

Course Description**RET2264 | Advanced Modalities and Monitoring | 2.00 credits**

This is an advanced course relating to critical care. Students will learn advanced techniques in invasive and non-invasive monitoring, electrocardiographic monitoring and interpretation, alternatives to conventional ventilation and advanced cardiovascular support systems. Prerequisite RET 2284; corequisite RET 2714.

Course Competencies

Competency 1: The student will describe the requirements for and benefits of pulmonary rehabilitation for a patient with chronic pulmonary disease by:

1. Defining pulmonary rehabilitation
2. Listing the team members who constitute a pulmonary rehabilitation program
3. Comparing intensive programs, maintenance programs, and perioperative programs
4. Identifying candidates for a pulmonary rehabilitation program
5. Describing the components of patient assessment in a comprehensive pulmonary rehabilitation program
6. Describing the role of education in a pulmonary rehabilitation program
7. Discussing the benefits of upper and lower extremity exercise training in a pulmonary rehabilitation program
8. Explaining the guidelines used to prescribe an exercise training program
9. Discussing the roles of the following in a pulmonary rehabilitation program: respiratory therapies, psychological therapies, physical therapy individualized instruction, nutrition counseling, and pharmacologic therapy

Competency 2: The student will describe the effects of nutrition on respiratory function and critical illness by:

1. Discussing the effects of nutritional status on the respiratory system
2. Discussing the effects of nutritional status during critical illness
3. Explaining the principle of nutritional assessment
4. Comparing methods used to estimate nutritional needs
5. Comparing approaches to nutritional support for patients with acute and chronic lung disease
6. Discussing the role of indirect calorimetry in nutrition assessment
7. Describing alternative methods to indirect calorimetry
8. Describing nutrition therapies for acute and chronic lung disease

Competency 3: The student will describe and discuss the clinical importance of hemodynamic monitoring by:

1. Describing the factors that control blood pressure and the dynamics that affect them
2. Identifying the equipment utilized for hemodynamic monitoring
3. Describing the indications for continuous monitoring of arterial blood pressure
4. Describing the pulmonary artery and central venous catheters and their function
5. Describing the normal ranges of arterial blood pressure (systolic and diastolic), central venous blood pressure, pulmonary artery pressure, and pulmonary capillary wedge pressure, and the waveforms each produced during hemodynamic monitoring
6. Describing how various cardiopulmonary diseases present in hemodynamic monitoring
7. Calculating pulse pressure, mean arterial pressure, cardiac output, systemic vascular resistance, and pulmonary vascular resistance
8. Describing the basic principles of Extracorporeal Membrane Oxygenation (ECMO)

Competency 4: The student will describe the purpose, equipment, and monitoring techniques involved in chest drainage systems by:

1. Discussing pathologies/disease processes requiring chest drainage systems
2. Identifying the location/placement of chest tubes for the pathologies/disease processes
3. Identifying and describing the components and operation of the three-bottle chest drainage system
4. Identifying and describing the components and operation of the commercial chest drainage system (wet

and dry)

5. Discussing how a chest drainage system is assessed for proper function
6. Discussing the procedures involved in transporting a patient with a chest tube, trouble-shooting accidental disconnection/ removal, and termination of the chest tube

Competency 5: The student will describe various causes of Ventilator Induced Lung Injury (VILI) and the lung protective strategies used in mechanical ventilation to prevent it by:

1. Defining and discussing barotrauma, its causes and manifestations, and how it is prevented
2. Defining and discussing volutrauma, its causes, and how it is prevented
3. Defining and discussing atelectrauma, its causes, and how it is prevented
4. Defining and discussing biotrauma
5. Defining and discussing oxygen toxicity
6. Discussing various lung protective strategies used in mechanical ventilation

Competency 6: The student will describe interventions utilized in optimizing oxygenation of the mechanically ventilated patient by:

1. Discussing lung recruitment procedures, benefits, and hazards
2. Discussing various types of PEEP titration methods used to improve oxygenation
3. Discussing selective pulmonary vasodilation as a means of improving oxygenation
4. Discussing prone positioning as a means of improving oxygenation

Competency 7: The student will describe the application and advantages and disadvantages of various types of “Closed-Loop Ventilation” by:

1. Defining and discussing the application and advantages/disadvantages of Pressure Regulated Volume Controlled Ventilation (PRVC)
2. Defining and discussing the application and advantages/disadvantages of Adaptive Pressure Ventilation (APV)
3. Defining and discussing the application and advantages/disadvantages of Volume Support Ventilation (VSV)
4. Defining and discussing the application and advantages/disadvantages of Volume- Assured Pressure Support (VAPS)
5. Defining and discussing the application, management, and advantages/ disadvantages of Airway Pressure Release Ventilation (APRV)

Competency 8: The student will describe the initiation and management of High-Frequency Oscillation Ventilation (HFOV) by:

1. Defining HFOV
2. Discussing HFOV as a lung protective strategy
3. Describing the various controls utilized on HFOV and their function
4. Discussing the indication and exclusion criteria for HFOV
5. Discussing the initial settings utilized for adult HFOV
6. Discussing assessment of effectiveness when using HFOV

Competency 9: The student will describe the initiation and management of Airway Pressure Release Ventilation (APRV) by:

1. Defining APRV
2. Discussing APRV as a lung protective strategy
3. Describing the various controls utilized on APRV and their function
4. Discussing the indication and exclusion criteria for APRV
5. Discussing the initial settings utilized for adult APRV
6. Discussing assessment of effectiveness when using APRV

Learning Outcomes:

- Communicate effectively using listening, speaking, reading, and writing skills

- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information