RSPC A185: RESPIRATORY ANATOMY AND PHYSIOLOGY

Item	Value
Curriculum Committee Approval Date	12/02/2020
Top Code	121000 - Respiratory Care/Therapy
Units	3 Total Units
Hours	54 Total Hours (Lecture Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)

Course Description

Anatomy and physiology of the cardiopulmonary system with emphasis on function & clinical assessment by respiratory therapists. Includes pulmonary and cardiac anatomy, pulmonary ventilatory mechanics, pulmonary blood flow, oxygenation transport, hypoxemia and hypoxia, carbon dioxide transport, acid-base balance and regulation of respiration. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Apply knowledge of normal anatomical structures and functions of the pulmonary system in patient assessment including:pulmonary compliance, gas distribution/ventilation, pulmonary circulation, oxygenation, acid/base analysis, and regulation.

Course Objectives

- 1. Describe the anatomical structures of the cardiopulmonary system and identify the functions of each. (SCANS: Information)
- 2. Describe any abnormalities that may occur to cardiopulmonary structures. (SCANS: Information, Thinking)
- 3. Explain the sub-sections of lung ventilation and atmospheric gas concentrations. (SCANS: Information, Thinking)
- 4. Perform calculations relating to atmospheric and cardiopulmonary gas concentrations. (SCANS: Thinking)
- 5. Describe the lung-thorax system, applying principles to clinical situations. (SCANS: Information, Thinking)
- 6. Describe the concepts of airway resistance and pulmonary compliance. (SCANS: Information, Thinking)
- 7. Perform calculations determining and affecting airway resistance and compliance. (SCANS: Thinking)
- 8. List the functions of cardiopulmonary circulation. (SCANS: Information)
- 9. Describe pulmonary intra-vascular pressures and conditions affecting osmotic and hydrostatic pressures. (SCANS: Information, Thinking)
- 10. Explain regional blood and ventilation distributions. (SCANS: Information, Thinking)
- 11. Describe oxygen transport and factors that influence it. (SCANS: Information, Thinking)
- 12. Apply oxygen transport to clinical situations to determine abnormal conditions. (SCANS: Thinking)
- 13. List and define types of hypoxia. (SCANS: Information)
- 14. Describe carbon dioxide transport mechanisms. (SCANS: Information)
- 15. Identify carbon dioxide affects on acid-base balance. (SCANS: Information)
- 16. Interpret acid-base status. (SCANS: Information, Thinking)
- 17. Explain the regulation of respiration and abnormalities that may develop. (SCANS: Information, Thinking)

Lecture Content

Cardiopulmonary anatomy Thoracic cage Structural components Movement Muscles of ventilation Primary muscles Accessory muscles Organs of the thorax Lung gross structure Other organs structure Upper airways Gross anatomy Cellular structure Lower airways Gross anatomy Cellular structure Heart and conduction system Cardiac structure Cardiac function and pressures Innervation Pulmonary ventilation and ventilatory mechanics Ventilation Lung volumes and dead space Dead space and alveolar ventilation Gas properties and alveolar gas equation Ventilatory mechanics Ventilatory movement intrapleural pressures intrapulmonic pressures Elasticity, elastic resistance, compliance La Places law surface tension surfactant Airway (inelastic) resistance Poiseuilles law Laminar and turbulent air flow Obstructive conditions Spirometric application Clinical application Restrictive conditions Spirometric application Clinical conditions Static and dynamic compliance Calculation Clinical application III. Pulmonary blood flow and diffusion Functions of pulmonary circulation Pulmonary intravascular pressures Interstitial and capillary pressures Colloid pressures Hydrostatic pressures Pulmonary vascular resistance Calculation Effects of resistance changes Regional distribution of blood Ventilation/Perfusion conditions Perfusion zones Metabolic functions Oxygenation Oxygen transport Plasma and hemoglobin binding Calculation of oxygen content Arterial-mixed venous content difference Oxyhemoglobin dissociation curve significance of curve shape curve movement factors causing curve shift Hypoxemia and hypoxia Definitions Clinical manifestations Types of hypoxia pulmonary pure hypoventilation mismatching shunt diffusion defect circulatory anemic histotoxic Assessment of hypoxia A-a difference a/A ratio shunt fraction Carbon dioxide transport and acid base interpretation Carbon dioxide transport Plasma transport Erythrocyte transport Carbon dioxide dissociation curve Acid-base conditions Acids and bases Hydrogen ion concentration and pH Buffers and buffer systems Henderson-Hasselbach equation Interpretation of acid-base status Normal conditions Respiratory component Metabolic component Compensation Clinical application Regulation of Respiration Brain controls Cerebral cortex Medulla Pons Chemoreceptors Central Peripheral Other chemoreceptors Hering-Breuer J-receptors Paradoxical reflex

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)

Instructional Techniques

Lecture and application of ideas; problem solving

Reading Assignments

Students will spend 2-3 hours per week reading from assigned course material packet and textbook.

Writing Assignments

Students will spend 1-2 hours per week completing written homework assignments for each unit of the course. Proficiency will be demonstrated by satisfactorily completing assignments with a 75% or better. Students will demonstrate critical thinking skills and apply knowledge of the normal anatomical structures and functions in patient assessment through satisfactory completion of in-class written exams containing anatomical diagrams, short answer questions, and mathematical calculations.

Out-of-class Assignments

Students will spend 1-2 hours per week completing homework assignments for each unit of the course to appy knowledge of the thoracic cage, ventilator mechanics, pulmonary blood flow, oxygenation, and carbon dioxide transport.

Demonstration of Critical Thinking

Homework assignments, written examinations, problem solving exercises

Required Writing, Problem Solving, Skills Demonstration

Written examinations Clinical application of concepts

Eligible Disciplines

Respiratory technologies: Any bachelors degree and two years of professional experience, or any associate degree and six years of professional experience.

Textbooks Resources

1. Required Heuer, Al; Kacmarek, Robert; Stoller, James. Egans Fundamentals of Respiratory Care , 11th ed. Elsevier Health Sciences, 2016 Rationale: -