Oxygenation and Perfusion
Alina Ruiz, MSN-Ed., RN

Anatomy and Physiology of Oxygenation
What does the respiratory system do?

Lungs:

Ventilation vs Respiration vs Perfusion
- Ventilation is like what's in your car, when air moves in and out
- Respiration is the freon, it's the gas exchange that happens
- Perfusion is the fan, it's the process which gets the O2 to the body

Ventilation: In and Out
- Inspiration
- Expiration
- Factors that affect air flow?

Respiration
- Where does it occur?
  - Diffusion: Oxygen in the alveoli move into capillaries to go to the body, and carbon dioxide from the venous blood moves into the alveoli and is exhaled
  - Factors affecting gas exchange?
  - Incomplete lung expansion or the collapse of alveoli, known as _____, prevents pressure changes and the exchange of gas by diffusion in the lungs.

Perfusion
- What is it?
- How does oxygen get to the body?
- How do you check it?
- What dictates how much gas is exchanged?

Abnormal Function
- Controlled by the medulla
- Stimulation of receptors by carbon dioxide and hydrogen
- ABG's- affected by carbon dioxide level
- Blood pressure: up vs down
• Physical demand
• Hypoxia vs hypoventilation
• Dyspnea

9  NCLEX Style Practice
The nurse is caring for a 90 year old woman who has been in an automobile crash and sustained four fractured ribs on the left side of her thorax. Based on her age and the injury, the nurse knows she is at risk for what complication?

a. altered thought processes
b. pneumonia
c. urinary incontinence
d. viral influenza

10  Cardiovascular System
• Heart: What is it’s function? Location?

• Atria-
• Ventricles-
• Capillaries: function in the exchange location

11  The Circulatory System
What is the flow of blood through the heart and body?

12  NCLEX Style Practice
The nurse is caring for a client who has sustained a left ventricle infarct. Which of the following findings would the nurse expect as a result?

a. right ventricle failure
b. congestion of blood into the systemic system
c. decreased afterload
d. congestion of blood into the pulmonic system

13  The Circulatory System
What is the flow of the conduction system of the heart?

14  Problems in the Cardiovascular System
• Dysrhythmia
• Ischemia
• Angina
• MI
• HF

15  Nursing Considerations
• Level of health
Level of development:
- Infants:
- Toddlers:
- School age:
- Adolescent:
- Adult:
- Older adults:

16 Medications: Upper Respiratory System
- Antihistamines/ Mast Cell Stabilizers: H1 receptor agonists
- Intranasal Corticosteroids:
- Decongestants:
- Antitussives:
- Expectorants and Mucolytics:

17 Medications: Lower Respiratory System
2 types of Medications: short and long acting that effect different mechanisms of action

Bronchodilators: beta-adrenergic, anticholinergic, and methylxanthines

Anti-Inflammatory Drugs: Inhaled corticosteroids, mast cell stabilizers, leukotriene receptor antagonists

18 Administration of Inhaled Drugs
- Aerosol
- Nebulizer
- Dry-powder inhaler
- Metered dose inhaler

19 NCLEX Style Practice
A nurse is caring for a client with asthma who is receiving albuterol (Proventil). The nurse is preparing discharge teaching for the client and knows that the following adverse effects must be discussed with the client. Select all that apply.

a. sedation
b. tachycardia
c. headache
d. nervousness
e. dyspnea

20 Oxygen Therapy
- What is the purpose of oxygen therapy?
- What are the nursing considerations when administering prescribed oxygen?
- What is the PRIORITY teaching of a client with oxygen therapy?

21 Methods of O2 Delivery
22 Chest Physiotherapy
   • Postural Drainage
   • Chest Percussion and Vibration
   • Breathing Retraining

23 Airway Management
   Ventilation can not occur if the airway is obstructed!

   Emergency vs Non-Emergency

   Endotracheal tube vs tracheostomy

24 Tracheostomy Device

25 Monitoring Oxygenation and Perfusion
   • Pulse Oximetry: measures arterial oxyhemoglobin saturation SpO2
   • Arterial blood gas and pH analysis: measures the pressure exerted by oxygen and carbon dioxide in the blood and the blood pH. Measures the adequacy of oxygenation, ventilation, and perfusion.
   • Blood Counts
   • Spirometry
   • Pulmonary Function Test
   • Radiography
   • Lung scan
   • Skin tests
   • Thoracentesis

26 Pneumonia
   • Inflammation of the lung tissue caused by microorganisms
     • Bacteria
     • Mycobacteria
     • Fungi
     • Virus
   • Classifications
     • Community-acquired (CAP)
     • Health care-associated (HCAP)
     • Hospital-acquired (HAP)
     • Ventilator associated (VAP)
     • Immunocompromised Host (PCP)

27 Pneumonia
   • Signs and Symptoms
     • Varies with based on the organism/cause
       • Fever, chills, tachypnea, shortness of breath fast onset with streptococcal
• Bradycardia with viral
• Signs of upper respiratory infection may hinder diagnosis
• Mucopurulent sputum
• Rusty-blood tinged sputum with streptococcal, staphylococcal, and Klebsilla

• Diagnostic Testing
  • CXR
  • Blood/sputum cultures

28 Pneumonia: Nursing Interventions
• Improve airway patency
• Rest
• Promote fluid intake
• Maintain nutrition
• Pharmacological therapy
  • Antibiotics for bacterial infections

29 Pneumonia: Potential Complications
• Shock and respiratory failure
• Pleural effusion
• Confusion

30 Pneumonia: Education of the client
• Medications:
• Side effects or complications to report:
• Rest/Conservation:
• Lifestyle considerations:
• Vaccination:

31 Pneumonia: Evaluating Outcomes
• Improved airway patency
• Rest
• Hydration
• Dietary intake
• Management
• Complications
• Prevention

32 Medications for Infections
• Identify bacteria with gram staining
  • Gram negative- E. coli, pseudomonas, salmonella, klebsiella
  • Gram positive- staphylococcus, streptococci, enterococci
• Aerobic vs anaerobic
• Selecting appropriate antibiotic- broad vs narrow spectrum
• Consideration of: allergies and client status

33 Penicillins AKA “-illin”
Kill bacteria by disrupting the cell walls; beta-lactam ring
  • Beta-lactamase or penillinase enzyme (clavulanate, sublactam, and tazobactam)
  • Gram positive bacteria
  • Safest; allergy can occur
  • Side effects: nausea, diarrhea

34 □ Cephalosporins AKA “cef-”
  Bacteriocidal and act by attaching to penicillin-binding protein to inhibit the bacterial cell-wall synthesis
  • Gram negative bacteria, or clients that cannot tolerate PCN
  • Generations (first through fourth): sound very similar
  • Allergy/side effects similar to PCN
  • Contraindicated in clients that had an allergic reaction to PCN

35 □ Tetracyclines AKA “-cycline”
  • Inhibit growth (protein synthesis) by binding to the bacterial protein ribosome
  • Broadest spectrum of the antibiotics
  • Phototoxicity and childhood teeth discoloration are different adverse effects for this class

36 □ Macrolides AKA “-mycin”
  • Safe alternative to penicillins
  • Inhibit growth (protein synthesis) by binding to the bacterial protein ribosome
  • Used to treat infections inside host cells
  • Adverse effects are mild, gi upset, diarrhea, abdominal pain.

37 □ Concept Mapping

38 □ Concept Mapping

39 □ Concept Mapping

40 □ Concept Map Creation
  Steps in concept map care planning are:
  Develop a basic skeleton diagram.
  Analyze and categorize data.
  Analyze nursing diagnoses relationships.
  Identify goals, outcomes, and interventions.
  Evaluate patient's responses.