



### *CRCE Through the Journal—2008*

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*CRCE through the Journal*, a program for American Association for Respiratory Care (AARC) members to gain credit for continuing education, is now in its seventeenth year. By reading *RESPIRATORY CARE*—the science journal for respiratory care professionals—and completing this examination, AARC members may earn credit for continuing education.\*

This 50-item, multiple-choice examination is based on papers published from July 2007 through May 2008 in *RESPIRATORY CARE*. The issue and page numbers of the paper on which a question is based are shown in brackets following the question. You may consult the cited paper; however, we encourage you to read the paper in its entirety before answering the question. Choose the single most-correct answer, and mark the answer sheet, which is located on the back of this page.

Your answer sheet is the worksheet you will use to record your answers in the AARC's web-based testing module. After registering for the test, paying the \$15 fee by credit card, and entering your answers, your test will be instantly scored. If you correctly answer 35 or more of the 50 items, you will be able to print a signed Certificate of Completion to present to your state board as evidence that you have earned 6 CRCE contact hours. Your CRCE contact hours will also be instantly added to your web-based AARC transcript. You will have two attempts to achieve a passing score. To register and pay for the test go to <http://www.rcjournal.com/> and click on *CRCE Through the Journal—2008*. The online test will be available from **August 15th to October 1st, 2008**. The test answers will be published in the October 2008 issue of the Journal.

We are indebted to Timothy B Op't Holt EdD RRT AE-C FAARC, William Pruitt MBA RRT RPFT AE-C, William V Wojciechowski MSc RRT, and David Chang EdD RRT-NPS CPFT, faculty members in the Department of Cardiorespiratory Care at the University of South Alabama, Mobile, Alabama.

\*The acceptance of these credits for the fulfillment of license-mandated continuing education is dictated solely by the licensure law of each individual state.

*CRCE through the Journal* — Answer Sheet

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**QUESTIONS:** Please follow the instructions on Page 1097 and use the worksheet we have provided on Page 1098 to mark your answers. You will have two attempts to achieve a passing score. To register and pay for the test go to <http://www.RCJournal.com/> and click on *CRCE Through the Journal —2008*. The online test will be available from August 15th to October 1st, 2008. The test answers will be published in the October 2008 issue of the Journal.

1. What was the main limitation to the study conducted by Win et al, entitled “*The Effect of Lung Resection on Pulmonary Function and Exercise Capacity in Lung Cancer Patients*”? [June 2007;52(6):720-726]
  - A. That all lung cancer patients in this study did *not* have oat cell carcinoma
  - B. That the follow-up period was too short to reflect long-term recovery
  - C. That 20% of the patients in this study were included in this study too soon after their surgeries
  - D. That *not* all the cohort abstained from cigarette smoking during this study
  
2. According to the authors of the study entitled, “*Respiratory Failure Due to Expiratory Central Airway Collapse*,” which of the following conditions can cause expiratory central airway collapse? [June 2007;52(6):752-754]
  - I. Obstructive sleep apnea
  - II. Tracheobronchomalacia
  - III. Mast cell degranulation
  - IV. Bulging of airway’s posterior membrane
  - A. I, II only
  - B. II, III only
  - C. II, IV only
  - D. I, III, IV only
  
3. Which of the following conclusions was/were drawn in the study conducted by Haynes concerning the ear as an alternative site for a pulse oximeter finger clip sensor? [2007;52(6):727-729]
  - A. A pulse oximeter finger clip sensor placed on the ear does *not* provide clinically reliable  $S_{pO_2}$  measurements.
  - B. A pulse oximeter finger clip sensor placed on the ear provides clinically reliable  $S_{pO_2}$  measurements.
  - C. A pulse oximeter finger clip sensor placed on a finger or toe provides clinically reliable  $S_{pO_2}$  measurements.
  - D. A pulse oximeter finger clip sensor placed on a toe does *not* provide clinically reliable  $S_{pO_2}$  measurements.
  
4. Based on the paper by Mussa et al, what are the major deficiencies that constrain data modeling in the process of building an optimal computerized respiratory care information system? [June 2007;52(6):730-739]
  - I. The array of respiratory therapeutic modalities used in the clinical setting
  - II. The mobility of respiratory therapists within the acute care settings
  - III. The lack of a standardized respiratory therapy language
  - IV. The absence of classification systems in respiratory therapy
  - A. I, II only
  - B. II, III only
  - C. III, IV only
  - D. I, III, IV only
  
5. According to Op’t Holt, which of the following reasons might explain the incidence of death attributed to the use of long-acting  $\beta_2$ -agonists among asthmatics, as revealed by meta-analysis? [July 2007;52(7):820-832]
  - I. Increased bronchial hyperreactivity caused by using the medication more than its prescribed frequency
  - II. Worsened asthma control caused by desensitization of the adrenoreceptor
  - III. Increased bronchial reactivity with regular use of beta adrenergic drugs
  - IV. Decreased asthma control caused by down-regulation of receptors after several hours of  $\beta_2$ -agonist exposure
  - A. I only
  - B. I, II, III only
  - C. I, III, IV only
  - D. II, III, IV only

6. According to Phua and MacIntyre, which of the following medications reduces the fractional exhaled nitric oxide in patients with asthma? [July 2007;52(7):852-858]
- Anticholinergic bronchodilators
  - Beta-2 adrenergic bronchodilators
  - Methylxanthines
  - Corticosteroids
7. Based on the paper by Rubin, which of the following medications change the biophysical properties of secretions by degrading the mucin polymers, DNA, fibrin, or F-actin in airway secretions, generally decreasing the viscosity of the mucus? [July 2007;52(7):859-865]
- Expectorants
  - Mucolytics
  - Lubricants
  - Diluents
8. What conclusion was reached regarding the cause of the rapid shallow breathing pattern in patients with ARDS/ALI in the study performed by Kallet et al? [August 2007;52(7):989-995]
- Decreased pulmonary compliance
  - Increased respiratory drive
  - Decreased pulmonary elastance
  - Increased work of breathing
- I, II only
  - I, III only
  - I, II, IV only
  - II, III, IV only
9. Based on the study conducted by Munroe et al concerning end-of-life decisions and ALS patients, what conclusions were drawn from this retrospective analysis? [August 2007;52(7):996-999]
- End-of-life decisions are usually delayed regarding patients with ALS.
  - Compared to cancer patients, end-of-life decisions for ALS patients are dealt with in a more-timely manner.
  - End-of-life decisions among ALS patients tend to be influenced by the degree of severity of their respiratory insufficiency.
  - End-of-life decisions among ALS patients tend to be influenced by the degree of severity of their bulbar involvement.
10. In the paper by Sehlin et al, what was concluded regarding the physiological responses of PEP therapy between the PEP bottle and the PEP mask? [August 2007;52(7):1000-1005]
- That the PEP bottle and the PEP mask were equivalent in their relationship between airflow and airway pressure
  - That the PEP bottle caused subjects to lose their breath more than the PEP mask
  - That the PEP mask caused subjects to lose their breath more than the PEP bottle
  - That post-operative COPD patients lost their breath more with the PEP bottle than with the PEP mask
11. According to the paper by Stoller et al, which respiratory therapy protocols demonstrated high degrees of agreement regardless implementation method? [August 2007;52(7):1006-1012]
- Hyperinflation therapy protocol
  - Bronchopulmonary hygiene therapy protocol
  - Oxygen therapy protocol
  - Pulse oximetry protocol
- I, IV only
  - II, III only
  - III, IV only
  - I, III, IV only
12. In the study by Lin et al, how was the aerosol (that was lost to the ambient air because of the space between the mask and the mannequin's face) accounted for? [August 2007;52(7):1021-1026]
- The lost aerosol was calculated by subtracting the inhaled drug mass from the dead volume drug mass.
  - The aerosol lost to ambient air was directly measured via spectrophotometry.
  - The lost aerosol was measured by weighing the aerosol extracted from the inhalation filter and subtracting it from the dead volume mass.
  - The lost aerosol was calculated by subtracting the inhaled drug mass and the dead volume drug mass from the starting dose of the drug.

13. In the article on the physiology of airway mucus secretions, how many mucin (MUC) genes were found in airway secretions? [September 2007;52(9): 1134-1149]
- Three
  - Five
  - Nine
  - Twenty
14. In the paper by Rogers on mucoactive agents, which of the following diseases involved tethering of mucus to the airway epithelium? [September 2007;52(9):1176-1197]
- Cystic fibrosis
  - COPD
  - Bronchiectasis
  - Asthma
15. A proposed algorithm by van der Schans has evaluation of the cough or huff listed as the first step in intervening in retained secretions. If this is ineffective, what is the next step? [September 2007;52(9):1198-1209]
- Have the patient cough or huff with less force and at a higher lung volume
  - Assessing for signs of airway collapse
  - Initiate postural drainage and chest percussion
  - Administer an aerosol treatment using N-acetylcysteine
16. According Fink, what is the recommended age range to start teaching belly breathing and huff coughing? [September 2007;52(9):1210-1223]
- 2 - 4 years
  - 4 - 8 years
  - 8- 10 years
  - 10 - 12 years
17. According to Myers, what is meant by the word “tuning” when used in conjunction with the Flutter device? [October 2007;52(10):1308-1327]
- Tilting the device upward or downward to change the vibration frequency
  - Adjusting the expiratory resistance on the rotating cuff at the distal end of the device
  - Assessing the various weighted stainless steel balls to find the optimal one for secretion removal
  - Adjusting the vibration rate knob to achieve a vibratory frequency of 8 to 12 Hz.
18. According to Rubin, which of the following is an important positive factor for sputum transportability by cough when studying mucus clearance with in vitro tests? [October 2007;52(10):1328-1347]
- Tenacity
  - Viscoelasticity
  - Mucociliary action
  - Sputum surface properties
19. In the paper by Haas et al, which of the following terms are used to describe a series of gulps, using the lips, tongue, pharynx, and larynx to force air into the lungs? [October 2007;52(10):1362-1381]
- Reverse burp breathing
  - Frog breathing
  - Mouth stacking
  - Glossopharyngeal breathing
- I and II only
  - I and IV only
  - II and III only
  - II and IV only
20. In the paper by Brewer et al regarding measurement of FRC, which of the following were given as additional useful pits of information obtained from the partial CO<sub>2</sub> rebreathing monitor? [November 2007;52(11):1480-1489]
- Compliance
  - Pulmonary capillary blood flow
  - Pressure-volume curves
  - Cardiac output
- I and III only
  - I, II and III only
  - II and IV only
  - II, III and IV only

21. In the paper by Weaver, what did the results reveal when comparing  $P_{tcCO_2}$  and  $P_{aCO_2}$  under hyperbaric conditions? [November 2007;52(11):1490-1496]
- The transcutaneous measurement correlated well with the arterial measurement but was consistently higher
  - The transcutaneous measurement was not statistically different from the arterial measurement
  - The transcutaneous measurement correlated poorly with the arterial measurement
  - The transcutaneous measurement was consistently within 0.673 of the arterial measurement
22. Which of the following are true according to the article on educational technology by Hopper and Johns? [November 2007;52(11):1510-1524]
- Cost and time-savings by using online surveys are significant compared to telephone or postal instruments.
  - RC Program directors have a similar adoption rate to that of respiratory care department managers for using PDA (portable digital assist) devices on-the-job.
  - There may be a limitation of a pro-technology bias in the research results for respiratory care managers
  - Respiratory care program directors were somewhat more favorable in their view of baccalaureate and higher degrees earned entirely via distance learning as compared to respiratory care managers
- I and II only
  - III and IV only
  - II and IV only
  - II, III and IV only
23. In the paper by Mikkelsen et al, what was listed as the third most prevalent indication to use Extracorporeal Life Support (ELS) according to the ELS Organization registry? [November 2007;52(11):1525-1529]
- Viral pneumonia
  - ARDS
  - Aspiration
  - Trauma
24. The information provided in the article by Kaynar et al shows that one of the most effective VAP-prevention strategies is: [December 2007;52(12):1687-1694]
- Chest physiotherapy.
  - Routine changes of in-line suction catheter.
  - Removal of gastric and endotracheal tube as soon as feasible.
  - Routine changes of ventilator circuit.
25. According to the paper by Mokhlesi et al, extubation failure following a successful spontaneous breathing trial may be predicted by the: [December 2007;52(12):1710-1717]
- Pre-extubation Glasgow coma scale score > 10.
  - Post-extubation amount of secretions in the mouth.
  - Post-extubation APACHE score.
  - Pre-extubation arterial  $P_{CO_2}$  measurement.
26. The study by Dellweg et al shows that noninvasive ventilation provides muscle rest to the patients with the following breathing pattern: [December 2007;52(12): 1734-1740]
- Increasing tidal volume and increasing frequency.
  - Increasing tidal volume and decreasing frequency.
  - Decreasing tidal volume and increasing frequency.
  - Decreasing tidal volume and decreasing frequency.
27. Which of the following statements is true based the study done by Mahoney et al? [December 2007;52(12): 1741-1743]
- The  $S_{PCO}$  requires an arterial blood sample.
  - The  $S_{PCO}$  requires a venous blood sample.
  - Smokers have a higher  $S_{PCO}$  than non-smokers.
  - Smokers and non-smokers have similar  $S_{PCO}$  measurements.

28. In the article by Orens et al, the projected vacant full time equivalents across the US (based on the 2005 AARC Human Resources Survey) is almost double between 2000 and 2005 for: [December 2007;52(12):1767-1773]
- Staff respiratory therapists.
  - Directors.
  - Supervisors.
  - Instructors/educators.
29. The article by Sandrock shows that personal protection equipment is *not* required for isolation and protection in the presence of: [January 2008;53(1):40-57]
- Viral hemorrhage fever.
  - Smallpox.
  - Influenza.
  - Anthrax.
30. According to Hotchkin et al, the most important factor that directly impacts the prompt delivery of adequate medical care during a mass casualty situation is the: [January 2008;53(1):67-77]
- Number of critically ill victims.
  - Type of disaster.
  - Weather condition.
  - Availability of medical personnel.
31. In the article *Surge Capacity Mechanical Ventilation*, the mechanical ventilation strategy for patients with ARDS includes: [January 2008;53(1):78-90]
- Peak inspiratory pressure less than 30 cm H<sub>2</sub>O.
  - Tidal volume from 4 to 8 mL/kg of predicted body weight.
  - F<sub>IO<sub>2</sub></sub> at 100%.
  - PEEP less than 5 cm H<sub>2</sub>O.
32. Which of the following statements is true based on the article by Malatino, *Strategic National Stockpile: Overview and Ventilator Assets?* [January 2008;53(1):91-95]
- The Strategic National Stockpile ventilators can be delivered within 12 hours of the federal decision to deployment.
  - Uni-Vent 754 ventilator requires an optional external PEEP valve.
  - As of November 2006, the LP10 ventilator is no longer produced.
  - The initial funding allowed purchase of 40,000 portable ventilators for the Strategic National Stockpile program.
33. The paper by Wilgis shows that stockpiling ventilators for mass casualty settings allows: [January 2008;53(1):96-103]
- Hospital staff maintains their expertise and troubleshooting skills with the ventilators.
  - Ventilators remain charged and ready.
  - Reduction in storage cost.
  - Accurate inventory control.
34. In the paper by Hanley, project XTREME describes the process to: [February 2008;53(2):176-189]
- Recruit and schedule non-clinical respiratory therapists in mass casualty scenarios.
  - Cross-train non-respiratory health care workers for medical emergencies.
  - Stockpile emergency respiratory supplies in a central location.
  - Provide triage and emergency aids to patients outside the acute care facilities.
35. According to *Ethical Issues in Resource Triage* by O’Laughlin, “do no harm” refers to the ethical principle of: [February 2008;53(2):190-200]
- Nonmaleficence
  - Autonomy
  - Beneficence
  - Justice
36. In her paper, Daugherty describes that there is no need for airborne infection isolation in caring of patients exposed to or infected by: [February 2008;53(2):201-214]
- Smallpox
  - Severe acute respiratory syndrome (SARS)
  - Anthrax
  - Pandemic influenza
37. The paper by Ritz suggests that the following oxygen devices or supplies should not be used during a mass casualty situation: [February 2008;53(2):215-225]
- Reservoir cannula
  - Oxygen concentrators
  - Portable liquid oxygen systems
  - Portable size E cylinders

38. Based on the paper by Talmor, safe and effective airway management during a mass casualty event can best be done by using a(n): [February 2008;53(2):226-231]
- A. Laryngeal mask airway
  - B. Endotracheal tube
  - C. Tracheostomy tube
  - D. Noninvasive face mask
39. According to Alves et al, what is the optimal angle that results in the highest mean pressures at most flows when using the Flutter VRP1? [March 2008;53(3):316-323]
- A. +30 degrees
  - B. +15 degrees
  - C. 0 degrees
  - D. -15 degrees
40. According to Khassawneh et al, what delivery device had the lowest incidence of improper handling among drug delivery devices? [March 2008;53(3):324-328]
- A. MDI
  - B. Aerolizer
  - C. Diskus
  - D. Turbuhaler
41. Which of the following statements accurately reflects the conclusions reached by Uzawa et al in their study evaluating ventilator user interfaces? [March 2008;53(3):329-337]
- A. Failures in the setting-change tasks were due in part to confusion with differences in ventilator-specific terminology
  - B. There was no significant difference in operation failures among ventilators in operational tasks performed
  - C. Standardization of the user interface among different ventilators is unnecessary
  - D. Participants in this study had the most trouble with alarm setting and response tasks
42. According to Salyer et al, what was the most important factor leading to the increase in use of MDI with valved holding chamber (VHC) in a pediatric hospital? [March 2008;53(3):338-345]
- A. The decrease in cost associated with MDI and VHC determined by the study
  - B. The frequent consultations by respiratory therapists with ordering physicians
  - C. The decreased length of stay associated with the transition to MDI with VHC
  - D. A default to deliver albuterol by MDI with VHC in the computerized ordering system
43. Following telerehabilitation, what outcome was evident in the patient described by Marshall et al? [March 2008;53(3):346-350]
- A. Improved pulmonary function
  - B. Elimination of supplementary oxygen
  - C. Improved exercise capacity
  - D. More frequent episodes of exercise-induced bronchospasm
44. According to Ziegler et al, what may explain the fact that there is no relationship between nutritional status and the MIP/MEP in patients with cystic fibrosis? [April 2008;53(4):442-449]
- A. The use of BMI as a measure of nutritional status
  - B. Absence of a correction factor for lung volume
  - C. Variability in the MIP/MEP measurements
  - D. The heterogeneity of the population studied
45. According to Johnson et al, which colors of sputum should be sent to the laboratory for bacteriologic analysis? [April 2008;53(4):450-454]
- I. Green
  - II. Cream
  - III. Rust
  - IV. Yellow-green
- A. I, II, and III only
  - B. I, II, and IV only
  - C. I, III, and IV only
  - D. II, III and IV only

46. According to Mikkelsen et al, why is lung protective ventilation discontinued, even when physicians initially intended to use this method? [April 2008;53(4):455-461]
- I. Diagnostic uncertainty
  - II. Failure of implementation
  - III. Therapists unable to implement technique
  - IV. Change in clinical status
- A. I, II, and III only
  - B. I, II, and IV only
  - C. I, III, and IV only
  - D. II, III and IV only
47. According to Curtis, what commonly performed procedure in the ICU was reported by > 60% of patients to be associated with severe discomfort? [April 2008;53(4):480-487]
- A. Endotracheal tube suctioning
  - B. Arterial puncture
  - C. Arterial line placement
  - D. Chest tube insertion
48. According to Martinez, what has been the trend in hospitalization rate for asthma, over the past 25 years? [May 2008;53(5):561-565]
- A. It increased in the 1980-1995 period, but decreased in the 2001-2004 period
  - B. It has remained stable
  - C. It decreased during the 1980-1995 period, and has remained stable since 2001
  - D. It has increased, due to increased severity
49. A 45 year-old patient with a 25 pack-year history of smoking presents with cough, shortness of breath, chest tightness and wheezing. According to McCormack and Enright, which of the following findings would lead to a diagnosis of asthma, rather than COPD? [May 2008;53(5):583-590]
- A. Reversible airflow obstruction following bronchodilator administration
  - B. The presence of mucoid sputum
  - C. Decreased  $D_{LCO}$
  - D. Negative bronchoprovocation
50. According to Diette et al, effective strategies for the control of dust mites include which of the following? [May 2008;53(5):602-615]
- I. Mattress and pillow encasing
  - II. Air filters
  - III. Removal of stuffed toys
  - IV. Reducing indoor humidity
- A. I, II, and III only
  - B. I, II, and IV only
  - C. I, III, and IV only
  - D. II, III and IV only

Enter the answers to the questions online at <http://www.rcjournal.com/> and click on CRCE Through the Journal—2008. The online test will be available from **August 15th to October 1st, 2008.**