or QuantiFERON blood test.
 - Management: Anti-infective pharmacotherapy for 2-6 months
 - Four drug combo: isoniazid, rifampin, pyrazinamide, and ethambutol.
 - Reportable disease
 - Most prevalent bacterial infection globally
 - BCG vaccine available
- **Acute respiratory distress syndrome (ARDS)**
 - Patho: Damage to the alveolar-capillary membrane, leads to fluid leaking into the alveoli.
 - Presentation: Hypoxemia, tachypnea, dyspnea, cyanosis, and signs of shock
 - Diagnosed by overall hemodynamic and respiratory status
 - Involves labs, imaging, vitals, progression, and comorbidities
 - Management: Mechanical ventilation, hemodynamic support
 - Evolves as a secondary complication of a primary pathophysiologic issue such as sepsis, trauma, pneumonia, or aspiration.
- **Upper Respiratory Infection (URI)**
 - Patho: Viral infection affecting the upper respiratory tract, including the nose, sinuses, pharynx, and larynx.
 - Presentation: Nasal congestion, rhinorrhea, sore throat, cough, low-grade fever, headache, and mild fatigue.
 - Diagnosed by history and physical examination.
 - Management: Supportive care and OTC medication for symptoms relief.
 - Also referred to as the common cold and rhinovirus.
 - Teach infection prevention and avoiding disease transmission.
 - RSV is an infection that often presents as an URI in adults. In children and other at risk populations, RSV can develop into a severe lower respiratory infection.

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