Course Description

Prerequisites: RSP-226. Co-requisites: RSP-231 and RSP-240

Course Description: This course provides the student with advance skills necessary to manage the intensive care patient. Students will learning to evaluate, monitor, and use protocols to provide advance management therapies based on pathophysiology of the critically ill patient. The laboratory portion of this course will reflect the practical application of the topics presented in lecture.

Student Learning Objectives: As a result of meeting the requirements in this course:

UNIT ONE – Indications for Ventilatory Support

Goal: The student will identify the indications and objectives of mechanical ventilation; measure and assess the parameters of respiratory insufficiency and failure; identify and describe the pathophysiological mechanisms causing alterations in pulmonary function.

1. Differentiate between the following clinical terms:
   1.1. Respiratory failure (acute/chronic)
   1.2. Respiratory insufficiency
   1.3. Ventilatory failure
   1.4. Ventilatory insufficiency

2. Differentiate between the pathophysiological mechanisms and clinical management of respiratory failure with/without hypercapnia: be able to identify respiratory and non-respiratory causes of alveolar hypoventilation and be able to describe the various clinical courses of arterial hypoxemia and tissue hypoxia.

3. Describe the etiology and clinical manifestations of acute respiratory failure with/without hypercapnia.

4. Identify, measure, and assess the following categories of pulmonary function:
   4.1. Oxygenation
   4.2. Mechanics
   4.3. Ventilation, and
4.4. Related measured parameters to the proper clinical management of patients with acute or impending respiratory failure.

5. Explain clinical and laboratory criteria for weaning the patient from continuous mechanical ventilation.

6. Define the rationale and objectives of mechanical ventilation in each of the following categories of disease states potentially cause respiratory failure. The respiratory conditions including but not limited to:
   6.1. COPD, restrictive conditions of the lungs and thorax, pulmonary infections, flail chest and other traumas including surgeries.
   6.2. Cardiovascular conditions: pulmonary edema, shock, disseminating intravascular coagulation.
   6.3. Central Nervous System (CNS) and neuromuscular conditions including cerebral trauma and edema, brain stem injuries, drug intoxication, CVA, tetanus and botulism, neuropathies, and myopathies.
   6.4. Multiple organ failures: renal failure, GI disorders-pancreatitis, abdominal distention, and thermal injuries.

7. Describe the common complications of acute and chronic respiratory failure.

8. Identify some of the psychological and philosophical implications of respiratory care, critical care, organ system support and life prolongation measures, and relate this to patient therapist interaction.

UNIT TWO – Physiology Artificial Ventilation

Goal: By identifying some of the physiological aspects affecting volume exchange, the student will be able to differentiate between spontaneous ventilation and assisted ventilation; the student will identify the harmful effects of mechanical ventilation and demonstrate an ability to minimize or avoid the harmful effects of mechanical ventilation.

1. Differentiate between spontaneous ventilation, assisted, assist/control, controlled, pressure control ventilation, pressure support, intermittent mandatory ventilation, and noninvasive ventilation.

2. Define by words or graphs the following terms:
   2.1. PEEP
   2.2. PLVC
   2.3. SIMV
   2.4. PCV
   2.5. APRV
   2.6. CPAP
   2.7. BiPAP
   2.8. Bi-Level
   2.9. PS
   2.10. Exp. Resistance
   2.11. Insp. Plateau

3. Describe the physiological factors affecting volume exchange including lung-thorax compliance and airway resistance.

4. Calculate:
   4.1. Breathing frequency
   4.2. % inspiratory time
   4.3. % expiratory time
   4.4. I:E ratio
   4.5. Liters/minute
   4.6. Tidal volume
   4.7. Minute volume

5. Differentiate between changes in alveolar (intrapulmonary) and intrathoracic (intrapleural) pressure during spontaneous ventilation, continuous positive pressure breathing, and intermittent positive pressure breathing by using a graph of pressure vs. time.

6. Describe the causes and clinical signs of the following harmful effects of positive pressure ventilation:
6.1. Cardiovascular effect
6.2. Barotrauma
6.3. Effect on gas distribution
6.4. Effect on renal function and fluid balance
6.5. Metabolic effects
6.6. Cerebral vascular effects
6.7. Oxygen toxicity
7. Discuss in physiological terms means of reducing mean intrapulmonary and intrathoracic pressure during mechanical ventilation.
8. Demonstrate your ability to know when/when not to utilize various modes/techniques (respiratory rates, % Insp. Time, I:E ratio, flow rates, pressure control, pressure support, PEEP, SIMV,) to reduce mean intrapulmonary/thoracic pressure.

UNIT THREE – Management of Mechanically Ventilated Patients
Goal: The student will demonstrate proficiency in estimating the ventilation and oxygen requirements of patients requiring mechanical ventilation. The student will be proficient in physical assessment, basic and advanced cardiopulmonary monitoring techniques, and in the evaluation of pertinent laboratory data. The student will apply this information to the proper and safe management of the patient.
1. Identify essential safety principles to be utilized whenever mechanical ventilation is instituted.
2. Estimate the patients ventilatory and oxygenation requirements utilizing the following:
   2.1. Body-weight formula
   2.2. FIO2 estimate equation
3. Be able to correctly alter the parameters of ventilation and oxygenation according to proper therapeutic standards.
4. List the clinical and physiologic techniques utilized in the monitoring of patients being controlled during mechanical ventilation.
5. Describe the common complications associated with mechanical ventilation and the treatment of acute and chronic respiratory failure including:
   5.1. Cardiovascular complications
   5.2. Gastrointestinal complications
   5.3. Electrolyte and fluid abnormalities
   5.4. Neurological complications
   5.5. Pulmonary complications
6. Demonstrate proficiency in the physical evaluation of patients relative to the initiation, maintenance, and liberation of various therapeutic mechanical ventilation modalities.
7. Demonstrate competency in the monitoring of the following parameters on patients being mechanically ventilated:
   7.1. Temperature of inspired gas
   7.2. Specific alarm systems
   7.3. Oxygen concentrations
   7.4. Tidal volume
   7.5. Respiratory rates
   7.6. Flow rates
   7.7. I:E ratios
8. Describe the clinical normal and significance of the following laboratory tests relative to the management of the patient.
   8.1. ABG’s
   8.2. WBC and differential
   8.3. Mixed venous blood gases
   8.4. RBC
   8.5. Hematocrit and hemoglobin
   8.6. Serum electrolytes:
      8.6.1. Na+
      8.6.2. K+
      8.6.3. Cl−
8.6.4. Ca
8.7. Serum protein
8.8. Cardiac enzymes
8.9. BUN, Creatinine
8.10. Lactic acid
8.11. Bilirubin

9. Describe the physiologic rationale, goals, definitions, methods of application, indications, contraindications, and complications of PEEP, CPAP, PS, PCV, PRVC, A/C, BiPAP, Bi-level, APRV, and SIMV demonstrate proficiency in its application and utilization.

10. Describe the physiological and psychological prerequisites to restoration of spontaneous ventilation from a period of mechanical ventilation; demonstrate your ability to properly:
   10.1. Prepare and evaluate the patient
   10.2. Establish a weaning schedule
   10.3. Utilize the appropriate weaning modes
   10.4. Evaluate weaning procedure
   10.5. Provide the appropriate follow-up when weaning list and describe the advantages and the disadvantages of various weaning techniques.
   10.6. How to assess the patient for extubation
   10.7. Explain why some patients cannot be weaned

11. List hazards and complications associated with mechanical ventilation and demonstrate the appropriate steps that can be initiated to prevent these hazards and complications.

12. List and explain the various weaning methods and procedures (PS, SIMV, CPAP, and BiPAP).

13. Explain and demonstrate correct procedures for the cleaning, calibration, and sterilization of equipment used with mechanical ventilators.

14. Describe the procedure, methods, and reasons for obtaining dynamic and static compliance.

15. Explain how to troubleshoot the patient-ventilator system.

UNIT FOUR – Protocols in the ICU

Goal: The student will demonstrate proficiency in developing useful and proper protocols in the intensive care environment. The student will apply this information to the patient’s pathophysiologic condition to result in proper and safe management.

1. Explain methods used for monitoring the quality of respiratory care
2. Explain how respiratory care protocols enhance the quality of respiratory care services
3. Describe evidence-based medicine
4. Explain how evidence-based protocols improve outcomes
5. Describes the methods for preparing an RC protocol
6. Develop a model models of protocols in use in hospitals
7. Explain the benefits of disease specific protocols
   7.1. ARDS-Net
   7.2. Ventilator Associated Pneumonia

UNIT FIVE – Advance Management Strategies

1. Explain and describe the procedure for performing lung recruitment maneuvers.
2. Explain and define the uses for inhaled nitric oxide.
3. Explain and describe adult high frequency oscillation ventilation.

Course Content

This course will be presented and delivered in a formal lecture with student discussions, selected multimedia aids, and guest speakers. The laboratory sessions will utilize exercises and computer simulation problems.

Special Features of the Course

MoodleRooms is used to enhance the interaction with the student.

The course will utilize a laboratory sessions to practically apply the knowledge obtained through lecture sessions.
Course Texts


Research, Writing, and Examination Requirements

**Student Topic Presentation:** Each student will present a comprehensive small group problem-solving case study activity. The activity will be a patient the group provided invasive or non-invasive respiratory care during their clinical experience. Details with response questions, scoring rubric, and schedule are posted on Moodle.

**Examinations:** The course will have 4 quizzes covering the units presented during class. All quizzes will consist of multiple-choice format, matching, true-false, or short-answer essay type questions. The laboratory exams will be a practical evaluation that requires higher-level critical thinking skills. The final exam for both lecture and laboratory will be a comprehensive evaluation.

Means of Assessment

Students will be assessed in the following methods: Quizzes and final exam will consists of short answer, fill-in, matching, multiple choice, or true-false questions based on select units readings and class presentations. All quizzes and final exam will be conducted through Moodle Rooms.

Grading Policy

<table>
<thead>
<tr>
<th>Grade Determinations</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Quizzes (4)</td>
<td>40%</td>
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<tr>
<td>Final comprehensive examination</td>
<td>20%</td>
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<tr>
<td>Oral Presentation</td>
<td>10%</td>
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<tr>
<td>Laboratory grade</td>
<td>30%</td>
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**Laboratory Grading:**

| Exam 1 and 2                              | 60%        |
| Comprehensive final examination           | 40%        |

**Grading Scale:**

- **A** Student must demonstrate superior work; excel to contribute positively to class discussions and demonstrated skills. 92-100
- **B+** Student must merit excellent work; contribute to class discussions and demonstrated skills 86-91.9
- **B** Student must show above average work and an above average standard of achievement 80-85.9
- **C+** Student must meet and attain a standard of achievement with reasonable theoretical knowledge and demonstrated skills 75-79.9
- **F** Student fails to meet acceptable standards and skills <75
- **N** Incomplete: Student has not completed course requirements

Late work or Assignments:
Late work and make-up examinations, including laboratory, will be penalized with a grade being no greater than 75%. Late work and examinations must be completed before the last scheduled class day.
Attendance Policy

BCC Attendance Policy:
All students are expected to attend punctually every scheduled meeting of each course in which they are registered. Attendance and lateness policies and sanctions are to be determined by the instructor for each section of each course. These will be established in writing on the individual course outline. The instructor will be keep attendance for administrative and counseling purposes. Class attendance and student participation are essential to successful completion of this course.

Course Attendance Policy:
It is expected that students will attend all class meetings. Poor attendance will affect your grade. If a student misses five or more classes throughout the semester, the student will not earn a grade higher than a ‘B’ in the course. Four lateness’s equal one absence; class days when tests are held are included as classes. Illness, accidents, family, and business emergencies sometimes occur; therefore, it befits everyone to anticipate these emergencies by being in class routinely. (If you are late, be sure to see the Professor that class so as not the lateness be counted as an absence.)

Departmental Policy Statements

1. Acceptable quality of work and mature behavior are expected from every student at all times. Students are regarded as professionals and are expected to conduct themselves accordingly.
2. High standards of professional performance demand that students maintain good academic progress throughout their course of study in the program.
3. Students demonstrating chronic tardiness or absenteeism will be placed on academic warning or probation, and may be subjected to termination from the program.
4. Absence from a class during a scheduled exam will be subject to the policy of the instructor for that specific course. If the student is going to miss a scheduled exam, it is expected that the student will contact the instructor ahead of time by e-mail or phone to the department office.
5. All students are required to adhere to the policies and procedures of the school as outlined in the college catalogue.

Student and Faculty Support Services

1. The program faculty maintains office hours for counseling and is available to provide tutorial assistance to students.
2. Students must make appointments in advance to meet with the respective instructors.
3. Students may also obtain assistance from the College Tutoring Center. Appointments must be made in advance through this center.
4. The College has a personal counseling center for those students who may need personal assistance. Appointments are made directly through this center.
5. Any problems, concerns, or questions should be directed to the course instructor or the student’s advisor.
6. Statement on Civility
   a. Refer to the Standards of Conduct Subsection found in the Student Judicial Affairs Policies & Procedures Section found in the Student Handbook.
7. Academic Integrity
   a. Refer to the Academic Integrity Subsection; found in the Academic Regulations, Academic Policies Section found in the Academic Policies & Regulations Area of the College Catalog
8. Other possible College, Divisional, and/or Departmental Policy Statements to be referenced
   a. ADA statement.
      i. Students with documented disabilities who require accommodations by the American with Disabilities Act (ADA) can request support services from the Office of Specialized Service of Bergen Community College located in room L-115 of the Pitkin Learning Center.
         http://www.bergen.edu/Pages1/Pages/5175.aspx
b. Sexual Harassment statement.
c. Statement on acceptable use of BCC technology.
d. Statement on the purpose and value of faculty office hours.

9. Student and Faculty Support Services
   a. List support services, e.g., the Writing Center, the Math Lab, the Tutorial Center, Online Writing Lab (OWL), Office of Specialized Services, etc.

10. BCC Library
   a. The Sidney Silverman Library is committed to providing a quiet, welcoming, respectful atmosphere conducive to study and research in an environment that is comfortable, clean, and safe. The use of the library will be beneficial in providing resources on researching topic information, citation styles, finding current articles among many other media services available.

### Weekly Schedule

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<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Reading</th>
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| Sept 3 & 8 | • Indications for Ventilatory Support      | • Egan – Respiratory Failure and the Need for Ventilatory Support  
|            |                                            | • Egan – Discontinuing Ventilatory Support        |
| Sept 10 & 15 | • Continued                                               |                                                   |
| Sept 17 & 22 | Quiz 1  
|             | • Introduction to Artificial Ventilation             |                                                   |
| Sept 24 & 29 | • Continued                                              |                                                   |
| Oct 1 & 6  | Quiz 2  
|             | • Introduction to Management                           | • Egan – Physiology of Ventilatory Support       |
|             |                                            | • P&P – Mechanical Ventilators: Classification and Principles of Operation |
| Oct 8 & 13 | • Management of Mechanically Ventilated Patients       | • Egan – Initiating and Adjusting Invasive Ventilatory Support  
|            |                                            | • P&P – Mechanical Ventilation                     |
| Oct 15 & 20 | • Continued                                              |                                                   |
| Oct 22 & 27 | • Case presentations / discussion                    |                                                   |
| Oct 29 & Nov 3 | Quiz 3  
<p>|            | • Introduction to Protocols                           |                                                   |</p>
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<thead>
<tr>
<th>Date</th>
<th>Activity</th>
<th>Reading Material</th>
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<tbody>
<tr>
<td>Nov 5 &amp; 10</td>
<td>Protocols in the ICU</td>
<td>Egan – Quality and Evidence-Based Respiratory Care</td>
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<td>P&amp;P – Mechanical Ventilation</td>
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<td>Nov 12 &amp; 17</td>
<td>Health Care in Suburbia – special program</td>
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<td>Case presentations / discussion</td>
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<td>Nov 19 &amp; 24</td>
<td>Quiz 4</td>
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<td></td>
<td>Introduction to Strategies</td>
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<tr>
<td>Dec 1 &amp; 3</td>
<td>Advance Management Strategies</td>
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<td>P&amp;P – Mechanical Ventilation</td>
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<td>Dec 8 &amp; 10</td>
<td>Case presentations / discussion</td>
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<tr>
<td>Dec 15 &amp; 17</td>
<td>Final examination</td>
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**Note to Students:** This course outline is tentative and subject to change, depending upon the progress of the class.