RESP-2310: MECHANICAL VENTILATION

Cuyahoga Community College

Viewing: RESP-2310: Mechanical Ventilation

Board of Trustees:
2015-12-03

Academic Term:
2016-08-22

Subject Code
RESP - Respiratory Care

Course Number:
2310

Title:
Mechanical Ventilation

Catalog Description:
Theory and application of mechanical ventilation techniques with emphasis on mechanical ventilator characteristics, physiologic effects, patient set-up and evaluation, maintenance of oxygenation, weaning techniques, ventilation safety and nutritional concerns. Discussion on ventilator management and the medicolegal issues involving life support systems.

Credit Hour(s):
4

Lecture Hour(s):
3

Lab Hour(s):
3

Other Hour(s):
0

Requisites

Prerequisite and Corequisite
RESP-2210 Introduction to Mechanical Ventilation, and concurrent enrollment in RESP-2950 Respiratory Care Field Experience II.

I. ACADEMIC CREDIT

Academic Credit According to the Ohio Department of Higher Education, one (1) semester hour of college credit will be awarded for each lecture hour. Students will be expected to work on out-of-class assignments on a regular basis which, over the length of the course, would normally average two hours of out-of-class study for each hour of formal class activity. For laboratory hours, one (1) credit shall be awarded for a minimum of three laboratory hours in a standard week for which little or no out-of-class study is required since three hours will be in the lab (i.e. Laboratory 03 hours). Whereas, one (1) credit shall be awarded for a minimum of two laboratory hours in a standard week, if supplemented by out-of-class assignments which would normally average one hour of out-of-class study preparing for or following up the laboratory experience (i.e. Laboratory 02 hours). Credit is also awarded for other hours such as directed practice, practicum, cooperative work experience, and field experience. The number of hours required to receive credit is listed under Other Hours on the syllabus. The number of credit hours for lecture, lab and other hours are listed at the beginning of the syllabus. Make sure you can prioritize your time accordingly. Proper planning, prioritization and dedication will enhance your success in this course.
The standard expectation for an online course is that you will spend 3 hours per week for each credit hour.

II. ACCESSIBILITY STATEMENT

If you need any special course adaptations or accommodations because of a documented disability, please notify your instructor within a reasonable length of time, preferably the first week of the term with formal notice of that need (i.e. an official letter from the Student Accessibility Services (SAS) office). Accommodations will not be made retroactively.
For specific information pertaining to ADA accommodation, please contact your campus SAS office or visit online at http://www.tri-c.edu/accessprograms. Blackboard accessibility information is available at http://access.blackboard.com.
Eastern (216) 987-2052 - Voice
Metropolitan (216) 987-4344 – Voice. (216) 987-4048 – TTY.
Western (216) 987-5079 – Voice. (216) 987-5117 – TTY.
Westshore (216) 987-3900 – Voice. (216) 987-4048 – TTY.
Brunswick (216) 987-5079 – Voice. (216) 987-5117 – TTY.
Off-Site (216) 987-5079 - Voice

III. ATTENDANCE TRACKING

Regular class attendance is expected. Tri-C is required by law to verify the enrollment of students who participate in federal Title IV student aid programs and/or who receive educational benefits through other funding sources. Eligibility for federal student financial aid is based in part on enrollment status.

Students who do not attend classes for the entire term are required to withdraw from the course(s). Additionally, students who withdraw from a course or stop attending class without officially withdrawing may be required to return all or a portion of their financial aid based on the date of last attendance. Students who do not attend the full session are responsible for withdrawing from the course(s).

Tri-C is responsible for identifying students who have not attended a course before financial aid funds can be applied to students’ accounts.

Therefore, attendance is recorded in the following ways:

- For in-person and blended-learning courses, students are required to attend the course by the 15th day of the semester (or equivalent for terms shorter than five weeks) to be considered attending. Students who have not met all attendance requirements for in-person and blended courses, as described herein, within the first two weeks or equivalent, will be considered not attending.
- For online courses, students are required to login at least two times per week and submit one assignment per week for the first two weeks of the semester, or equivalent to the 15th day of the term. Students who have not met all attendance requirements for online courses, as described herein, within the first two weeks or equivalent, will be considered not attending.

At the conclusion of the first two weeks of a semester or equivalent, instructors report any registered students who have "Never Attended" a course. Those students will be administratively withdrawn from that course. However, after the time period in the previous paragraphs, if a student stops attending a class or wants or needs to withdraw, for any reason, it is the student’s responsibility to take action to withdraw from the course. Students must complete and submit the appropriate Tri-C form by the established withdrawal deadline.

Tri-C is required to ensure that students receive financial aid only for courses that they attend and complete. Students reported for not attending at least one of their registered courses will have all financial aid funds held until confirmation of attendance in registered courses has been verified. Students who fail to complete at least one course may be required to repay all or a portion of their federal financial aid funds and may be ineligible to receive future federal financial aid awards. Students who withdraw from classes prior to completing more than 60 percent of their enrolled class time may be subject to the required federal refund policy.

If illness or emergency should necessitate a brief absence from class, students should confer with instructors upon their return. Students having problems with coursework due to a prolonged absence should confer with the instructor or a counselor.

IV. LEARNING OUTCOMES ASSESSMENT

Occasionally, in addition to submitting assignments to their instructors for evaluation and a grade, students will also be asked to submit completed assignments, called ‘artifacts,’ for assessment of course and program outcomes and the College’s Essential Learning Outcomes (ELOs). The artifacts will be submitted in Blackboard or a similar technology. The level of mastery of the outcome demonstrated by the artifact DOES NOT affect the student’s grade or academic record in any way. However, some instructors require that students submit their artifact before receiving their final grade. Some artifacts will be randomly selected for assessment, which will help determine improvements and support needed to further student success. If you have any questions, please feel free to speak with your instructor or contact the Learning Outcomes Assessment office.

V. CONCEALED CARRY STATEMENT

College policy prohibits the possession of weapons on college property by students, faculty and staff, unless specifically approved in advance as a job-related requirement (i.e., Tri-C campus police officers) or, in accordance with Ohio law, secured in a parked vehicle in a designated parking area only by an individual in possession of a valid conceal carry permit.

As a Tri-C student, your behavior on campus must comply with the student code of conduct which is available on page 29 within the Tri-C student handbook, available at http://www.tri-c.edu/student-resources/documents/studenthandbook.pdf. You must also comply with the College’s Zero Tolerance for Violence on College Property available at http://www.tri-c.edu/policies-and-procedures/documents/3354-1-20-10-zero-tolerance-for-violence-policy.pdf

Outcomes

Course Outcome(s):
1. Demonstrate accurate and safe setup of both invasive and non-invasive mechanical ventilators to a patient’s specific pulmonary disease.
Objective(s):
1. C. Utilize technical knowledge of various devices and methods to maintain adequate arterial oxygenation and tissue perfusion.
2. D. Discuss the various responses to complications, both physiologic and mechanical, associated with mechanical and supportive ventilation methods and devices.
3. G. Discuss the most appropriate and current ventilator management approach to patients exhibiting acute respiratory failure.
4. H. Discuss current concepts specific to the medicolegal issues involved in withholding and discontinuing life-support systems.

Course Outcome(s):
10. Analyze ways in which ventilator associated pneumonia can be minimized.

Objective(s):
1. D. Discuss the various responses to complications, both physiologic and mechanical, associated with mechanical and supportive ventilation methods and devices.
2. G. Discuss the most appropriate and current ventilator management approach to patients exhibiting acute respiratory failure.

Course Outcome(s):
2. Illustrate conditions required for mechanical ventilation, including pulmonary mechanics, cardiovascular status, and type of respiratory failure.

Objective(s):
1. A. Demonstrate accurate set up of both invasive and non-invasive mechanical ventilators to a patient’s specific pulmonary disease using appropriate volumes, rates, flows, and alarm settings. B.
2. G. Discuss the most appropriate and current ventilator management approach to patients exhibiting acute respiratory failure.

Course Outcome(s):
3. Examine the effects of positive pressure on major organ systems, and minimize the risk of decreased cardiac output.

Objective(s):
1. B. Utilize patient information and technical knowledge of mechanical ventilation to initiate and maintain ventilatory support in a variety of pulmonary disorders.
2. D. Discuss the various responses to complications, both physiologic and mechanical, associated with mechanical and supportive ventilation methods and devices.

Course Outcome(s):
4. Relate operational triads as they affect mean airway pressure, and patient synchrony.

Objective(s):
1. B. Utilize patient information and technical knowledge of mechanical ventilation to initiate and maintain ventilatory support in a variety of pulmonary disorders.
2. D. Discuss the various responses to complications, both physiologic and mechanical, associated with mechanical and supportive ventilation methods and devices.

Course Outcome(s):
5. Interpret patient data as it relates to a successful weaning procedure from mechanical ventilation.

Objective(s):
1. E. Perform a basic nutritional assessment of the critical care patient and discuss the various methods of nutritional support and their effects on respiratory function.
2. F. Evaluate and determine appropriate weaning procedures and equipment set-up for various patient situations.

Course Outcome(s):
6. Consider the effects of malnutrition as it relates to mechanically ventilated patients’ ability to be maintained and weaned from mechanical ventilation.

Objective(s):
1. E. Perform a basic nutritional assessment of the critical care patient and discuss the various methods of nutritional support and their effects on respiratory function.
2. F. Evaluate and determine appropriate weaning procedures and equipment set-up for various patient situations.
Course Outcome(s):
7. Organize initial ventilator settings on neonates and pediatric patients.

Objective(s):
1. A. Demonstrate accurate set up of both invasive and non-invasive mechanical ventilators to a patient’s specific pulmonary disease using appropriate volumes, rates, flows, and alarm settings. B. Utilize patient information and technical knowledge of mechanical ventilation to initiate and maintain ventilatory support in a variety of pulmonary disorders.

Course Outcome(s):
8. Value patients’ abnormal sleep mechanics related to positive pressure therapy.

Objective(s):
1. F. Evaluate and determine appropriate weaning procedures and equipment set-up for various patient situations.

Course Outcome(s):
9. Illustrate lower than normal tidal volume ranges, and permissive hypercapnia when faced with acute respiratory distress.

Objective(s):
1. G. Discuss the most appropriate and current ventilator management approach to patients exhibiting acute respiratory failure.

Methods of Evaluation:
1. Quizzes
2. Examinations
3. Comprehensive final examination
4. Laboratory quizzes
5. Laboratory competencies

Course Content Outline:
1. Identify the causes of Type-I and Type-II respiratory failure.
2. Describe indicators for ventilatory support
3. Describe how positive end expiratory pressure (PEEP) and/or continuous positive airway pressure (CPAP) can assist in decreasing shunt
4. Identify the initial range for tidal volume and frequency given:
   a. Asthma
   b. Acute respiratory distress syndrome (ARDS)
   c. Chronic obstructive pulmonary disease (COPD)
   d. Normal
   e. Neuromuscular
5. Discuss how one can minimize adverse pulmonary effects of positive pressure ventilation
6. Describe characteristics and differences between volume controlled modes vs. pressure controlled modes
7. Describe what the cardiovascular effects of positive pressure are, and how they can be minimized
8. State the effects of positive pressure on the following systems:
   a. Central nervous system (CNS)
   b. Renal
   c. Liver
9. Describe complications of positive and negative pressure ventilation
10. State causes of ventilator-associated, nosocomial pneumonia
11. Discuss the “Rule of thumb” when faced with a ventilator malfunction
12. Discuss operational triads as they relate to:
   a. Patient synchrony
   b. Mean airway pressure (MAP)
   c. Calculations
      i. flowrate given tidal volume and inspiration time
      ii. tidal volume given flowrate and inspiration
iii. cycle time given rate and/or inspiration and expiration
iv. inspiration/expiration (i.e) ratio given times for inspiration and expiration
v. minute ventilation given tidal volume and rate

13. State the initial mode, tidal volume, and frequency ranges for the following disorders:
   a. Normal
   b. Acute respiratory distress syndrome (ARDS)
   c. Chronic Obstructive Pulmonary Disease (COPD)
   d. Asthma
   e. Post-op
   f. Myocardial infarction (MI)/Congestive Heart Failure (CHF)
   g. Neuromuscular
   h. Head trauma
   i. Unilateral
   j. Bronchopleural (BP) Fistula

14. Given a patient scenario, accurately determine the following alarm settings when given any mode of ventilation:
   a. Low Vt
   b. Low Ve
   c. High Ve
   d. High pressure
   e. Low pressure
   f. Low positive end expiratory pressure (PEEP)
   g. Fraction of inspired oxygen (FiO2)

15. Define optimal PEEP using the following:
   a. Oxygen delivery
   b. Blood pressure
   c. Mixed venous oxygen
   d. Saturation of mixed venous oxygen
   e. Arterial & venous oxygen difference
   f. Cardiac output
   g. Cardiac index
   h. Static compliance
   i. Lower inflection point

16. Discuss goals and indications of Non-Invasive Positive Pressure Ventilation (NPPV)
17. Identify disorders which are indications for NPPV
18. State exclusion criteria against the use of NPPV
19. Recognize 2 patient interfaces for NPPV and possible complications of each
20. Determine how machine tidal volume is affected using NPPV
21. Determine the initial set up for NPPV using:
   a. Mode
   b. Inspiratory positive airway pressure (IPAP)
   c. Expiratory positive airway pressure (EPAP)
   d. Breaths per minute (BPM)

22. Identify patients at high risk for malnutrition
23. State what affect too much protein, carbohydrate or fat can have on a patient
24. State when enteral nutrition and parenteral nutrition are needed.
25. Determine initial neonatal/pediatric ventilator settings
26. Discuss how the neonatal ventilator differs from adult ventilators
27. Value the need for assessing the neonate on mechanical ventilators
28. List 5 noninvasive assessment techniques used in neonatal mechanical ventilation
29. Identify the 4 basic types of weaning techniques and characteristics of each
30. Define the term, “Terminal Weaning (TW)”
31. Evaluate effects malnutrition has on the respiratory system
32. Discuss the specific nutritional guidelines apply to patients frequently seen by the respiratory care practitioner
33. Differentiate between obstructive sleep apnea (OSA) vs. central sleep apnea (CSA)
34. Discuss the pathologies which cause OSA and CSA
35. Identify long term consequences of untreated/uncontrolled OSA
36. Determine when to use continuous positive airway pressure (CPAP) vs. Bi-level positive airway pressure (PAP) in the treatment of OSA

37. Define the safe ventilator ranges related to the ARDSnet Trial
   a. Tidal volume
   b. Highest ventilator rate
   c. Plateau pressure goals

38. Identify causes of ventilator associated pneumonia (VAP)

39. Discuss interventions which may decrease VAP

Resources


Resources Other


Top of page

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