Western Technical College

10515174 Respiratory / Cardiac Physiology

Course Outcome Summary

Course Information

Description
Provides the student with an in-depth knowledge of the structure and function of the respiratory and circulatory systems necessary to function as a competent Respiratory Therapist.

Career Cluster
Health Science

Instructional Level
Associate Degree Courses

Total Credits
3.00

Total Hours
72.00

Types of Instruction

Instruction Type Credits/Hours
Lecture 2 CR / 36 HR
Lab 1 CR / 36 HR

Course History

Target Population
This course is designed for students enrolled in the Respiratory Therapy program.

Pre/Corequisites

Prerequisite Prerequisite(s): 10806177 General Anatomy and Physiology; 10515170 Respiratory Therapy Survey or 10515111 Respiratory Survey

Textbooks


Core Abilities

1. Apply mathematical concepts.

Status Active
2. **Demonstrate ability to think critically.**
   *Status*  
   *Active*

3. **Demonstrate ability to value self and work ethically with others in a diverse population.**
   *Status*  
   *Active*

4. **Transfer social and natural science theories into practical applications.**
   *Status*  
   *Active*

5. **Use effective communication skills.**
   *Status*  
   *Active*

6. **Use technology effectively.**
   *Status*  
   *Active*

**Program Outcomes**

1. **Apply advanced-level respiratory therapy concepts to patient care situations**  
   *(KNOWLEDGE)*
   *Type*  
   *TSA*  
   *Status*  
   *Active*

   **Criteria**
   1.1. you demonstrate the professional knowledge base required to function effectively as a Respiratory Therapist
   1.2. you demonstrate the general medical knowledge base required to function effectively as a Respiratory Therapist
   1.3. you interpret pertinent information from medical records and physical findings.
   1.4. you recommend appropriate therapeutic interventions based on physiological data and physical findings
   1.5. you make sound clinical judgments

2. **Demonstrate technical proficiency required to fulfill the role of an advanced-level RT**  
   *(SKILLS)*
   *Type*  
   *TSA*  
   *Status*  
   *Active*

   **Criteria**
   2.1. you perform patient assessment
   2.2. you initiate, modify and perform therapeutic procedures and modalities
   2.3. you perform diagnostic procedures

3. **Practice respiratory care according to established professional and ethical standards**  
   *(BEHAVIORS)*
   *Type*  
   *TSA*  
   *Status*  
   *Active*

   **Criteria**
   3.1. you demonstrate effective oral communication skills
   3.2. you demonstrate effective written communication skills
   3.3. you manage time effectively
   3.4. you respect the beliefs and values of all persons, regardless of cultural background, religion, age or lifestyle.

**Course Competencies**

1. **Analyze how components of the pulmonary system function in the body**
   *Domain*  
   *Cognitive*  
   *Level*  
   *Analysis*  
   *Status*  
   *Active*

   **Linked Core Abilities**
   Demonstrate ability to think critically.
   Transfer social and natural science theories into practical applications.
Assessment Strategies
1.1. by developing an analysis (format may be written, oral, graphic, or three-dimensional model)
1.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

Criteria
Criteria: Your performance will be successful when:
1.1. analysis addresses major gross and microscopic anatomical components of the respiratory system
1.2. analysis includes respiratory defense mechanisms and immune response
1.3. analysis identifies the major structural components of the respiratory system
1.4. analysis illustrates the relationships among the components of the respiratory system
1.5. analysis summarizes the functions of the respiratory system and its components
1.6. you use appropriate scientific equipment, methods, and safety precautions

Learning Objectives
1.a. Describe the locations, structures and functions of the organs of the respiratory system
1.b. Describe the mechanics of breathing
1.c. Define respiratory air volumes and capacities
1.d. Explain the mechanism of respiratory control and factors that may influence it
1.e. Investigate components of the respiratory immune response

2. Analyze control of breathing

Linked Core Abilities
Demonstrate ability to think critically.
Transfer social and natural science theories into practical applications.

Assessment Strategies
2.1. by creating an oral, written or graphic representation of control of breathing.
2.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

Criteria
Your performance will be successful when:
2.1. you describe the organization of the central controller
2.2. you describe the normal role of peripheral and central chemo receptors
2.3. you relate the reflexes affecting breathing to the respiratory pattern
2.4. you describe the neurologic adaptations in specific situations (i.e. exercise, metabolic acidosis, hypoxemia, CO2 retention)

Learning Objectives
2.a. Identify the location of the structures that regulate breathing
2.b. Describe how the peripheral and central chemo receptors differ in the way they regulate breathing
2.c. Identify the effect of various reflexes on the respiratory pattern
2.d. Describe how the regulation of breathing in individuals with hypercapnia differs from regulation of breathing in healthy individuals

3. Apply principles of gas transport

Linked Core Abilities
Apply mathematical concepts.
Demonstrate ability to think critically.
Transfer social and natural science theories into practical applications.

Assessment Strategies
3.1. by collecting, organizing and reporting data related to gas transport
3.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)
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Criteria

Your performance will be successful when:

3.1. application includes principles of gas transport
3.2. you generate and label a oxy-hemoglobin dissociation curve and list factors that shift the curve
3.3. application includes how oxygen and carbon dioxide are transported in the blood
3.4. application includes factors affecting gas transport
3.5. you calculate oxygen content of arterial and venous blood
3.6. application includes identification of abnormalities
3.7. application includes a description of the Bohr and Haldane effects

Learning Objectives
3.a. Diagram and label the oxy-hemoglobin dissociation curve and list factors that shift the curve
3.b. Explain how oxygen and carbon dioxide are transported in the blood
3.c. Give examples of factors affecting gas transport
3.d. Calculate oxygen content of arterial and venous blood

4. Apply principles of ventilatory mechanics

Domain Cognitive Level Application Status Active

Linked Core Abilities
Apply mathematical concepts.
Demonstrate ability to think critically.
Demonstrate ability to value self and work ethically with others in a diverse population.
Transfer social and natural science theories into practical applications.
Use effective communication skills.
Use technology effectively.

Assessment Strategies
4.1. by preparing a written response to a case study
4.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

Criteria

Your performance will be successful when:

4.1. application includes pressure/volume relationships of the lung and thorax
4.2. application includes pulmonary mechanics (e.g. volumes, pressures, and flows)
4.3. application includes respiratory monitoring (e.g. rate, tidal volume, minute volume, I:E)
4.4. application includes pulmonary compliance, elastance, airways resistance, work of breathing
4.5. application includes lung volumes and capacities with obstructive and restrictive patterns

Learning Objectives
4.a. Identify the forces that oppose gas movement into and out of the lungs including pulmonary compliance, elastance, and airways resistance
4.b. Describe how the lung and chest wall affect pressure/volume relationships of ventilation
4.c. Perform measurement of pulmonary mechanics including lung volumes, pressures and flows
4.d. Investigate data related to respiratory monitoring such as rate, tidal volume, minute volume, and I:E ratio
4.e. Compare lung volumes and capacities of patients with obstructive and restrictive patterns

5. Analyze how components of the cardiovascular system function in the body

Domain Cognitive Level Analysis Status Active

Linked Core Abilities
Demonstrate ability to think critically.
Transfer social and natural science theories into practical applications.

Assessment Strategies
5.1. by developing an analysis (format may be written, oral, graphic, or three-dimensional model)
5.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

Criteria
Criteria: Your performance will be successful when:

5.1. analysis addresses major gross and microscopic anatomical components of the cardiovascular system
5.2. analysis identifies the major structural components of the cardiovascular system
5.3. analysis illustrates the relationships among the cardiovascular system
5.4. analysis summarizes the functions of the cardiovascular system

Learning Objectives
5.a. Identify the names and locations of the major parts of the heart.
5.b. Explain the function(s) of each of the major parts of the heart.
5.c. Trace the pathway of the blood through the heart and lungs.
5.d. Compare the structures and functions of the major types of blood vessels.
5.e. Describe the mechanisms that aid in returning venous blood to the heart.

6. **Interpret blood gas data**

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**Linked Core Abilities**
- Apply mathematical concepts.
- Demonstrate ability to think critically.
- Demonstrate ability to value self and work ethically with others in a diverse population.
- Transfer social and natural science theories into practical applications.
- Use effective communication skills.
- Use technology effectively.

**Assessment Strategies**
6.1. by analyzing data (format may be oral or written)
6.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

Criteria

Your performance will be successful when:

6.1. you interpret the oxygenation status
6.2. you interpret the ventilation status
6.3. you interpret the acid-base balance
6.4. you identify primary and compensatory mechanisms
6.5. you differentiate between acute and chronic acid-base disturbances
6.6. you differentiate arterial and venous results

Learning Objectives
6.a. Interpret the oxygenation status
6.b. Interpret the ventilation status
6.c. Interpret the acid-base balance
6.d. Identify primary and compensatory mechanisms
6.e. Differentiate between acute and chronic acid-base disturbances
6.f. Differentiate arterial and venous results

7. **Identify normal hemodynamic values of the cardiopulmonary system**

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**Linked Core Abilities**
- Apply mathematical concepts.
- Demonstrate ability to think critically.
- Demonstrate ability to value self and work ethically with others in a diverse population.
- Transfer social and natural science theories into practical applications.
- Use effective communication skills.
- Use technology effectively.

**Assessment Strategies**
7.1. by preparing a written response to a case study
7.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)
Criteria

Your performance will be successful when:

7.1. identification includes cardiac output
7.2. identification includes stroke volume
7.3. identification includes SVR, PVR, CVP, PCWP, and PAP
7.4. identification includes factors that affect blood pressure

Learning Objectives

7.a. Define hemodynamic monitoring
7.b. Calculate cardiac output when given heart rate and stroke volume
7.c. Identify the factors that affect blood pressure
7.d. Calculate systemic vascular resistance when given MAP, CVP, and cardiac output
7.e. Calculate pulmonary vascular resistance when given PAP, PCWP and cardiac output

8. **Identify normal fluid and electrolyte balance values**
   
   **Domain**  Cognitive  **Level**  Evaluation  **Status**  Active

   **Linked Core Abilities**
   Apply mathematical concepts.
   Demonstrate ability to think critically.
   Demonstrate ability to value self and work ethically with others in a diverse population.
   Transfer social and natural science theories into practical applications.
   Use effective communication skills.
   Use technology effectively.

   **Assessment Strategies**
   8.1. by preparing a written response to a case study
   8.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

   **Criteria**

   Your performance will be successful when:

   8.1. identification includes the effects of imbalances in water, sodium, potassium, calcium, chloride, bicarbonate
   8.2. identification includes the major fluid compartments of the body
   8.3. identification includes how the kidney and lung regulate pH
   8.4. identification includes differentiation between cations and anions
   8.5. identification includes calculation of the anion gap
   8.6. identification includes intakes and outputs
   8.7. identification includes relating concepts to cardiopulmonary status

   **Learning Objectives**

   8.a. Identify clinical findings associate with excess of deficiencies in water, sodium, potassium, calcium, chloride, or bicarbonate
   8.b. Identify fluid compartments in the body and what their volumes are
   8.c. Describe how water loss and replacement occur
   8.d. Explain how the kidney and lung regulate pH
   8.e. Differentiate cations and anions
   8.f. Calculate the anion gap
   8.g. Relate electrolyte imbalances to alterations in cardiopulmonary status

9. **Recognize basic single lead rhythm strips**
   
   **Domain**  Cognitive  **Level**  Evaluation  **Status**  Active

   **Linked Core Abilities**
   Apply mathematical concepts.
   Demonstrate ability to think critically.
   Demonstrate ability to value self and work ethically with others in a diverse population.
   Transfer social and natural science theories into practical applications.
   Use effective communication skills.
Use technology effectively.

Assessment Strategies
9.1. by preparing a written or oral response to a case study
9.2. answering questions related to the learning objectives

Criteria

Your performance will be successful when:
9.1. you identify components of an ECG
9.2. you analyze rate and rhythm
9.3. you recognize major dysrhythmias (i.e. asystole, bradycardia, tachycardia, PVC's, VT/VF)

Learning Objectives
9.a. Identify the components of an ECG
9.b. Analyze rate and rhythm of a rhythm strip
9.c. Recognize major dysrhythmias (i.e. asystole, bradycardia, tachycardia, PVC's, VT/VF)