

RESP-1330: CARDIOPULMONARY ASSESSMENT AND PULMONARY DISEASES

Cuyahoga Community College

Viewing: RESP-1330 : Cardiopulmonary Assessment and Pulmonary Diseases

Board of Trustees:

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Academic Term:

Fall 2020

Subject Code

RESP - Respiratory Care

Course Number:

1330

Title:

Cardiopulmonary Assessment and Pulmonary Diseases

Catalog Description:

Theory and application of cardiopulmonary assessment, medical records, and charting. Includes physical assessment, assessment of lab values, radiologic evaluation, vital signs, EKG and pulmonary function testing and interpretation. Discussion of diseases including emphysema, chronic bronchitis, asthma, bronchiectasis, cystic fibrosis, pneumoconiosis, adult respiratory distress syndrome, pneumonia, pulmonary edema, cancer, acquired immune deficiency syndrome, tuberculosis, myasthenia gravis, Guillain-Barre and amyotrophic lateral sclerosis. Emphasis on identifying signs and symptoms of pulmonary diseases, and basic respiratory management of patient.

Credit Hour(s):

5

Lecture Hour(s):

4

Lab Hour(s):

3

Other Hour(s):

0

Requisites

Prerequisite and Corequisite

RESP-1300 Respiratory Care Equipment, and RESP-1310 Cardiopulmonary Physiology.

Outcomes

Course Outcome(s):

Assess patient status through physical assessment, clinical history, inspection, palpation, percussion, auscultation, laboratory findings, chest x-rays, EKGs, PFTs, and ABGs.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

1. Demonstrate the ability to properly enter information in medical records and maintain the confidentiality of medical records.
2. Describe the proper techniques for performing physical assessment and relate the clinical significance of findings to patient status, including clinical history, inspection, palpation, percussion and auscultation.
3. Identify normal and abnormal laboratory findings in the categories of hematology, blood chemistry, and electrolytes, which are common to cardiopulmonary disorders.
4. Systematically review and interpret a chest x-ray identifying normal structures and the presence of abnormal entities.

5. Perform a bedside assessment of the cardiovascular system incorporating physical assessment, vital signs, EKG testing/ interpretation and tests of pulmonary function, and correlate these findings to patient status.
6. Assess the effectiveness and efficiency of ventilation through evaluation of pulmonary function tests and by obtaining and analyzing arterial blood.
7. Demonstrate an understanding of the environment required for optimal patient assessment.

Course Outcome(s):

Consider possible disease processes based on a patient's clinical presentation and propose treatment.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

1. Discuss major assessment differences between obstructive and restrictive pulmonary diseases.
2. Discuss signs and symptoms, treatments and prognosis regarding restrictive pulmonary disorders.
3. Discuss signs and symptoms, treatments, and prognosis regarding obstructive pulmonary disorders.
4. Discuss inflammation and repair as it relates to cellular injury.
5. Describe the immune process as it relates to the lung.
6. Differentiate specific disease processes: Chronic Lung Disease, Pleural Space Disease, Localized Parenchymal Disease, Adult Respiratory Distress Syndrome, Pulmonary Vascular Disease, Cardiovascular Diseases, Neuromuscular Diseases and Extrapulmonary Diseases, based on assessment components addressed in the course.
7. Describe assessment procedures needed to identify disease entities of the pulmonary system.

Methods of Evaluation:

1. Quizzes
2. Exams
3. Evaluation of ability to utilize equipment and perform assessments
4. Computerized clinical simulations

Course Content Outline:

1. Obtaining initial patient information
 - a. Basic chart review
 - i. history and physical exam
 - ii. diagnosis
 - iii. physician progress notes
 - iv. respiratory therapy progress notes
 1. therapy received
 2. reaction to therapy
 3. breath sounds
 4. cough productivity
 - v. pulmonary function results
 1. identifies disease process
 2. obstructive versus restrictive disease
 3. degree of impairment
 - vi. radiology reports
 1. infiltrates
 2. consolidation
 3. pleural effusion
 4. atelectasis
 5. hyperinflation
 6. increased density
 7. hyperlucency
 8. cardiomegaly
 9. hemidiaphragms
 - vii. current vital signs
 1. BP
 2. pulse

3. respiratory rate
4. temperature
- viii. bedside pulmonary function measurements
 1. tidal volume
 2. respiratory rate
 3. minute ventilation
 4. forced vital capacity
 5. negative inspiratory force
 6. peak flow
 7. inspiratory:expiratory ratio
 8. forced expiratory volume - timed (FEV)
 - a. FEV1
 - b. FEV3
- ix. electrocardiogram
- x. fluid intake and output
 1. clinical signs of overhydration
 2. clinical signs of dehydration
 3. normal output
- b. Laboratory assessment
 - i. hematology
 1. red blood count
 - a. normal values male/female
 - b. causes of polycythemia
 - c. causes of anemia
 - d. hematocrit
 - e. hemoglobin
 2. white blood count
 - a. normal values
 - b. causes of leukocytosis
 - c. causes of leukopenia
 - d. differential count
 - i. neutrophils
 - ii. lymphocytes
 - iii. monocytes
 - iv. eosinophils
 - v. basophils
 3. platelets
 - a. normal values
 - b. causes of thrombocytopenia
 - c. causes of thrombocytosis
 4. coagulation tests
 - a. bleeding time
 - b. thrombin time
 - c. prothrombin time
 - d. partial prothrombin time
 - ii. blood chemistry
 1. glucose
 - a. normal whole blood
 - b. normal serum/plasma
 - c. normal fasting blood level
 - d. causes of hyperglycemia
 - e. causes of hypoglycemia
 2. blood urea nitrogen
 - a. normal values
 - b. causes of elevated bun
 3. creatinine
 - a. normal values
 - b. causes of elevated levels
 4. cardiac enzymes

- a. CPK, LDH, SGOT
 - b. probable causes for increased levels
- iii. electrolytes
 - 1. potassium
 - a. normal values
 - b. causes of hyperkalemia
 - c. causes of hypokalemia
 - 2. chloride
 - a. normal values
 - b. causes of hyperchloremia
 - c. causes of hypochloremia
 - 3. sodium
 - a. normal values
 - b. causes of hypernatremia
 - c. causes of hyponatremia
 - 4. calcium
 - a. normal values
 - b. causes of hypercalcemia
 - c. causes of hypocalcemia
 - 5. sputum culture and gram stain
 - a. definition of culture
 - b. sensitivity
 - c. gram stain
 - d. sample collection factors
 - 6. arterial blood gases
 - a. acid/base interpretation
 - b. oxygenation assessment
 - c. causes for abnormalities
- c. Radiologic evaluation
 - i. basic information
 - 1. x-ray theory
 - 2. chest x-ray views
 - a. posterior anterior
 - b. anterior posterior
 - c. lateral
 - d. oblique
 - 3. patient positioning
 - a. inspiratory vs. expiratory film
 - b. rotation
 - c. abnormalities in A-P portables
 - 4. densities
 - a. radiopacity
 - b. radiolucency
 - 5. quality of film
 - a. position of patient
 - b. exposure level
 - ii. examination of normal structures
 - 1. bony thorax
 - a. ribs
 - b. spine
 - c. sternum
 - d. clavicles
 - e. scapulae
 - 2. trachea
 - a. position
 - b. carina
 - c. endotracheal tube position
 - d. tracheostomy tube position
 - iii. mediastinal structures

1. hilar regions
2. shifting of structures
3. increased densities
- iv. heart
 1. right heart border
 2. left heart border
 3. heart size
- v. diaphragm
 1. unequal hemidiaphragms
 2. flattened
 3. elevated
 4. costaphrenic angles
- vi. pleura
 1. thickening
 2. effusions
 3. blunting
- vii. lung fields
 1. fissures
 2. lung periphery
 3. interstitial markings
 4. bronchus vs. vessels
- viii. other common markings
 1. NG tube
 2. Swan Ganz catheter
 3. ventilator tubing
 4. EKG electrodes
 5. jewelry
 6. gastric
- d. abnormal chest films
 - i. silhouette sign
 1. obliteration of right heart border
 2. obliteration of left heart border
 - ii. diffuse lung disease
 1. alveolar filling pattern
 2. acute vs. chronic filling
 3. interstitial pattern
 4. vascular pattern
 5. bronchial pattern
 - iii. patterns of localized opacifications
 1. consolidation
 2. atelectasis
 3. pleural effusion
 4. replacement opacity
 - iv. pneumonia
 1. bacterial
 2. viral
 3. tuberculosis
 4. parasite
 5. noninfectious pneumonic processes
 - v. solitary and multiple nodules
 - vi. atelectasis and loss of volume
 - vii. bronchial obstruction
 - viii. pulmonary cavities and cysts
 - ix. diffuse airway obstruction
 1. asthma
 2. chronic bronchitis
 3. emphysema
 - x. pneumothorax and pneumomediastinum

- xi. pleural effusions
 - xii. diaphragmatic abnormalities
 - 1. bilateral depression
 - 2. bilateral elevation
 - 3. unilateral elevation
 - 4. hiatal hernia
 - xiii. foreign body aspiration
2. Patient interview
- a. Respiratory therapist interview
 - i. history of smoking
 - ii. occupational history
 - iii. medications
 - iv. cough history
 - 1. onset and progression
 - 2. frequency and duration
 - 3. precipitating factors
 - v. expectoration
 - 1. amount
 - 2. color
 - 3. odor
 - 4. consistency
 - 5. hemoptysis
 - vi. breathlessness
 - vii. level of consciousness
 - b. Physicians interview includes following
 - i. presenting complaints in chronological order
 - ii. personal history
 - 1. background
 - 2. birth date
 - 3. birth place
 - 4. racial origin
 - 5. economic status
 - 6. personal habits
 - 7. hobbies/pets
 - 8. place of residence
 - 9. occupational history
 - iii. family history
 - iv. previous illnesses and medical exams
 - v. nonrespiratory systems
 - 1. nervous system
 - 2. cardiovascular system
 - 3. gastrointestinal system
 - 4. genitourinary system
 - 5. metabolic system
 - 6. locomotor system
 - vi. medications
 - vii. history of present illness
 - 1. chronological description
 - 2. acute vs. chronic condition
 - 3. progressive versus stationary
 - 4. cough history
 - 5. expectoration
 - 6. hemoptysis
 - 7. breathlessness
 - 8. chest pain
 - 9. upper respiratory symptoms
 - 10. constitutional symptoms
 - viii. mental status

1. orientation
 2. level of consciousness
 3. emotional state
 4. ability to cooperate
3. Physical assessment
- a. Inspection
 - i. examination of the chest
 1. landmarks
 2. topographical lines
 3. surface markings
 4. lung borders
 5. fissures
 - ii. evaluation of skin
 1. flushed
 2. pallor
 3. jaundice
 4. cyanosis
 5. ecchymosis
 6. petechiae
 7. diaphoretic
 8. edema
 9. cold and clammy
 10. capillary refill
 - iii. evaluation of muscle wasting
 - iv. identification of clubbing
 - v. evaluation of venous distension
 - vi. assessment of chest cage abnormalities
 1. scoliosis
 2. kyphosis
 3. kyphoscoliosis
 4. pectus excavatum
 5. pectus carinatum
 6. asymmetrical chest excursion
 - vii. evaluation of thoracic muscle use
 1. accessory muscles
 2. retractions
 - viii. breathing patterns
 1. rate, depth, rhythm
 2. cheyne stokes
 3. biots
 4. kussmaul
 - ix. observation of cough/sputum production
 1. effort
 2. productivity
 - x. observation of work of breathing
 1. definition
 2. determining factors
 3. clinical signs
 - b. Palpation
 - i. palpation of pulse
 1. rate
 2. rhythm
 3. force
 - ii. tracheal deviation
 1. technique
 2. abnormalities resulting in shift
 - iii. chest symmetry

1. technique
2. paradoxical movement
3. abnormalities resulting in asymmetry
- iv. tactile fremitus
 1. technique
 2. causes of increased and decreased intensity
- v. palpable rhonchi
 1. technique
 2. causes
- vi. crepitation
 1. technique for observing
 2. causes
- vii. causes of tenderness of chest on palpation
- c. Percussion of the thorax
 - i. technique
 - ii. pitch of sound
 - iii. sound transmission through solid, liquid, air
 - iv. determining diaphragmatic excursion
- d. Auscultation
 - i. technique
 - ii. identification of normal breath sounds
 1. bronchial
 2. vesicular
 3. bronchovesicular
 - iii. identification of adventitious sounds
 1. rales
 2. rhonchi/wheezes
 3. pleural friction rub
 - iv. breath sounds correlating to following
 1. atelectasis
 2. pneumonia
 3. pneumothorax
 4. pleural effusion
 5. pulmonary edema
 6. chronic obstructive lung disease
 7. asthma
 8. pulmonary fibrosis
 - v. heart sounds
 - vi. bowel sounds
4. Bedside evaluation of the cardiovascular system
 - a. Vital signs
 - i. temperature
 1. maintenance of thermal balance
 2. heat production
 3. heat dissipation
 4. normal body temperature
 - a. oral temperature
 - b. rectal temperature
 - c. auxiliary temperature
 5. causes of and clinical signs of increased temperature
 6. causes of and clinical signs of decreased temperature
 7. methods of determining temperature
 - ii. pulse
 1. mechanism of pulse
 2. normal, increased, and decreased pulse
 3. abnormalities in rate, rhythm, volume
 4. pulse sites
 5. technique for obtaining pulse
 - iii. respirations

1. definition ventilation vs. respiration
 2. normal respiratory rates
 3. abnormal respiration
 - a. tachypnea
 - b. bradypnea
 - c. hypoventilation
 - d. hyperventilation
 4. abnormal patterns
 - a. apnea
 - b. hyperpnea
 - c. biots
 - d. kussmaul
 - e. cheyne stokes
 - f. orthopnea
 - g. dyspnea
 - h. shortness of breath
 5. technique for obtaining resp. rate
- iv. blood pressure
1. physiology of blood pressure
 2. factors effecting blood pressure
 3. normal, elevated and decreased blood pressure
 4. technique for measurement
 5. types of equipment available
 - a. sphygmomanometer
 - b. aneroid
 - c. mercury
 - d. cuff characteristics
 - e. doppler
- b. EKG testing
- i. testing technique
 1. equipment
 2. electrode placement
 3. 12 lead EKG
 4. basic monitoring
 5. identification of artifact
 - ii. evaluation of normal sinus rhythm
 1. electrocardiograph paper
 2. rate
 - iii. identification of common arrhythmias
 1. premature atrial contractions
 2. premature ventricular contractions
 3. atrial flutter
 4. atrial fibrillation
 5. ventricular tachycardia
 6. ventricular fibrillation
 7. sinus tachycardia
 8. sinus bradycardia
 9. atrioventricular blocks
 10. pacemaker rhythm
 11. paroxysmal supraventricular tachycardia
 12. electro-mechanical dissociation
 - iv. identification of arrhythmias commonly associated with:
 1. hypoxia
 2. hypocarbia
 3. hypercarbia
 4. rapid correction of hypercarbia
 5. hyperkalemia/hypokalemia
 6. hypercalcemia/hypocalcemia

7. excessive lidocaine administration
 8. excessive digitalis administration
 9. excessive aminophylline administration
 10. myocardial infarction
5. Assessment of pulmonary function
- a. Bedside pulmonary function
 - i. basic spirogram review
 - ii. determination of ideal body weight
 - iii. measurement techniques
 1. patient airway
 2. patient position
 3. supplemental equipment
 4. supplemental oxygen therapy
 5. patients on mechanical ventilation
 6. evaluation of work of breathing
 - iv. respiratory rate
 1. normal rate
 2. measurement technique
 - v. tidal volume
 1. predicted normal values
 2. measurement technique
 - vi. minute volume
 1. predicted normal values
 2. measurement technique
 - vii. vital capacity
 1. slow vs. forced VC
 2. predicted normal values
 3. minimal acceptable VC
 4. measurement technique
 - viii. negative inspiratory force
 1. predicted normal values
 2. measurement technique
 - ix. peak flow
 1. predicted normal values
 2. measurement technique
 - x. forced expiratory volume-timed (FEV)
 1. predicted normal values
 2. measurement technique
 - xi. determination of deadspace ventilation
 1. anatomic
 2. physiologic
 - xii. determination of alveolar ventilation
 - xiii. causes and clinical significance of abnormal parameters
 1. respiratory rate
 2. tidal volume
 3. minute ventilation
 4. alveolar ventilation
 5. deadspace ventilation
 6. vital capacity
 7. negative inspiratory force
 8. peak flow
 9. I:E ratio
 10. FEV timed
 - b. Pulmonary function testing in laboratory
 - i. indications for PFT testing
 - ii. testing regimens
 - iii. determination of predicted values
 - iv. lung volumes/capacities

1. spirogram
 - a. lung volumes
 - b. capacities
2. vital capacity
 - a. normal values
 - b. causes of decrease
3. inspiratory capacity
 - a. normal values
 - b. causes of decrease/increase
4. expiratory reserve volume
 - a. normal values
 - b. causes of increase/decrease
5. functional residual capacity
 - a. normal values
 - b. causes of increase/decrease
6. residual volume
 - a. normal values
 - b. causes of increase/decrease
7. total lung capacity
 - a. normal values
 - b. causes of increase/decrease
8. RV/TLC ratio
 - a. normal values
 - b. causes of increase/decrease
- v. pulmonary mechanics tests
 1. forced vital capacity
 - a. description of maneuver
 - b. normal values
 - c. significance of abnormal values
 2. FEV timed
 - a. description of maneuver
 - b. normal values
 - c. significance of abnormal values
 3. FEV timed/FVC ratio
 - a. normal values
 - b. significance of abnormal values
 4. forced expiratory flow 200-1200
 - a. description of maneuver
 - b. normal values
 - c. significance of abnormal values
 5. forced expiratory flow 25%-75%
 - a. description of maneuver
 - b. normal values
 - c. significance of abnormal values
 6. peak flow rate
 - a. description of maneuver
 - b. normal values
 - c. significance of abnormal values
 7. maximum voluntary ventilation
 - a. description of maneuver
 - b. normal values
 - c. significance of abnormal values
 8. flow volume loop
 - a. description of maneuver
 - b. parameters obtained from test
 - c. significance of abnormal loops
- vi. gas distribution and diffusion tests

1. closing volume/capacity
 - a. description of maneuver
 - b. normal values
 - c. significance of abnormal values
2. carbon monoxide diffusing capacity
 - a. description of maneuver
 - b. normal values
 - c. significance of abnormal values
- vii. clinical interpretation of pulmonary function test
 1. obstructive pattern
 2. restrictive pattern
 3. combined pattern
 4. normal pattern
- c. Arterial blood gas (ABG) analysis
 - i. ABG puncture
 1. hazards of punctures
 2. criteria determining puncture site
 3. collection and assembly of equipment
 - a. syringe
 - b. needle
 - c. topical antiseptic
 - d. anticoagulant
 - e. gauze
 - f. cork/cap
 - g. ice
 4. pre-assessment of patient
 - a. physician order
 - b. oxygen concentration
 - c. diagnosis
 - d. vital signs
 - e. anticoagulant therapy
 - f. bleeding abnormalities
 5. technique
 - a. evaluate collateral circulation
 - b. aseptic technique
 - c. palpation of vessel
 - d. positioning of needle
 - e. insertion of needle
 - f. filling of syringe
 - g. withdrawal of needle
 - h. maintenance of sample
 - i. transportation of sample to lab
 - ii. arterial cannulization
 1. indications for insertion
 2. complications of procedure
 3. collection and assembly of equipment
 - a. catheter
 - b. local anesthetic
 - c. skin antisepsis
 - d. flush system
 4. insertion technique
 - a. application of anesthetic
 - b. catheter placement
 - c. securing catheter
 - d. obtaining sample
6. Disease and management
 - a. Idiopathic respiratory distress syndrome (IRDS)
 - i. signs and symptoms
 - ii. treatments

1. CPAP
2. mechanical ventilation
3. surfactant replacement
- iii. prognosis
- b. Acquired immune deficiency syndrome (AIDS)
 - i. signs and symptoms
 - ii. precautions
 - iii. treatments
 - iv. prognosis
- c. Pneumocystis carinii pneumonia (PCP)
 - i. signs and symptoms
 - ii. precautions
 - iii. treatments
 1. oxygen
 2. mechanical ventilation
 3. antibiotic
 4. aerosol
 - a. current respiratory drug(s)
 - b. time element
 - c. risk to practitioners
 - iv. prognosis
- d. Lung cancers
 - i. squamous cell
 1. signs and symptoms
 2. treatments
 3. prognosis
 - ii. adenocarcinoma
 1. signs and symptoms
 2. treatments
 3. prognosis
 - iii. small cell
 1. signs and symptoms
 2. treatments
 3. prognosis
 - iv. large cell
 1. signs and symptoms
 2. treatments
 3. prognosis
- e. Pulmonary edema
 - i. cardiogenic
 1. signs and symptoms
 2. treatments
 - ii. medications
 - iii. oxygenation
 - iv. positive pressure
 1. CPAP
 2. mechanical ventilation
 3. peep
 4. prognosis
 - v. noncardiogenic (ARDS)
 1. signs and symptoms
 2. treatments
 3. prognosis
- f. Pneumoconiosis
 - i. coal worker
 1. signs and symptoms
 2. treatments
 3. prognosis
 - ii. asbestosis

- 1. signs and symptoms
- 2. treatments
- 3. prognosis
- iii. carbon monoxide
 - 1. signs and symptoms
 - 2. treatments
 - 3. prognosis
- g. Thoracic cage abnormalities
 - i. pectus carinatum
 - 1. signs and symptoms
 - 2. treatments
 - 3. prognosis
 - ii. pectus excavatum
 - 1. signs and symptoms
 - 2. treatments
 - 3. prognosis
 - iii. scoliosis
 - 1. signs and symptoms
 - 2. treatments
 - 3. prognosis
 - iv. kyphoscoliosis
 - 1. signs and symptoms
 - 2. treatments
 - 3. prognosis
 - v. flail chest
 - 1. signs and symptoms
 - 2. treatments
 - 3. prognosis
- h. Neuromuscular diseases
 - i. Myasthenia Gravis
 - 1. signs and symptoms
 - 2. treatments
 - 3. prognosis
 - ii. Guillain-Barre Syndrome
 - 1. signs and symptoms
 - 2. treatments
 - 3. prognosis
 - iii. Amyotrophic Lateral Sclerosis (ALS)
 - 1. Signs and symptoms
 - 2. treatments
 - 3. prognosis
- i. Chronic Obstructive Pulmonary Disease (COPD)
 - i. emphysema
 - 1. signs and symptoms
 - 2. treatments
 - 3. prognosis
 - ii. chronic bronchitis
 - 1. signs and symptoms
 - 2. treatments
 - 3. prognosis
 - iii. asthma
 - 1. signs and symptoms
 - 2. treatments
 - 3. prognosis
 - iv. bronchiectasis
 - 1. signs and symptoms
 - 2. treatments
 - 3. prognosis
 - v. cystic fibrosis

1. signs and symptoms
 2. treatments
 3. prognosis
7. Cellular inflammation and repair
- a. Definitions
 - i. exudate
 - ii. transudate
 - iii. chemotaxis
 - iv. phagocytosis
 - v. granuloma
 - vi. abscess
 - b. Inflammation features
 - c. Chemical mediators
 - d. Blood cells
 - e. Healing and regeneration
8. Lung immunology
- a. Definitions
 - i. immunity
 - ii. antigens
 - iii. antibodies
 - iv. immunoglobulins
 - v. T-cells
 - vi. B-cells

Resources

Des Jardins, T. (2020) *Clinical Manifestations of Respiratory Disease*, St. Louis: Mosby.

Kacmarek, R.M. (2017) *Egan's Fundamentals of Respiratory Care*, St. Louis: Elsevier.

Colbert, B.J. (2016) *Integrated Cardiopulmonary Pharmacology*, Redding: BVT.

S. Karpel and A. Linz. (2020) *Linz's Comprehensive Respiratory Disease*, Burlington, MA: Jones & Bartlett Learning.

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