

Neonatal/ Pediatric Mechanical Ventilation (RSPT 2319)



Credit: 3 semester credit hour (2 hour lecture, 2 hour lab)

Prerequisite : RSPT: 1113, RSPT: 1207, RSPT: 1461, RSPT: 1325, RSPT: 1329, RSPT: 1331. RSPT: 1335, RSPT: 1360

Co-requisite: RSPT: 2413, RSPT: 2255, RSPT: 2361

Course Description

A study of therapeutic procedures to achieve adequate spontaneous and artificial ventilation of the neonatal and pediatric patient. Includes indications, complications, and physiological effects of ventilatory support.

Required Textbook and Materials

1. *Comprehensive Perinatal & Pediatric Respiratory Care* by Kent Whitaker
 - a. ISBN# 978-0-7668-1373-1
2. *Mechanical Ventilation Physiological and Clinical Applications* by Susan P. Pilbeam and Jim Cairo
 - a. ISBN number 13 978-0-323-03236-0
3. *Workbook For Mechanical Ventilation Physiological and Clinical Applications* by Susan P. Pilbeam and Jim Cairo
 - a. ISBN# 978-0-323-03296-4
4. A package of #882 Scantrons and #2 pencils

Course Objectives

Upon completion of this course, the student will be able to:

1. Perform, analyze, and interpret the assessment of oxygenation and ventilation
2. Identify and discuss neonatal and pediatric advanced life support
3. Describe the concepts of mechanical ventilation
4. Perform and describe the management of the patient-ventilator system
5. Identify common ventilators and monitors
6. Describe special procedures and nonconventional ventilator techniques.
7. Discuss and critically analyze case scenarios

Course Outline

1. Review of Oxygenation and acid-base status

Approved 11/2010

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- a. oxygenation
- b. ventilation
- c. hemoximetry
2. Neonatal Advanced Life Support
3. Pediatric Advanced Life Support
4. Concepts of mechanical ventilation
 - a. Goals of mechanical ventilation
 - b. Terminology
 1. peak inspiratory pressure (PIP)
 2. Positive end expiratory pressure (PEEP)
 3. frequency
 4. inspiratory time
 5. mean airway pressure
 6. tidal volume
 7. Minute ventilation
 8. deadspace
 9. alveolar ventilation
 10. opening pressure
 11. driving pressure
 12. functional residual capacity
 13. diffusion time
 14. flow rate
5. The relationships that exist between ventilator parameters.
 - a. Compliance
 1. How lung compliance is measured.
 2. Static compliance
 3. Dynamic compliance
 4. Values in the neonate.
 5. Determinants of pulmonary compliance.
 6. Compliance of the thorax and how it is developed.
 7. The relationship between the lungs and thorax that determines the overall compliance.
 8. The lung compliance curve.
 9. Lung disorders that alter lung compliance.
 - b. Resistance
 1. The factor that is responsible for airway resistance changes.
 2. The airway resistance in the normal newborn, and how to measure resistance.
 3. Increase resistance in the neonatal airway
 - c. Time Constants
 1. Three time constants and expiratory time.
 2. Calculate a minimal expiratory time needed.
 3. Changes in resistance and compliance change time constants

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6. Perform and describe the management of the patient-ventilator system.
 - a. The indications for ventilator support of the neonate and child.
 - b. Partial ventilator support
 - c. Full ventilator support.
 - d. Describe how the following initial ventilator parameters are determined:
 1. Mode
 2. peak inspiratory pressure
 3. set rate
 4. sensitivity
 5. PEEP
 6. FIO₂
 7. inspiratory flow
 8. inspiratory time
 9. I:E ratio
 10. tidal volume.
 - e. Volume versus pressure controlled ventilation
 - f. Ventilator settings based on:
 1. blood gases
 2. clinical evaluation.
 - g. Hazards and effects of mechanical ventilation
 - h. Humidification
 - i. Nebulization and MDI's
 - j. Pulmonary hygiene
 - k. Suctioning
 - l. Oxygen devices and analyzation
 - m. Pharmacology
 - n. Airway management
 - o. Trach care
 - p. Sputum characteristics
 - q. Patient positioning
 - r. Fluid balance with and without an indwelling catheter

8. Weaning and Discontinuance of Mechanical Ventilation

- a. Weaning of the neonatal and pediatric patient from mechanical ventilation.
- b. Extubation of the neonatal and pediatric patient.
- c. Medical Ethics

9. Identify common ventilators and monitors

- a. Identify and discuss, for each of the following ventilators, the classification, control switches and timers, internal mechanisms, and features:
 1. Servo I
 2. PB 840
 3. Drager Avea

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- b. Calculating FiO_2 and flow rate when given the necessary information and data.
- c. Intermittent ventilator monitoring
 - 1. ventilator parameters
 - 2. alarm systems
 - 3. chest x-ray
 - 4. capillary and arterial blood gas analysis
- c. Continuous ventilator monitoring
 - 1. transcutaneous monitoring
 - 2. pulse oximetry
 - 3. capnography and End Tidal CO_2
 - 4. Airway graphics

10. Special procedures and nonconventional ventilator techniques.

- a. Surfactant replacement therapy.
 - 1. History
 - 2. Indications
 - 3. Administration techniques
 - 4. Outcomes
- b. High Frequency ventilation (HFV).
 - 1. Rates of ventilation
 - 2. Indications
 - 3. Clinical uses
 - 4. Hazards
- c. Conventional ventilator is used in conjunction with:
High Frequency Jet ventilation (HFJV)
High Frequency Oscillation (HFO).
- d. Theories of gas flow characteristics associated with high frequency jet ventilation (HFJV) and high frequency oscillation (HFO).
- e. inhaled nitric oxide
 - 1. treatment of the newborn and pediatric patient in respiratory failure.
 - 2. The safety of inhaled nitric oxide
 - 3. Adverse effects
- f. Heliox
 - 1. pediatric patients with airflow obstruction.
 - 2. Extra Corporal Life Support(ECLS):
 - 3. History
 - 4. Venoarterial vs. Venovenous bypass
 - 5. Components of the ECLS circuit
 - 6. Use of mechanical ventilation during ECLS
 - 7. selecting patients for ECLS
 - 8. Contraindicated.
 - 9. Initiated,
 - 10. Indications for termination,

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11. **Negative pressure ventilation:**
 1. History
 2. Methods of delivery
 3. Current uses
 4. Advantages and disadvantages
12. **Partial liquid ventilation.**
 - a. History
 - b. Use
13. **Patient/Clinical case studies and algorithms**
 - a. Algorithms
 - b. Analyze :
 1. subjective history
 2. objective data
 3. assessment
 4. form the treatment plan.

Grade Scale

- A = 93 – 100 %
B = 85 - 92 %
C = 77 - 84 %
D = 68 - 76%
F = less than 68 %

Course Evaluation

Exam I	100
Exam II	100
Exam III	100
Final Exam	250
Lab (three test 50 point each)	150
Home Work	<u>100</u>
Total	<u>700</u>

Student Grades

_____	x2.5
_____	x1.5

_____	/700

Course Requirements

1. You must attend class
2. Homework is due at the beginning of the next class
3. No late work will be accepted.
4. Three exams
5. Comprehensive Final

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Course Policies

Attendance – If you do not attend class you are missing some very valuable information. Test will include both textbook material and anything mentioned in class.

Homework Assignments –Please turn in homework assignments at the start of the next class meeting. **NO LATE WORK ACCEPTED!!!!** If you have an excused absence you may e-mail your work to me before the class starts. If the absence is not excused you will receive a zero.

Absences – According to LIT policy students with approved absences shall be allowed to make up examinations and written assignments without penalty. This privilege does not extend to unapproved absences. The determination of whether an absence is excused or approved is the responsibility of the instructor, except in the case of approved absence for an Institute-sponsored activity. If absences seriously interfere with performance the instructor may recommend to the Department Chair that the student be dropped from the course. You may be asked to present documentation to the instructor as to why the absence was necessary for the next class meeting that you attend, (i.e. doctor excuse, funeral pamphlet, note from child’s doctor, etc.).

Make-up Exam - You may make-up an exam only if the absence is excused by the instructor. The make-up exam will be taken on the next class day that you return.

Class Roll – will be taken on the first and fourth class days. If your name is not on the class roster on the fourth class day, you will be asked to leave class until this matter is taken care of.

NO EATING, NO DRINKING, TURN OFF BEEPERS, TURN OFF CELL PHONES, NO DISRUPTIVE BEHAVIOUR, AND NO CHILDREN ALLOWED IN CLASS PLEASE!

Remediation – Refer to the Respiratory Care student handbook.

Disabilities Statement

The Americans with Disabilities Act of 1992 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodations for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409) 880-1737 or visit the office in Student Services

Course Schedule

Lecture

Week	Topic	Reference (required reading)
1	Neo/pediatric arterial blood gas	Comprehensive Perinatal & Pediatric

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Week	Topic	Reference (required reading)
	interpretation	Respiratory Care
2	Review of neonatal and Pediatric Diseases	Comprehensive Perinatal & Pediatric Respiratory Care
3	Concepts of Mechanical ventilation	Chapter 14 - Comprehensive Perinatal & Pediatric Respiratory Care
4	Concepts of mechanical ventilation- Ventilator Commitment	Comprehensive Perinatal & Pediatric Respiratory Care
5	Test # 1 / Management of Patient ventilator systems	Chapter 15 - Comprehensive Perinatal & Pediatric Respiratory Care
6	Management of Patient ventilator systems	Chapter 15 - Comprehensive Perinatal & Pediatric Respiratory Care
7	Management of Patient ventilator systems	Chapter 15 - Comprehensive Perinatal & Pediatric Respiratory Care
8	Common ventilators and Monitors	Chapter 16 - Comprehensive Perinatal & Pediatric Respiratory Care
9	Test #2, troubleshooting and Problem solving	Chapter 15 - Comprehensive Perinatal & Pediatric Respiratory Care
10	Special procedures and nonconventional ventilator techniques	Chapter 17- Comprehensive Perinatal & Pediatric Respiratory Care
11	Ventilatory graphics	Chapter 22 - Mechanical Ventilation Physiological and Clinical Applications
12	Test #3- Special Procedures	Chapter 17- Comprehensive Perinatal & Pediatric Respiratory Care
13	Special Procedures / Clinical Case studies	Chapter 17 – Comprehensive Perinatal & Pediatric Respiratory Care
14	Clinical Case studies	Chapter 22 - Comprehensive Perinatal & Pediatric Respiratory Care
15	Clinical Case studies	Chapter 22- Comprehensive Perinatal & Pediatric Respiratory Care
16	Clinical Case studies- Exam #4	Chapter 22- Comprehensive Perinatal & Pediatric Respiratory Care

Lab:

Week	Topic	Required reading
1	ABG exercises	Comprehensive Perinatal & Pediatric Respiratory Care
2	Case scenarios (disease)	Comprehensive Perinatal & Pediatric Respiratory Care
3	Terminology	Chapter 14 - Comprehensive Perinatal & Pediatric Respiratory Care
4	Identifying and label parts of ventilator	Comprehensive Perinatal & Pediatric Respiratory Care

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Week	Topic	Required reading
5	Scenarios (commitment and management)	Chapter 15 - Comprehensive Perinatal & Pediatric Respiratory Care
6	Test #1	Chapter 15 - Comprehensive Perinatal & Pediatric Respiratory Care
7	Identifying setting buttons on ventilator	Chapter 15 - Comprehensive Perinatal & Pediatric Respiratory Care
8	Troubleshooting and problem solving	Chapter 16 - Comprehensive Perinatal & Pediatric Respiratory Care
9	Test #2	Chapter 15 - Comprehensive Perinatal & Pediatric Respiratory Care
10	Graphic analysis	Chapter 17- Comprehensive Perinatal & Pediatric Respiratory Care
11	Graphic analysis	Chapter 22- Mechanical Ventilation Physiological and Clinical Applications
12	NPPV- Special procedures	Chapter 17- Comprehensive Perinatal & Pediatric Respiratory Care
13	Clinical case scenarios	Chapter 17 – Comprehensive Perinatal & Pediatric Respiratory Care
14	Clinical case scenarios	Chapter 22- Comprehensive Perinatal & Pediatric Respiratory Care
15	Clinical case scenarios	Chapter 22- Comprehensive Perinatal & Pediatric Respiratory Care
16	Check offs	Dataarc © Competency

Contact Information

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OFFICE HOURS: posted outside office door. Additional times available with appointment. Available for remediation or tutoring.