# RSPC A190: BASIC RESPIRATORY CARE EQUIPMENT

| Item | Value |
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| Curriculum Committee Approval Date | 12/02/2020 |
| Top Code | 121000 - Respiratory Care/Therapy |
| Units | 3 Total Units |
| Hours | 90 Total Hours (Lecture Hours 36; Lab Hours 54) |
| Total Outside of Class Hours | 0 |
| Course Credit Status | Credit: Degree Applicable (D) |
| Material Fee | Yes |
| Basic Skills | Not Basic Skills (N) |
| Repeatable | No |
| Grading Policy | Standard Letter (S) |

## Course Description

Theories of equipment operation, procedures, and use for treatment of cardiopulmonary disease, including the use of humidity and aerosol, oxygen, infection control, hyperinflation techniques, basic ventilatory measurement, respirators, chest physiotherapy, and equipment related to compressed gases. Emphasis is placed on clinical application of equipment & techniques. COREQUISITE: RSPC A185 and RSPC A195. Transfer Credit: CSU.

## Course Level Student Learning Outcome(s)

1. Describe and apply assessment techniques and therapeutic modalities to patients being able to determine correct equipment, application, hazards, alternatives, and techniques.

## Course Objectives

- 1. Describe the physiological process causing retained pulmonary secretions.
- 2. Explain the concept and methods of administering humidity therapy.
- 3. Describe the concept of aerosol therapy and the equipment used to deliver it.
- 4. Apply the clinical indications and goals, hazards and methods of humidity and aerosol therapy.
- 5. Explain the concept of hyperinflation technique and its physiological effects.
- 6. Explain the methods of obtaining basic spirometric measurements and their use in clinical situations.
- 7. Perform basic beside spirometric measurements in the laboratory.
- 8. Describe the theory and relationship of pressure/volume/and time as used in IPPB.
- 9. Apply IPPB theory to patient situations and perform IPPB therapy in the laboratory setting.
- 10. Explain the theory and techniques of chest physiotherapy.
- 11. Perform chest physiotherapy in the laboratory setting.
- 12. Describe the indications, and hazards of oxygen therapy.
- 13. Explain the types of oxygen delivery systems applying the correct type of oxygen device for given clinical situations.
- 14. Describe the purpose and use of carbogen and heliox gases.
- 15. Explain the principle of operation and application of various types of oxygen analyzers.
- 16. Perform oxygen analysis in the laboratory.
- 17. Apply the basic principles of infection control to the clinical setting.
- 18. List common respiratory tract pathogens.
- 19. Describe the proper equipment processing and handling for infection control.
- 20. List and describe types of isolation and precaution taken.
- 21. Explain types of bacterial surveillance through culturing.
- 22. Describe and apply the gas laws to clinical situation.
- 23. Describe the physical properties of medical gases.
- 24. State the regulatory agencies, applying rules of those agencies to the use and storage of medical gases.
- 25. Calculate gas usage.
- 26. Describe the use and markings of compressed gas cylinders.
- 27. Describe the types and usage of regulators and flowmeters.

## Lecture Content

Humidity and Aerosol Therapy Retained secretions alterations in normal physiology physiological effects Humidity therapy concepts of humidity versus aerosol calculations of humidity absolute humidity relative humidity humidity deficit water vapor pressure dewpoint operation of humidifiers indications and hazards of humidity therapy Aerosol therapy goals of aerosol therapy particle deposition and penetration administration of aerosol therapy types of aerosol generators atomizers pneumatic nebulizers ultrasonic nebulizers inhalers valved holding chambers Incentive Spirometers Purpose of hyperinflation techniques Incentive spirometry method of administration types of devices volume oriented flow oriented Ventilatory measurements types of spirometers Vane type spirometers Bourns LS-75 Bag type spirometers pneumotach types Peak flow meters Technique Long term monitoring measurements taken optimal measurement application to patient condition Intermittent Positive Pressure Breathing Definition Lung-thorax pressure changes Pressure/volume/time relationship effects on blood flow Hazards Method of administration Adjusting the respirator Monitoring and coaching the pt. Determining effectiveness Airway Clearance and Lung Expansion Chest physiotherapy Goals of physiotherapy Postural drainage Positions used Effectiveness Percussion Hand technique Hand utilized equipment Electromechanical devices Vibration Hand technique Patient breathing procedure Modifications to therapy Hazards Cough procedures Huff cough Staccato cough Quad cough Mechanical Devices High frequency chest wall oscillation Vibratory PEP IPV Insufflation / Exsufflation device Oxygen administration Application of oxygen Clinical indications Hazards Methods of determining effectiveness Oxygen delivery devices Low flow devices Simple masks Nasal cannulas Non and partial re-breathing masks Reservoir devices High flow devices Venturi masks Other ve nturi devices Blender systems Nasal cannula Oxygen Analyzers Principles and use of oxygen analyzers Polarographic Galvanic cell Techniques and performance of oxygen analysis Infection control Hospital infection control Definition of terms Epidemiology Handwashing Microbiology for respiratory therapy Equipment handling and processing Facilities design Gross decontamination Disinfection and sterilization techniques Autoclave Ethylene oxide Chemical agents Monitoring effectiveness of

sterilization  Indicators  Proper handling Isolation techniques Universal Precautions Droplet Isolation Airborne Isolation Contact Isolation Reverse Isolation Bacterial surveillance Microbial growth and spread Culturing techniques Compressed gases Gas laws Boyles Law Charles law Gay-Lussacs law Henrys law Chemical and physical properties of medical gases Regulatory agencies USP NFPA CGA DOT  Gas storage Cylinders Color code Cylinder sizes Cylinder codes Liquid systems Calculations of gas usage Compressed gases Liquid systems Regulators and flowmeters Regulators Safety systems Stages Adjustable or preset Flowmeters Bourdon type Thorpe tube type Specialty Gases Heliox Carbogen

## Lab Content

Complete weekly lab assignments and/or practice patient case studies pertaining to content identified in the course objectives. Humidity Aerosol Therapy Incentive Spirometry Ventilatory Measurements IPPB Airway Clearance and Lung Expansion O2 administration Infection Control Compressed Gases Practice, perform and document basic Respiratory assessment as it pertains to the patient. Breath sounds Pulse oximetry Heart Rate Respiratory Rate Work of breathing Practice, successfully comeplete required skill check-offs, and document therapies. Incentive Spirometry Hand Held Nebulizer Metered Dose Inhaler Oxygen Therapy Chest Physiotherapy E-cylinder

## Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- Lab (04)
- DE Live Online Lab (04S)

## Instructional Techniques

Lecture and application of ideas Demonstration of techniques Laboratory Paired and small group exercises with instructor feedback Case Studies Clinical Simulation Roll playing

## Reading Assignments

Students will spend 3-4 hours weekly reading chapters assigned from texts and related primary/secondary source material per week.

## Writing Assignments

Students will spend 2-3 hours weekly completing written homework assignments in the following content areas:  Humidity, Aerosol therapy, Oxygen therapy, Airway clearance / Lung Expansion, and Medical Gases.  Written technical examinations consisting of unit exams, a midterm, a comprehensive final exam and lab practicum.

## Out-of-class Assignments

Students will spend 3 hours weekly completing written homework assignments and a group research project. Homework assignments will be completed pertaining to the following content areas:  Humidity, Aerosol therapy, Oxygen therapy, Airway clearance/ Lung Expansion, and Medical Gases.  Students will also complete a group research project identifying and describing the eitologies, pathologies, and manifestations of common Respiratory diseases.  It will also include the appropriate treatment and care of these patients as it pertains to the therapies learned and practiced within the class/lab. The group findings will be orally presented.

## Demonstration of Critical Thinking

Student skills performance, homework assignments; content-based technical examinations

## Required Writing, Problem Solving, Skills Demonstration

Homework assignments; content-based technical examinations

## 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 Kacmarek, R. Egans Fundamentals of Respiratory Care, 10th ed. St. Louis: Elsevier Mosby, 2013 Rationale: -