

The Respiratory System

LEARNING OBJECTIVES: Upon completion, the student will be able to differentiate the concept of oxygenation process between the Cardiovascular and the Respiratory system. The student will understand of the perfusion system that nurtures the lungs and the peripheral system. The student will be able to learn of the primary purpose of the respiratory system to provide oxygen to the cells and remove carbon dioxide excreted by the cells during metabolism. Also the role play by the lungs in the maintenance of acid base balance.

RESPIRATION: Consists of taking oxygen(O_2) into the body through the lungs and eliminating the waste products: carbon dioxide (CO_2) and water(H_2O). Carbon dioxide has the effect of stimulating respiration; with an elevation of the carbon dioxide, more oxygen is taken in to offset the high CO_2 level.

Breathing air in is called inspiration or inhalation; breathing air out is called expiration or exhalation.

Bradypnea: slow respirations

Cheyne-Stokes: periods of apnea alternating with rapid respirations

DOE: dyspnea on exertion

Dyspnea: difficulty breathing; may be subjective or objective

Orthopnea: difficulty breathing in a supine position; relieved by sitting up

Paroxysmal nocturnal dyspnea: transient episodes of acute dyspnea that occur a few hours after falling asleep

SOB: short of breath

Tachypnea: rapid respirations

Wheeze sound as air moves out through bronchi and bronchioles that have been narrowed by spasm, swelling and secretions

DIAGNOSTIC TESTS/METHODS

- A. Chest x-ray examination: a picture of lung tissue from different angles; based on a knowledge of normal anatomy and usual changes in disease, diagnosis of many conditions can be made (e.g., tumors, pneumonia); there is no preparation and no special care or observations after x-ray examination
- B. Bronchoscopy
- C. Bronchogram
- D. CT scan
- E. Ultrasound
- F. MRI
- G. Thoracentesis
- H. CBC
- I. Arterial blood gases
- J. Culture and sensitivity
- K. Sputum analysis
- L. Pulmonary function tests
- M. Lung scan
- N. Biopsy examination

FREQUENT PATIENT PROBLEMS AND NURSING CARE

- A. Activity intolerance related to fatigue and weakness
- B. Potential for injury related to dizziness: caused by diminished oxygen to the brain cells
- C. Altered oral mucous membrane related to mouth breathing
- D. Altered breathing pattern related to orthopnea
- E. Ineffective airway clearance; impaired gas exchange related to dyspnea and coughing
- F. Anxiety related to dyspnea, fatigue and weakness
- G. Alteration in nutrition, less than body requirements, related to dry mouth from mouth breathing, foul taste and odor from sputum and fatigue; may affect desire for food

WEEK 6

MAJOR MEDICAL DIAGNOSES

LEARNING OBJECTIVES: Upon completion, the student will become familiarized with pathologies persistent to the respiratory system. The student will be able to understand and differentiate the manifestations and symptoms and the multiple presumptive diagnostic lab procedures to a final diagnoses. Then the choice to the proper medication.

P.S. Anatomy of respiratory system at the end Sinusitis

- A. Definition: inflammation of one or more of the sinuses of the frontal, ethmoid, sphenoid or maxillary bones
- B. Cause: results from the spread of organisms from the nose or trapped secretion interfering with drainage
- C. Signs and symptoms
- D. Diagnostic tests/methods
- E. Treatment
- F. Nursing intervention
 - 1. Administer non-narcotic analgesics or nasal constrictors
 - 2. Provide moist steam
 - 3. Provide hot wet pack
 - 4. Give general preoperative and postoperative care

Epistaxis (Nosebleed)

- A. Definition: bleeding from the nose
- B. Cause: may be spontaneous, related to direct trauma, or a result of a systemic diseases
- C. Sign: bleeding
- D. Diagnostic tests/ methods: patient history and physical examination
- E. Treatment
- F. Nursing intervention
 - 1. Maintain patent airway
 - 2. Control bleeding
 - 3. Instruct patient to expectorate blood
 - 4. Apply ice or cold compresses to nasal area to constrict blood vessels
 - 5. Monitor vital signs
 - 6. Avoid hot liquids
 - 7. Provide oral hygiene

Laryngitis

- A. Definition: an inflammation and swelling of the mucous membrane lining of the larynx
- B. Cause: local irritation
- C. Signs and symptoms
- D. Diagnostic tests/ methods
- E. Treatment and nursing intervention
 - 1. Rest voice; provide alternate means of communication
 - 2. Removal of cause
 - 3. Provide moist steam inhalations
 - 4. Administer astringent or antiseptic spray

Carcinoma of the Larynx

- A. Description: squamous cell carcinoma grows, spreads and metastasizes
- B. Causes: related to heavy smoking, chronic laryngitis and vocal abuse and alcohol consumption
- C. Signs and symptoms
- D. Diagnostic tests/ methods
- E. Treatment: surgery
- F. Nursing intervention
 - 1. Provide general preoperative and postoperative care
 - 2. Immediate postoperative care
 - 3. Continued postoperative care

Pneumonia

- A. Description: an inflammation of the lungs or part of the lung
- B. Causes: bacterial infections and viruses are spread by respiratory secretions(droplets)
- C. Signs and symptoms
- D. Diagnostic test/ methods
- E. Treatment
- F. Nursing intervention
 - 1. Provide optimum rest: provide care; help patient conserve energy; schedule rest periods; limit conversation; keep personal items and call bell within easy reach; alleviate anxiety
 - 2. Maintain oxygen with humidity
 - 3. Isolate as indicated, especially patients with oral and nasal secretions; provide disposal

4. Liquefy secretions: force fluids (3000ml daily or more); observe and document productions of sputum; suction as necessary
5. Provide oral hygiene q2h
6. Monitor vital signs q4h; use rectal thermometer; monitor lung sounds
7. Assist with loosening of secretions: have patient turn, cough and deep breathe q2h(splint chest if painful) Observe and document cough
8. Maintain adequate nutrition: provide liquid-to-soft diet high in protein and calories
9. Maintain IV fluids and medication schedule to ensure continued blood levels
10. Position for comfort(high-Fowler's or lying on affected side)

Pneumothorax/ Hemothorax

- A. Description
- B. Causes
- C. Signs and symptoms
- D. Diagnostic tests/ methods
- E. Treatment
- F. Nursing intervention
 1. Provide nursing care and observations as necessary for primary diagnosis
 2. Place patient in high-Fowler's position
 3. Monitor vital signs
 4. Administer oxygen
 5. Provide nursing care for a patient with chest tubes as described in the box above

Pulmonary Tuberculosis

- A. Description: a chronic progressive infection
- B. Cause: Mycobacterium tuberculosis
- C. Signs and symptoms
- D. Diagnostic tests/ methods
- E. Treatment
- F. Nursing intervention

1. Provide rest; assist with or provide care; plan rest periods; limit conversation; leave personal items in easy reach
2. Prevent transmission: ensure respiratory isolation; provide tissues and bag for disposal; encourage proper use of tissues; insist on patient covering mouth and nose when coughing or sneezing
3. Provide frequent, small meals and nutritious snacks
4. Avoid chills; keep skin dry and clean; protect from drafts, especially at night
5. Allay fears of patient and family about transmission: encourage proper adherence to drug maintenance; explain how organism is carried, transmitted and test is recommended for all contacts with a person with tuberculosis (TB); a positive test result does not mean the disease has manifested but indicates that the organism has entered the body and that the body has produced antibodies at some point

Asthma

- A. Description: spasms of the bronchial muscle occur
- B. Causes
- C. Signs and symptoms
- D. Diagnostic tests/methods: patient history and physical examination
- E. Treatment
- F. Nursing intervention
 1. Reduce anxiety: provide time to listen; do not leave patient alone during attack
 2. Remove cause: keep environment free from dust and other allergens
 3. Provide continuous humidity as ordered
 4. Force fluids; maintain IV as ordered
 5. Position for maximum comfort and breathing: have patient sit in high-Fowler's position with arms supported by over-bed table
 6. Prevent secondary infections: avoid staff and visitors with upper respiratory infections
 7. Teach abdominal breathing
 8. Do not allow smoking; refer patient for help in quitting

Chronic Bronchitis

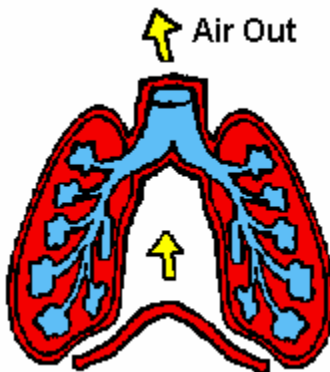
- A. Description: chronic, progressive infection accompanied by hyper-secretion of mucous by the bronchioles
- B. Causes
- C. Signs and symptoms
- D. Diagnostic tests/methods
- E. Treatment
- F. Nursing intervention
 - 1. Provide care to relieve patient problems (refer to discussions earlier in chapter)
 - 2. Loosen, liquefy and remove secretions: provide postural drainage and chest percussion as ordered; force fluids
 - 3. Involve patient and family in care and care planning
 - 4. Do not allow smoking; refer patient for help in quitting.

Emphysema

- A. Description: a chronic, progressive condition in which the alveolar sacs distend, rupture and destroy the capillary beds
- B. Cause (see discussion on bronchitis)
- C. Signs and symptoms
- D. Diagnostic tests/ methods
- E. Treatment
- F. Nursing intervention
 - 1. Loosen, liquefy and remove secretions: provide postural drainage and chest percussion as ordered; force fluids; administer expectorants as needed
 - 2. Promote respiratory function: breathing exercises and coughing
 - 3. Administer oxygen; oxygen is administered in low concentrations only(1 to 2 L)
 - 4. Prevent and control infections: administer antibiotics
 - 5. Provide rest: limit exertion of any type
 - 6. Include family in care and care plan; be understanding that this condition is chronic
 - 7. Teach pursed-lip breathing; abdominal breathing

Cancer of the Lung

- A. Description: primary or secondary
- B. Cause
- C. Signs and symptoms
- D. Diagnostic tests/ methods
- E. Treatment
- F. Nursing intervention
 - 1. Provide nursing care for symptoms(see discussion on frequent patient problems)
 - 2. Provide preoperative and postoperative nursing care
 - a. Maintain patent airway; administer oxygen; have patient turn, cough and deep breathe q2h; a patient with pneumonectomy must not cough; do not turn on operative side until physician orders
 - b. Provide special care for a patient with chest tubes (rarely used, but still a possibility)



DIAPHRAGM OF THE LUNGS

760 mmHg – atmospheric pressure

increase of CO₂ stimulates resp (acidosis) CO₂ + H₂O= carbonic acid H₂CO₂

low CO₂ slow resp(Alkalosis) 20 down to 1 H₂ CO₂ ratio

Blood PH 7.35 (hydrogen ions)

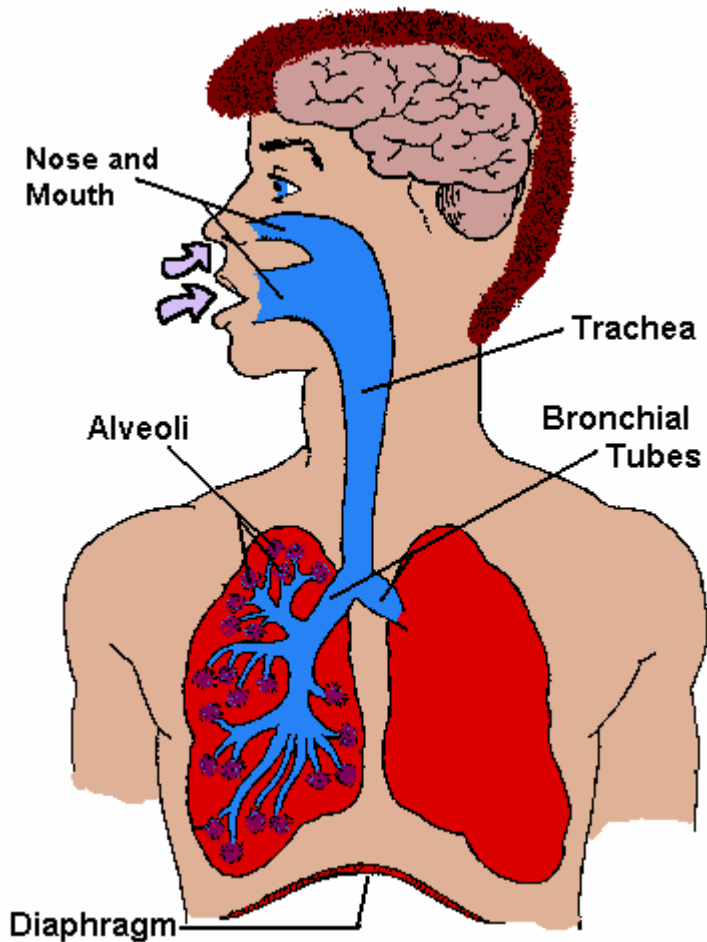
Na H CO₃= Sodium bicarbonate

Surfactant: Lines Alveoli; needs adequate blood supply for the surface tension

Any decrease of surfactant, smaller alveoli can't surface tension, and the lungs will collapse.

Mediastinum: area with esophagus, trachea, Ige, blood vessels and heart

Thoracic cavity; is closed, Base is diaphragm



ANATOMY OF THE RESPIRATORY SYSTEM

NOSE : septum divides nares

4 pr. Sinuses drain into nose

Olfactory nerve of smell

**PHARYNX: Throat(Nasopharynx-adenoids
(oropharynx-tonsils)**

LARYNX : Thyroid cartilage- Adam's Apple

TRACHEA "C" shape

Divides into primary bronchi, secondary, bronchioles

Alveoli ducts>sacs

LUNGS – Right- bronchus, larger, more vertical

Left - bronchus- 45 degree angle and smaller

Questions and Answers for stimulation PART 1

Question: What epithelial cell type do you find lining the nasal cavity, pharynx and trachea

Answer: Nasal cavity, nasopharynx, and trachea are lined with pseudostratified ciliated columnar and the lower pharynx (oro and laryngo) is lined with stratified squamous

Question: What is the mucus escalator

Answer: The beating of the cilia lining the respiratory tract, moving mucus towards the oropharynx

Question: What is the function of the nasal conchae

Answer: To warm, filter, and moisten incoming air

Question: How would the vocal ligaments be structured in a person with a very deep voice

Answer: Long and thick

Question: Which branches of the bronchial tree do not contain cartilage

Answer: The bronchioles, they contain a spiral layer of smooth muscle instead

Question: What is the function of surfactant

Answer: To prevent alveolar collapse by reducing surface tension

Question: What do alveolar macrophage do

Answer: Remove cellular debris and pathogens by phagocytosis

Question: What are the components of the respiratory membrane

Answer: The capillary endothelium, basement membrane, and alveolar epithelium

Question: What holds the visceral and parietal pleura together

Answer: Fluid in the pleural cavity creating surface tension (adhesion)

Question: What is Boyle's law

Answer: Pressure is inversely related to volume

Question: What is atmospheric pressure at sea level

Answer: 760 Torr (or mm Hg)

Questions and Answers for stimulation part 2

Question: What epithelial cell type do you find lining the nasal cavity, pharynx and trachea

Answer: Nasal cavity, nasopharynx, and trachea are lined with pseudostratified ciliated columnar and the lower pharynx (oro and laryngo) is lined with stratified squamous

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