RESP-2320: PEDIATRIC/NEONATAL RESPIRATORY CARE

Cuyahoga Community College

Viewing: RESP-2320: Pediatric/Neonatal Respiratory Care

Board of Trustees:
2013-12-05

Academic Term:
2014-08-25

Subject Code
RESP - Respiratory Care

Course Number:
2320

Title:
Pediatric/Neonatal Respiratory Care

Catalog Description:
Presentation of theory and its practical application to pediatric and neonatal respiratory disease states. Includes pathophysiology, etiology, patient assessment and treatment using equipment unique to this specialty area.

Credit Hour(s):
2

Lecture Hour(s):
2

Lab Hour(s):
0

Other Hour(s):
0

Requisites

Prerequisite and Corequisite
RESP-2300 Basic Therapeutic Procedures, and concurrent enrollment in RESP-2310 Mechanical Ventilation.

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):
A. Examine factors which can safely assist a neonate to breathe effectively following a high risk delivery.
**Objective(s):**

1. A. Summarize the phases of fetal lung development, the role of pulmonary surfactant and its production and the unique characteristics of fetal circulation and hemodynamic transition that occur during and shortly after the birth process.
2. K. Participate in the Neonatal Resuscitation Program, utilizing training procedure established by the American Heart Association.
3. B. Explain the care of a neonate including factors which may indicate a high risk delivery, patient assessment techniques, thermoregulation, resuscitation and airway management.
4. C. Discuss the theory and application of supplemental oxygen, nasal continuous positive airway pressure, and mechanical ventilation as they apply to the pediatric and neonatal patient.
5. E. Identify the most common conditions which produce distress in the neonate and discuss the pathophysiology, assessment techniques, treatment and clinical presentation of these states.
6. F. Describe the pathophysiology and identify the incidence, symptoms and treatment of the most common cardiac defects seen at birth: patent ductus arteriosis, atrial septal defect, ventricular septal defect, transposition of the great vessels and tetralogy of fallot.
7. G. Identify and explain the harmful physiologic consequences associated with the use of supplemental oxygen and/or positive pressure, the clinical presentation and methods used to prevent and treat them.
8. H. Discuss the etiology, clinical presentation, assessment and treatment of croup, epiglottitis bronchiolitis and cystic fibrosis in the pediatric patient.
9. I. Summarize the role and function of the transport team, its members and responsibilities needed to produce a successful transport of the pediatric or neonatal patient.

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**Course Outcome(s):**

B. Inventory features of neonatal ventilators so the respiratory practitioner can utilize appropriate functions to optimally ventilate diverse pathologies.

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**Objective(s):**

1. K. Participate in the Neonatal Resuscitation Program, utilizing training procedure established by the American Heart Association.
2. C. Discuss the theory and application of supplemental oxygen, nasal continuous positive airway pressure, and mechanical ventilation as they apply to the pediatric and neonatal patient.
3. D. Identify and discuss the operation, features, limitations and advantages of currently available mechanical ventilators used in the treatment and care of pediatric and neonatal patients.
4. H. Discuss the etiology, clinical presentation, assessment and treatment of croup, epiglottitis bronchiolitis and cystic fibrosis in the pediatric patient.
5. I. Summarize the role and function of the transport team, its members and responsibilities needed to produce a successful transport of the pediatric or neonatal patient.

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**Course Outcome(s):**

C. Interpret patient data and symptoms related to unique lung and cardiac defects in order for the respiratory practitioner to treat high risk neonates.

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**Objective(s):**

1. K. Participate in the Neonatal Resuscitation Program, utilizing training procedure established by the American Heart Association.
2. B. Explain the care of a neonate including factors which may indicate a high risk delivery, patient assessment techniques, thermoregulation, resuscitation and airway management.
3. C. Discuss the theory and application of supplemental oxygen, nasal continuous positive airway pressure, and mechanical ventilation as they apply to the pediatric and neonatal patient.
4. E. Identify the most common conditions which produce distress in the neonate and discuss the pathophysiology, assessment techniques, treatment and clinical presentation of these states.
5. F. Describe the pathophysiology and identify the incidence, symptoms and treatment of the most common cardiac defects seen at birth: patent ductus arteriosis, atrial septal defect, ventricular septal defect, transposition of the great vessels and tetralogy of fallot.
6. G. Identify and explain the harmful physiologic consequences associated with the use of supplemental oxygen and/or positive pressure, the clinical presentation and methods used to prevent and treat them.
7. H. Discuss the etiology, clinical presentation, assessment and treatment of croup, epiglottitis bronchiolitis and cystic fibrosis in the pediatric patient.
8. I. Summarize the role and function of the transport team, its members and responsibilities needed to produce a successful transport of the pediatric or neonatal patient.

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**Course Outcome(s):**

D. Analyze the qualities of the transport, respiratory practitioner and their functions as they relate to being a member of this specialized team.

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**Objective(s):**

1. I. Summarize the role and function of the transport team, its members and responsibilities needed to produce a successful transport of the pediatric or neonatal patient.
Course Outcome(s):
E. Contrast the differences between skills of an acute care pediatric therapist versus a pediatric home care therapist.

Objective(s):
1. J. Describe the therapy modalities offered to the pediatric/neonatal patient and the criteria used for set up and discontinuation of these applications at home.

Course Outcome(s):
F. Demonstrate competency in the Neonatal Resuscitation Program (NRP).

Objective(s):
1. K. Participate in the Neonatal Resuscitation Program, utilizing training procedure established by the American Heart Association.
2. I. Summarize the role and function of the transport team, its members and responsibilities needed to produce a successful transport of the pediatric or neonatal patient.

Methods of Evaluation:
1. Quizzes
2. Examinations

Course Content Outline:
1. Fetal growth and development
   a. Lung development
      i. embryonic
      ii. pseudoglandular stage
      iii. canalicular
      iv. terminal sac stage
   b. Surfactant
      i. effects on lung compliance
      ii. production pathways
   c. Cardiovascular development
      i. anatomy of fetal circulation
      ii. function of placenta
      iii. oxygenation of fetal blood
      iv. systemic vascular resistance
      v. pulmonary vascular resistance
      vi. anatomic shunts
         1. ductus vensus
         2. foramen ovale
         3. ductus arteriosus
   d. transitional circulation
      i. removal of lung fluid
      ii. clamping of umbilical vessels
      iii. changes in pulmonary vascular resistance
      iv. reversal/closure of anatomical shunts
   e. baroreceptors
   f. chemoreceptors
   g. placenta
   h. umbilical cord
      i. functions of amniotic fluid
2. Labor delivery and physiological changes after birth
   a. Assessment of the neonate
      i. prenatal risk factors
         1. maternal age
         2. severe hypertension
         3. diabetes
         4. gestational age
         5. intrauterine growth retardation
         6. multiple pregnancy
ii. intrapartum risk factors
   1. abruptio placenta
   2. placenta previa
   3. maternal hypotension
   4. maternal fever
   5. fetal drug depression
   6. prolapsed cord
   7. fetal distress

iii. cesarean delivery
   1. indications
   2. complications

iv. gestational age (Dubowitz)
v. birth weight
vi. apgar; infant scoring system
vii. meconium stained amniotic fluid
viii. tachypnea
ix. bradycardia
x. cyanosis
   1. central
   2. peripheral
xi. grunting/flaring/retracting
xii. asphyxia
xiii. apnea
   1. primary
   2. secondary

b. Thermoregulation
   i. surface area vs. body mass
   ii. methods of heat loss
      1. radiation
      2. convection
      3. conduction
      4. evaporation

   iii. Methods of heat production
      i. physical
      ii. chemical

d. Neutral thermal environment

e. Effects of cold stress
   i. oxygen consumption
   ii. carbon dioxide production
   iii. acid-base
   iv. ventilatory pattern

f. Resuscitation technique
   i. close chest compression
   ii. ventilation
      1. intubation technique
      2. assessment of ventilation
      3. medications

3. Ventilatory support systems
a. Oxygen administration
   i. indications
   ii. delivery systems
   iii. goals
   iv. hazards

b. Continuous positive airway pressure
   i. indications
   ii. goals
   iii. complications
   iv. delivery systems

c. Mechanical ventilation
i. indications
ii. mean airway pressures
iii. time cycled/pressure limited ventilation
iv. ventilator characteristics
   1. partial support
   2. constant pressure generator
   3. continuous flow circuit

4. Mechanical ventilators
a. Time cycled/pressure limited ventilators
   i. advantages
   ii. characteristics
b. Characteristics of common ventilators
c. High frequency
   i. jet ventilation
   ii. oscillation
d. Ventilatory management
   i. initial settings
   ii. hazards of mechanical ventilation
   iii. weaning

5. Neonatal distress
a. Idiopathic respiratory distress syndrome
   i. clinical significance
   ii. contributing factors
      1. birth weight
      2. gestational age
      3. diabetic mother
      4. cesarean section
      5. "B" twin
   iii. clinical symptoms
      1. cyanosis in room air
      2. tachypnea
      3. g.f.r. (grunting, flaring, retracting)
      4. decreased air entry
      5. fine rales
   iv. chest radiographic appearance
   v. physiologic changes
      1. decreased lung compliance
      2. deadspace ventilation
      3. right to left shunt
      4. decreased lung volume
      5. decreased functional residual capacity
      6. increased minute volume
      7. work of breathing
   vi. probable cause
   vii. treatment
      1. oxygen administration
      2. continuous positive airway pressure
      3. weaning concerns
      4. blood gas goals
      5. acid-base goals
b. Persistent fetal circulation
   i. circulation routes
   ii. contributing factors
   iii. clinical signs
      1. cyanosis
      2. acidosis
      3. retractions
      4. tachypnea
5. hypoxemia with oxygen administration

6. murmur

iv. differential diagnosis
   1. hyperoxia test
   2. preductal vs. postductal atrial oxygen tension

v. respiratory treatment
   1. mechanical ventilation protocol
   2. maintenance of arterial blood gases
   3. monitoring oxygenation

vi. pharmacologic therapy

vii. prognosis

viii. complications of ventilatory management

c. Diaphragmatic hernia
   i. pathophysiology
   ii. signs/symptoms
   iii. respiratory concerns
   iv. treatment

d. Transient tachypnea
   i. pathophysiology
   ii. signs/symptoms
   iii. respiratory concerns
   iv. treatment

e. Beta hemolytic streptococcus pneumonia
   i. etiology
   ii. signs/symptoms
   iii. respiratory concerns
   iv. treatment

f. Sepsis
   i. etiology
   ii. signs/symptoms
   iii. respiratory concerns
   iv. treatment

6. Congenital heart defects

a. General information
   i. definition
   ii. etiology
   iii. incidence
   iv. associated factors

b. Patent ductus arteriosus
   i. incidence
   ii. pathophysiology
   iii. signs/symptoms
   iv. treatment

c. Atrial septal defect
   i. incidence
   ii. pathophysiology
   iii. signs/symptoms
   iv. treatment

d. Ventricular septal defect
   i. incidence
   ii. pathophysiology
   iii. signs/symptoms
   iv. treatment

e. Coarctation of the aorta

f. Tricuspid atresia

g. Anomalous venous return

7. Iatrogenic disorders
a. Bronchopulmonary dysplasia (B.P.D.)
   i. etiology
      1. high FiO2
      2. positive pressure ventilation
      3. time
   ii. four stages
      1. acute phase of Infant Respiratory Distress Syndrome (IRDS)
      2. 4-10 days after onset of IRDS
      3. 2-3 weeks after birth
      4. after one month
   iii. treatment
b. Retinopathy of prematurity (ROP)
   i. incidence
   ii. two stages
      1. vasoconstriction
      2. new growth and hemorrhage
   iii. etiology
   iv. oxygen administraton concerns
      1. arterial oxygen tension
      2. FiO2
c. Oxygen toxicity
   i. pathophysiology
   ii. etiology
      1. oxygen concentration
      2. length of exposure
      3. individual susceptibility
   iii. treatment
d. Volutrauma
   i. incidence
   ii. clinical significance
      1. mechanical ventilation requirements
      2. borderline ventilation/oxygenation
      3. severe cardiac/pulmonary disease
   iii. etiology
   iv. may develop pneumomediastinum, pneumopericardium
   v. pulmonary interstitial emphysema
   vi. clinical signs/symptoms
      1. sudden onset of irritability
      2. rapid deterioration in appearance
      3. cyanosis
      4. decreased breath sounds
      5. a shift in PMI (point of maximum impulse)
   vii. diagnosis
   viii. treatment
      1. needle aspiration
      2. chest tube
      3. oxygen administration
e. Apnea
   i. etiology
   ii. treatment

8. Pediatric disease
a. croup
   i. incidence
   ii. etiology
   iii. signs/symptoms
   iv. treatment
b. Epiglottitis
   i. incidence
   ii. etiology
iii. signs/symptoms
iv. treatment
c. Bronchiolitis
   i. incidence
   ii. etiology
   iii. signs/symptoms
   iv. treatment
      1. riboviron
      2. SPAG-2
d. Sudden infant death syndrome
   i. possible risk factors
   ii. treatment
e. Cystic fibrosis
   i. incidence
   ii. etiology
   iii. signs/symptoms
   iv. prognosis
   v. diagnostic tests
   vi. treatment
f. Human immunodeficiency virus
   i. clinical signs
   ii. diagnosis and treatment
g. Cytomegalovirus
   i. transmission
   ii. symptoms
h. Congenital anomalies
   i. tracheo-esophageal fistula
   ii. choanal atresia
   iii. diaphragmatic hernia
   iv. Pierre-Robin syndrome
i. Asthma
   i. pathophysiology
   ii. signs
   iii. treatment
j. Neuromuscular disorders
   i. Myasthenia Gravis
   ii. Guillain-Barre syndrome
k. Reyes syndrome
   i. pathophysiology
   ii. treatment
9. Assessment of oxygenation and ventilation
   a. Arterial blood gases (ABGS)
      i. umbilical catheter
      ii. radial arterial line
   b. Capillary sample
      i. clinical uses
      ii. limitations
c. Assessment of ABGS
      i. respiratory
         1. alkalosis
         2. acidosis
      ii. metabolic
         1. alkalosis
         2. acidosis
d. Transcutaneous monitoring
   i. clinical uses
   ii. limitations
e. Pulse oximetry
   i. clinical uses
   ii. limitations
f. Capnography
   i. clinical uses
   ii. limitations

g. Extracorporeal membrane oxygenation (ECMO)

10. Pediatric/neonatal transports:
   a. Team members
      i. physician
      ii. respiratory therapist
      iii. nurse/paramedic
   b. Team skill requirements
      i. intubation
      ii. chest tube placement
      iii. working knowledge of pediatric/neonatal disease
      iv. placement of umbilical artery and venous catheters.
      v. cardiopulmonary resuscitation with manual ventilation
   c. Initial patient evaluation
      i. general clinical observations
      ii. respiratory evaluation
      iii. cardiovascular evaluation
      iv. maternal history
   d. Conditions requiring immediate intervention
      i. asystole
      ii. apnea
      iii. hypotension
      iv. acidosis
      v. hypoglycemia
      vi. pneumothorax
   e. Support measures used during transport
      i. manual ventilation
      ii. continuous positive airway pressure (CPAP)
      iii. oxyhood
      iv. maintenance of neutral thermal environment
      v. intravenous therapy (glucose, blood, etc.)
      vi. monitoring of vital signs
      vii. suctioning

11. Respiratory support measures in the home
   a. Oxygen therapy
   b. Aerosol therapy
   c. Apnea monitoring
      i. discharge planning:
         1. psychosocial assessment
         2. review of costs
         3. parent teaching
         4. community support
         5. assurance of working telephone
         6. identification of any language problem
      ii. support for monitor pt.:
         1. 24 hr. call
         2. visits by health care company
         3. monthly evaluation at ped. out pt. clinic
         4. monthly pneumogram
         5. local support system
      iii. criteria for discontinuation of monitor
   d. Mechanical ventilation
      i. patient selection criteria.
         1. family evaluation
         2. medical stability
         3. home health care company
      ii. discharge planning for home ventilator.
1. care plan
2. reimbursement
3. parent teaching
4. home assessment
5. preparation of home

12. Neonatal Resuscitation Program certification
   a. Initial steps in resuscitation
   b. Equipment
   c. Ventilation
d. Compressions
e. Intubation
   f. Medications

Resources


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